TANCET TRAINING COURSE MATERIAL

MEASI
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CASE ANALYSIS

Paper I
SECTION - I ANALYSIS OF BUSINESS SITUATIONS

Directions for questions 1 – 20:
This section comprises two passages. After each passage questions consisting of items relating to the preceding passage are given. Evaluate each item separately in terms of the respective passage and choose your answer

PASSAGE – I (Questions 1 – 10)
The Shop-O-shelf Company's supermarkets are situated in Bangalore, Coimbatore and Vellore. The company is dynamic and aggressive having grown from 8 stores ten years ago to 26 today.
Kanchipuram is a town 60 miles from Vellore. It has not shown the spectacular growth of other suburbs, but its population has increased from around 56,000 to 1, 30,000 in the past decade. With no other Shop-O-Self supermarket within 20 miles of the area, Shop-O-Self Company is considering opening a store in Kanchipuram.

The Arguments against: Some Shop-O-Self executives oppose the project as a poor risk. They point to the proposed site, which is in a shopping centre three miles from Kanchipuram business district. Two other supermarket chains have failed on this site because they claim; most new residences are on the other side of the community.
Moreover, the shopping centre owners demand a five year lease. Shop-O-Self would have to try to find another business to take over the lease should its own store fail before the end of that time. If a Shop-O-Self market must be opened in Kanchipuram, it would be far better, these executives argue, to build it in the heart of the community. But they point out, another supermarket is already there.

The Arguments for: The Majority of the executives maintain that the site has great potential. A new east-west highway is being built which will pass Kanchipuram to the north and force the car commuters to Kanchipuram to pass by the shopping centre. A housing project of 3,000 units is going to be constructed nearby. The average household is expected to consist of five people with over Rs. 30,000 of income to dispose of annually.
They also argue that the centre of Kanchipuram is now congested with traffic and has extremely poor parking facilities, while there is excellent parking in the shopping centre. Investment in a new building in Kanchipuram, proper than a five year lease should the store fail.

They are not too concerned about the other supermarket in Kanchipuram. There is enough business for both. Besides, the competitor's prices are higher than shop-o-self.
They also discount past supermarket failures in the shopping centre. They claim these were caused more by poor management than by the shopping centre's being slightly off the beaten path.

The Decision: The board of directors listens to both sides and then votes to open a Shop-o-self store at the Kanchipuram shopping centre.

Directions: The questions that follow relate to the preceding passage. Evaluate, in terms of the passage, each of the item given. Then select your answer from one of the following classifications.

a. If the item is a Major Objective in making the decision: that is, the outcome or result sought by the decision maker

b. If the item is a Major Factor in arriving at the decision; that is consideration, explicitly mentioned in the passage that is basic in determining the decision

c. If the item is a Minor Factor in making the decision: a less important element bearing on or affecting a Major Factor, rather than a Major Objective directly.

d. If the item is a Major Assumption made deliberately; that is a supposition or projection made by the decision maker before considering the factors and alternatives.

e. If the item is an unimportant issue in getting to the point; that is a factor that is insignificant or not immediately relevant to the situation.

Questions

1. The residents at the projected residential development will shop in the Kanchipuram store
2. Poor management causing past supermarket failures.
3. New east-west highway.
4. Expansion of dynamic company.
5. Failure of two supermarkets due to poor site selection.
6. Establishing a new store
7. New housing development.
8. Car commuters will shop at Kanchipuram supermarket.
9. High disposable income of expected new residents.
10. Kanchipuram's prices are lower than those of competitors.

PASSAGE II (Questions 11 – 20)

In 1997 Mr. Deepak, a chemical engineer, began experimenting in his spare time with a new method for processing fresh orange juice. By 2000, he had perfected the process to such an extent that he was ready to begin production in a small way. His process enabled him to extract 18 percent more juice from oranges than was typically extracted by a pressure juicer of the type currently used in cafes. His process also removed some of the bitterness, which got into the juice from the peelings when oranges were squeezed without peeling them.

Since many of the better quality restaurants preferred to serve fresh orange juice instead of canned or frozen juice, Mr. Deepak believed he could find a ready market for his product. Another appeal of his product would be that he could maintain more consistent juice flavor than haphazard restaurant juicing usually produced. Mr. Deepak patented the process and then started production. Since his capital was limited, he began production in a small building, which previously had been a woodworking shop. With the help of his brother, Mr. Deepak marketed the juice through local restaurants. The juice was distributed in glass bottles, which proved to be rather expensive because of high breakage. The new product was favourably accepted by the public and the business proved to be a success.

Mr. Deepak began to receive larger and more frequent orders from his customers and their business associates. In 2002, he quit his regular job in order to devote full time to his juice business. He soon reached his capacity because of his inability to personally over a larger area with his pickup truck. Advertising was on a small scale because of limited funds. Faced with the problems of glass bottle breakage and limited advertisement and distribution, Mr. Deepak approached a regional food distributor for a solution Mr. Deepak was offered a plan whereby the distributor would advertise and distribute the product on the basis of 25 percent of gross sales. The distributor would assist Mr. Deepak in securing a loan from the local bank to expand the production.

Before he had an opportunity to contact the bank to borrow money, Mr. Deepak was introduced to Mr. Sunil, a plastics engineer, who produced plastic containers. Mr. Deepak mentioned his own problems in the expansion of his business. Mr. Sunil wanted to finance expended juice production with the understanding that plastic containers would be used for marketing the orange juice. He would lend the money interest free, but he was to receive 40 percent of the net profits for the next ten years.

Distribution and advertising agent for 25 percent of gross sales. The principal on Mr. Sunil's invested money was to be repaid by Mr. Deepak on a basis of 10 percent of his share of the profits. Mr. Sunil was to retain an interest in the profits of the firm until the loan was repaid, or at least for ten years.

Mr. Deepak's current sales were 10,000 litres of juice a month. If distribution could be expanded, sales could be doubled, given the potential demand. Of the possible total sales of 20,000 a month, about 75 percent would be sold to large restaurants and the reminder to small cafes and canteens. As soon as the juices were bottled in plastic containers, sales could also be made to household consumers. Mr. Deepak was very optimistic that sales to the final consumer through retail shops would succeed. Some initial contacts were made with a local manager of a food chain supermarket. The manager was sure that he could sell 4,000 litres a month through his outlets.

Mr. Deepak also calculated his potential profits. His goal was to increased sales while at the same time earning a 10 percent rate of return on his prior capital investment in equipment and other assets. The present value of Mr. Deepak's investment was Rs. 2,50,000. Of this sum, machinery and equipment were valued at Rs. 1,00,000; building was worth Rs. 50,000 and his patent and know-how were valued at Rs. 1,00,000. On the basis of this evaluation, Mr. Deepak desired a return of Rs. 25,000 above salaries and other expenses after the first year of operation.

Both the regional distributor and Mr. Sunil believed that Mr. Deepak's sales could be increased to 15,000 litres of juice per month by the end of the first year of expanded operations. However, the extent to which production could be expanded to meet demand depended on the availability of plastic containers (which would be supplied at factory cost under Mr. Sunil's proposal), and additional machinery. Increased market coverage would be obtained both under the regional food distributor and Mr. Sunil's proposals. The critical deciding factor, as Mr. Deepak understood, was which plan would maximize his return on investment beyond the minimum figure of 10 percent.

Directions: The questions that follow relate to the preceding passage. Evaluate, in terms of the passage, each of the item given. Then select your answer from one of the following classifications.

a. If the item is a Major Objective in making the decision: that is, the outcome or result sought by the decision maker

b. If the item is a Major Factor in arriving at the decision; that is consideration, explicitly mentioned in the passage that is basic in determining the decision

c. If the item is a Minor Factor in making the decision: a less important element bearing on or affecting a Major Factor, rather than a Major Objective directly.

d. If the item is a Major Assumption made deliberately; that is a supposition or projection made by the decision maker before considering the factors and alternatives.

e. If the item is an unimportant issue in getting to the point; that is a factor that is insignificant or not immediately relevant to the situation.

11. Cost of securing a loan
12. High breakage rate of glass bottles.
13. Expansion of the business
14. Continued demand by the public for Mr. Deepak's orange juice
15. Possibility of doubling sales through expanded distribution
16. Previous use of Mr. Deepak's building as a woodworking shop
17. Ten percent return of investment
18. Small scale of current advertising
19. Value of patent held by Mr. Deepak.
20. Mr. Deepak's current level of sales.

Answer Key

1. (d)	2. (e)	3. (c)	4. (a)	5. (c)	6. (a)	7. (b)
8. (d)	9. (b)	10. (b)	11. (b)	12. (b)	13. (a)	14. (d)
15. (b)	16. (e)	17. (a)	18. (c)	19. (c)	20. (d)	

Paper II

SECTION - I ANALYSIS OF BUSINESS SITUATIONS

Directions:

This section comprises two passages. After each passage questions consisting of items relating to the preceding passage are given. Evaluate each item separately in terms of the respective passage and choose your answer

PASSAGE – I (QUESTIONS 1 - 20)

FSL was a food manufacturing company established in 1945. Until 1995 its major products consisted of tomato specialties such as pickles and barbecue sauces. Its consumer products business accounted for 40% of sales; the balance consisted of

sales to restaurants, hospitals and armed forces. The company has advertised for restaurant, hospital market but never for household consumers.

In 1995, the company introduced products meant for consumer market. The line was composed of a number of dishes. Each package contained all of the necessary ingredients (except meat) including seasoned tomato sauce, cheese and noodles.

Jagdish, son of the company's president, had conceived the idea for the line of products. Jagdish's enthusiasm for the product was quickly picked up by other executives. The financial expert wanted expansion would enable the company to solve a number of financial problems associated with its inability to attract outside capital.

Many meetings were held through the summer. The original thinking of the committee was that the product line should be introduced at the beginning of the food merchandising season, which started on about October

1. This deadline however, subsequently proved to be unrealistic. Production of the first items in the line did not get underway until September 30 and packaging difficulties prohibited introducing product before mid-December.

In July the problems involved in the product introduction were not foremost in the planner's thoughts. Many hours were spent on discussing the name of the product. Finally, the name Vegetable Scotch was adopted but without enthusiasm from the president's son who believed that a name did not express the gourmet image that he thought the name should express. With the exception of the name this man directed most of the decisions related to the marketing program. From the beginning he argued that there were already plenty of middle class products on the grocer's shelves. What was needed, he believed, was a prestige-even a "gourmet'- line. The popularity of expensive restaurants in cities convinced young manager of the opportunity to market these food specialties.

Early in the planning it was decided to limit distribution to the regional markets in which this company had previously established its reputation. National distribution would be undertaken from the beginning. It was planned that preparation would be marketed in all major food chain and headquarters would be made by food brokers handling such products rather than brokers used to handling goods.

For the first time in its experience, FSL planned to undertake an extensive consumer - advertising programme. A small advertising agency in Delhi with slight experience in handling food products was appointed. However, by the time the agency has been selected and oriented to the marketing programme, the time remaining before the scheduled introduction did not allow for the preparation of advertisements or sponsored programmes on TV. In order to break into the consumer market at the time of product introduction on October 1st a consumer - advertising programme using newspaper, television

commercials and radio was prepared. Except for the product introduction period, however, relatively little thought was given in planning sessions to the total amount money required to support the product with consumer advertising.

A number of circumstances combined to prevent the introduction in October as originally planned. No one has taken personal responsibility for package design and production was held up for three weeks while the company waited for supplies of packaging materials. FSL was forced to move very rapidly to obtain a package, but the result was neither very well designed nor attractive from a promotional point of view. Time was short, however, and there was no choice but to use this package or abandon the project for the present season and possibly altogether, depending upon competitive conditions.

A hastily put together advertising campaign was introduced in November. However, advertising cost had been greatly under estimated, that the intensity of the campaign was much lower than the manager had anticipated, even with the limited budget. As a result, most of the budget was allocated to newspapers and radio.

Moreover, problem of writing of the script of the TV commercial delayed broadcasting until the beginning of December. Newspaper advertisements and Radio commercials did commence as planned.

The new product was finally launched in mid - December. However, by February, two major competitors began marketing similar products. Shortly thereafter the company to determine whether the product made a favourable impression sponsored a market research survey on housewives. The result of the survey was negative. Only twenty-two percent of the housewives interviewed could recall the name and those only twelve percent had tried the product. Consumer evaluation of the product was for the first time, only four percent stated that they would but again.

Another indication that worried the company's management was that few major food chains showed interest. By midyear product sales were so poor that management established a special committee to determine without delay what immediate steps might be taken to reverse the poor sales record.

Directions: The questions that follow relate to the preceding passage. Evaluate, in terms of the passage, each of the item given. Then select your answer from one of the following classifications.

a. A Major Objective in making the decision: one of the goals sought by the decision.

b. A Major Factor in making the decision: an aspect of the problem, specifically mentioned in the passage that fundamentally affects and / or determines the decision.

c. A Minor Factor in making the decision: a less important element bearing on or affecting a Major factor, rather than a Major objective directly.
d. A Major Assumption in making the decision: a projection or supposition arrived at by the decision maker before considering the factors and alternatives.
e. An Unimportant issue in making the decision: an item lacking significant impact on, or relationship to, the decision.

1. Possibility of using existing production facilities in manufacturing new products.
2. Likelihood of achieving wide consumer acceptance of the new products.
3. Company's growth and expansion.
4. Age of FSL
5. The popularity of high priced restaurants in the country.
6. Depth of company's experience and expertise in the sale of consumer products.
7. Market survey results
8. Size of the advertising agency hired to promote the product.
9. National distribution of the product.
10. Company's inability to attract outside capital.
11. Difficulties with new package design.
12. Need for this new food line
13. Market entry of competitors.
14. Obtaining packaging materials.
15. Introducing the new product in October 1st.
16. Interest of major food chains in the product.
17. Scripting of T.V. commercials.
18. Introduction of new product line
19. Developing products as fast as possible.
20. Marketing ability of the company.

PASSAGE – II (QUESTIONS 21 - 30)

Coirfoam, a small company producing foam rubber mattresses, was in financial trouble, and its owners wanted to sell it. The company had been established some twenty years age, but its market share had steadily declined over the last five years. Since Mr. Krishnan had no previous experience in the mattress business, he requested his friend to tell him what he could do about it.

His friend analysed the company's resources. Their best resource was its product and brand name. However, synthetics are much cheaper than foam rubber mattresses. Latex mattresses are known for their orthopedic and anti allergic qualities, among others. The Coirfoam brand name had very nearly become a generic term for all types

of rubber mattresses. Coirfoam however was the only latex mattress produced locally.

Apart from a superior product, the company had few resources. Its equipment, though satisfactory, was old. It operated in leased praises on a year to year basis, although the landlord was willing to conclude a long term agreement on favourable terms. On the other hand the company's labour force was experienced and dedicated ad its production manager had more than ten year's experience in lated manufacturing. The Chairman of the company was seventy years old and wanted to retire. Apart from the sales manager, no one else shared responsibility for marketing or administration. He told Krishnan's friend that if the company was sold, he had no intensions of remaining in service, he had eighteen years of experience in mattress industry. if the sales manager left the company Krishnan might not find a suitable replacement.

This was another issue that Krishnan's friend had to study.
Coirfoam's financial position was precarious. The company was heavily in debt and its line of credit fully extended. There was some question as to purchase enough latex to keep production going, but the manager assured, that the company had a bank letter of credit to purchase additional month's supply. In spite of the chairman's optimism, the fact was that his company had steadily lost market share once the dominant mattress manufacturers, with fifty percent of local market, its market share had declined to less than 10 per cent. The chairman attributed this decline to popularity gained by spring mattresses manufacturers, who had only begun production five years ago. Spring mattresses now accounted for seventy percent of the total market, another company ten percent, with remaining twenty percent shared by a number of small plants producing synthetic rubber mattresses. Spring mattresses had some attributes similar to those of foam rubber, such as orthopaedic qualities. They were less costly to manufacture but sold to customers at about the same price as Coirfoam.

Because of Coirfoam's financial difficulties, it creased advertising in Newspaper and on radio for over the past five years. As a result, retailers were reluctant to handle the product. In contrast to it two spring manufacturers had advertised heavily in the mass media. One of these manufacturer's products was sold exclusively by the largest furniture chain. During his study of the mattress market, a number of retailers had expressed the opinion to Krishnan's friend that a whole generation of young people largely unaware of the Coirfoam product because of lack of advertising. One retailer was quoted saying. "It is true that older people remember Coirfoam, but these

mattresses last for twenty years. The big market is not the replacement market, but sales generated by family formation. Thousands of young couples get married every year and ever marriage means another mattress sale. It is obviously easier for my salesman to sell a mattress which his customers have seen in countless advertisements that one which is relatively unknown".

Krishnan's friend was aware of the fact that if Coirfoam was ever to regain some of its lost market share, it would have to launch a major advertising programme to educate young adults about the important attributes found in its products. A major question that needed an immediate answer was: "To what extent are people aware of Coirfoam mattresses and their attributes?" Other questions involved the attitudes of people toward spring mattresses in general and how these attitudes compared to those towards spring mattresses. Krishnan's friend ordered a market research survey to obtain answers to his questions. In brief, the study of Coirfoam mattresses showed that customers over twenty five years of age who were aware of Coirfoam mattresses had favourable attitudes towards their attributes. About three quarters of these people expressed a preference for foam rubber mattresses for their children (by contrast with other mattresses for their own use). Awareness among younger segments of the population of the attributes of foam rubber mattresses in general and Coirfoam in particular; was very low. Few people expressed an intention to buy foam rubber mattresses.

On the basis of the preliminary research Krishnan was optimistic that he could turn the company around. In support of his brief, he sighted the recognition of the company among a significant portion f the population, and the fact that they would buy a Coirfoam for their children. He believed that once retailers became aware that new management had taken over the company, they would be willing to stock the product. Krishnan was aware that the research findings were not always in agreement with his conclusions. However, the findings that young people were relatively unaware of coirfoam did not seem to worry him. He felt that well designed advertising programme could convince many people to buy a foam rubber mattresses, rather than any competing type. Moreover, the introduction of a new management team would instill confidence among Coirfoam bankers, credit lines would be increased thereby improving the company's financial position. However, before making a final decision as to whether to purchase Coirfoam, Mr. Krishnan waited for his friend's final report and recommendations.

Directions: The questions that follow relate to the preceding passage. Evaluate, in terms of the passage, each of the item given. Then select your answer from one of the following classifications.

a. A Major Objective in making the decision: one of the goals sought by the decision.

b. A Major Factor in making the decision: an aspect of the problem, specifically mentioned in the passage that fundamentally affects and or determines the decision.

c. A Minor Factor in making the decision: a less important element bearing on or affecting a Major factor rather than a Major objective directly.

d. A Major Assumption in making the decision: a projection or supposition arrived at by the decision maker before considering the factors and alternatives.

e. An Unimportant issue in making the decision: an item lacking significant impact on or relationship to, the decision.

Questions:

21. Public awareness of the high quality of Coirfoam mattresses.
22. The anti allergic qualities of Coirfoam mattresses.
23. Attitude of older consumer towards Coirfoam mattresses
24. Willingness of retailers to stock Coirfoam products in the future.
25. Need to import latex rubber
26. Coirfoam's present market share.
27. Krishnan's friend's recommendations.
28. Coirfoam leased its premises.
29. Plausibility of changing consumer attitudes through advertising.
30. The Chairman's explanation for loss of market share

Answer Key

1(b) 2(d) 3(a) 4(c) 5(e) 6(c) 7(b) 8(e) 9(e) 10(c) 11(c) 12(b) 13(b) 14(e) 15(a) 16(b) 17(c) 18(b) 19(a) 20(d) 21(b) 22(b) 23(b) 24(b) 25(b) 26(e) 27(c) 28(b) 29(d) 30(e)

Paper III

SECTION I - ANALYSES OF BUSINESS SITUATIONS

Directions:

There are two passages in this Section. After each passage questions consisting of items relating to the preceding passage are given. Evaluate each item separately in terms of the respective passage and choose your answer as per the following guidelines:

1. If the item is a MAJOR OBJECTIVE in making the decision; that is the outcome or result sought by the decision maker.
2. If the item is a MAJOR FACTOR in arriving at the decision; That is consideration, explicitly mentioned in the passage that is basic in determining the decision.
3. If the item is a MINOR FACTOR in making the decision: a less important element bearing on or affecting a Major Factor, rather than a Major Objective directly.
4. If the item is a MAJOR ASSUMPTION made deliberately; that is supposition or projection made by the decision maker before considering the factors and alternatives.

FIRST PASSAGE

Mr. Edward Corn, a building contractor by profession, met with a na old friend, Mr. Ratan Dutt, a marketing consultant. Mr. Corn was excited about a business opportunity and wanted to obtain Dutt's evaluation of its prospects. Formomat, a small company producing foam rubber mattresses was in financial trouble, and its owners were anxious to sell it. The company had been established some twenty years, but its market share had steadily declined over the last five years. Since Mr. Corn had no previous experience in the mattress business, he requested that his friend to find out what he could about the company.

Mr. Dutt first analysed the company's resources. Its best resource was its product and brand name. Foam rubber mattresses are made of imported latex and are extremely firm, unlike synthetics are much cheaper than foam rubber mattresses. Latex mattresses are known are known for their orthopaedic and anti-allergic qualities among others. The Formomat brand name had very nearly become a generic i=term for all types of rubber mattresses. Formomat, however, was the only latex mattress produced locally.

Apart from a superior product, the company had few resources. Its equipment, while satisfactory, was old and had been fully depreciated. It operated in leased premises on a year-to-year basis, although the landlord was willing to conclude a long term agreement on favourable terms. On the other hand, the company, the company's labour force was experienced and dedicated and its production manager had more than ten years' experience in latex manufacturing.

Mr. Joe Davies, President of the company, was past seventy years-old and was anxious to retire. He had tried to retire previously, but had failed to train a successor. Apart from Gordon Frederick, the sales manager, no one else shared responsibility for marketing or administration. Gordon Frederick had eighteen

years' experience in the mattress industry, including twelve years with Formomat. If Frederick left the company, Corn might be hard pressed to find a suitable replacement. This was another issue that Ratan Dutt would have to study.

Formomat's financial position was precarious. The company was heavily in debt and its line of credit fully extended. There was some question as to whether the company would be able to purchase enough latex to keep production going, but Mr. Davies assured Ratan Dutt that the company had a bank letter of credit to purchase an additional three month's supply.

In spite of Mr Davis optimism the fact was that his company had steadily lost market share. Once a dominant mattress manufacturer with 50% of the local market, its market share had now declined to less than 10%. Mr Davis attributed this decline to inroads made by spring mattress manufacturers who had only begun production 5 years ago. Spring mattresses. Spring Mattresses had quickly claimed a substantial 70% share of the total market, leaving Davies's company 10% with the remaining 20% shared by many number of small plants producing synthetic rubber mattresses. Spring mattresses had some attributes similar to those of foam rubber, such as orthopedic qualities. They were less costly to manufacture, but sold to the consumer at about the same price as Formomat mattresses.

Because of format financial difficulties, it ceased advertising in Newspapers and radio. Little if any advertising had been done in other media over the past five years. As a result, retailers were reluctant to handle the product line. By contrast, two of the larger spring mattresses manufacturers had advertised heavily in the mass media. One of these manufacturer's products was sold exclusively by the largest furniture chain in the country. During his study of the mattress market, a number of retailers had expressed the opinion to Mr. Dutt that a whole generation of young people were largely unaware of Formomat products because of the lack of advertising. One retailer was quotes as saying: "It is true older people remember Formomat, but these mattresses last for almost twenty years. The big market is not the replacement market, but sales generated by family formation. Thousands of young couples get married every year, and every marriage means another mattress sale. But thse young people only see advertisements for spring mattresses. It is obviously easier for my salesman to sell a mattress which his customers have seen in countless advertisements than one which is relatively unknown."

Dutt was aware of the fact that if Formomat was ever to regain some of its lost market share, it would have to launch a major advertising program to educate

young adults about the important attributes found in its products. A major question that needed an immediate answer was: “To what extent are people aware of Formomat mattresses and their attributes?” Other questions involved the attitudes of people toward foam rubber mattresses in general and how these attitudes compared to those towards spring mattresses. Mr. Dutt ordered a market research survey to obtain answers to his questions. In brief, the study revealed that a large segment of the population over twenty fine years of age was aware of the Formomat mattresses and had favourable attitudes towards their attributes. About three-quarters of these people expressed a preference for foam rubber mattresses for their children (by contrast with other mattresses for their own use). Awareness among younger segments of the population of the attributes of foam rubber mattresses in general, and of Formomat in particular, was very low. Few young people expressed an intention to buy foam rubber mattresses.

On the basis of the preliminary research result, Corn was optimistic that he could turn the company around. In support of his belief, he cited the recognition of the company among a significant portion of the population, and the fact that they would buy a Formomat for their children. He believed that once retailers became aware that new management had taken over the company, they would be willing to stock the product. Corn was aware that the research finding were not always in agreement with his conclusions. However, the finding that young people were relatively unaware of Formomat did not seem to worry him. He felt that a well-designed advertising program would convince many people to buy a foam rubber mattress, rather than any competing type. Moreover, the introduction of a new management team would instil confidence among Formomats bankers. Credit lines would be increased, thereby improving the company’s financial position. However, before making a final decision as to whether to purchase Formomat, Mr. Corn waited for Ratan Dutt’s final report and recommendations.

Questions:

1. Public awareness of the high quality of Formomat mattresses
2. The anti-allergic qualities of Formomat mattresses
3. Attitude of older consumers towards Formomat mattresses.
4. Willingness of retailer to stock Formomat products in the future.
5. Fommat’s present market share
6. Ratan Dutt recommendatisons.
7. Plausibility of changing consumer attitudes through advertising.
8. Orthopedic qualities of Frommat mattresses.
9. Frederick’s intention to leave.
10. Likelihood that credit lines could be increased.

Answers:

1. 2
2. 2
3. 2
4. 2
5. 3
6. 3
7. 4
8. 2
9. 3
10. 4

Passage II

More Western firms are filling their executive positions with locals. Foreigners with no Asian experience need not apply. Forget expats. Western companies doing business in Asia are now looking locals to fill the most important jobs in the region.

Behind the switch, experts say, are several factors including a levelled playing field in which Western companies must approach newly empowered Asian companies and consumers as equals and clients - not just manufacturing partners.

Companies now want executives who can secure deals with local businesses and governments without the aid of a translator, and who understand that sitting through a three-hour dinner banquet is often the key part of the negotiating process in Asia, experts say.

In fact, three out of four executives hired in Asia by multinationals were Asians natives already living in the region, according to a September Stuart analysis of 1,500 placements made from 2005 to 2010. Just 6% were noncitizens from outside of Asia.

"It's a strategic necessity to be integrated in the culture. Otherwise, the time to learn all of it takes forever,' said Arie Y. Lewin, a professor of strategy and international business at Duke University's a Fuqua School of Business. He adds that locals may better navigate a business culture where copycats and competitors often play by different rules.

What's more, a failed expatriate hire can be a costly mistake and slow a firm's progress in the region, said Phil Johnston, a managing director at recruiter Spencer Stuart.

To help companies fill Asia-based executive roles, at least two search firms-Spencer stuart and Korn/Ferry International-say they have begun classifying executives in four categories: Asia natives steeped in local culture but educated in the-U.S. or Europe; the foreigner who has lived or worked In Asia for a long time; a person of Asia descent who was born or raised in a Western country but has little exposure to Asia; and the local Asian executive who has no Western experience.

For companies seeking local expertise, both firms said the first category is by far the most sought-after. But Mr. Johnston said those candidates are difficult to find and

retain, and they can command salaries of $750,000 to $1 million on par with, and sometimes more than, their expat counterparts.

German Conglomerate Siemens AG in 2010 hired Mei Wei Chen a China-born Cornell University graduate, to head its Chinese operations a role previously held by European executives.

While Siemens's European executives had made inroads with Chinese consumers-building sales in the region to nearly one-tenth of global revenue-the firm realized that it needed someone who could quickly tap the local business partners.

After an extensive search, Siemens hired Mr.Cheng, formerly CEO at the Chinese subsidiaries of Ford Motor Co. and General Electric Co.

The decision to hire locally seems to have paid off for Siemens: In his first 18 months on the job, Mr.Cheng forged two wind-power joint ventures with Shanghai Electric Group Co.

Mr.Cheng communicates easily with local officials, a major advantage when it comes to selling energy technology to individual cities, says Brigitte Ederer, head of human resources for Siemens and a member of the company's managing board. Many local officials don't speak English.

Bob Damon, president of recruiter Korn/Ferry International's North American operations, said the current talent pool for executive roles is so limited that most top Asian executives simply rotate from one Western company to another, as Mr.Cheng did. Other companies are adding to the demand by creating new positions in Asia.

Campbell Soup Co. last week announced the appointment of Daniel Saw as its first-ever president of Asia operations, while Canadian conglomerate Bombardier Inc. hired Albert Li to fill a new role overseeing its aerospace business in China. Both executives were born in Asia and have worked as regional managers for Western multinationals.

Meanwhile, younger Chinese professionals are positioning themselves to meet the need for executive talent in the years to come. Nearly four in 10 American M.B.A. programs say China was their fastest-growing source of foreign applicants last year, according to the Graduate Management Admission Council, which administers the Graduate Management Admission Test.

Foreigners with no Asia experience, on the other hand need not supply, recruiters said. Spencer Stuart's Mr. Johnston said he occasionally receives inquiries from Western middle managers, proclaiming that they are finally ready to make a career

move to the region. He advises them that "there is nothing about the experience that is interesting or relevant to Asia.

In hubs like Singapore and Hong Kong, expats receive as much as $200,000 a year in subsidies for housing, transportation and private schooling. Mr. Johnston said Payments offset taxes for these benefits add up to another $100,000. Altogether, a bad match can cost a company as much as $1 million, after figuring in relocation costs, he said.

Monster Worldwide Inc. Chief Executive Sal lannuzzi said the company has been hiring locally for several years, in part because he found deploying expatriates cost too much. "It takes them six months to figure out how to take a ferry, they're there for 12 months, and then they spend the next six months figuring out how to get home," he said.

Like some other companies, Monster now tracks its own workers to ensure a pipeline of talent.

The online job-search company's current head of China operations, Edward Lo, a former fraternity brother of Mr. lannuizzi, understands the local scene, is well connected in China and knows how to recruit, Mr. lannuzzi said.

Among Mr. Lo's duties: finding his own successor before he retires.

Starwood Hotels & Resorts Worldwide Inc., based in White Plains, N.Y., also develops its own leaders for Asia, plucking people who have come up through the company ranks. For example, the head of Asia Pacific started in the 1970's, on the finance team in Hong Kong, and the head of the Middle East region was a hotel manager who worked his way up. Having grown up in their markets, managers understand—Customer needs, said Starwood CEO rits an Paasschen Regional heads in China, for instance, know that when dealing with land owners or developers, deals are less "transactional", and more "trust- based," he said. They also know that Chinese travellers — who now comprise the majority of hotel guests in the region — feel more at home when they are supplied with tea kettles, slippers and chopsticks, he added.

For fast food company Yum Brands Inc., CEO David Novak calls his Asia-bred regional head and executive team 'our single biggest competitive advantage." China has become the company's biggest earnings driver, comprising more than 40% of operating profit. Thanks to Yum's China leaders, Mr.Novak says, KFC in China began serving rice porridge and soy milk for breakfast, and Pizza Hut now offers an afternoon tea menu-both of which have been big hits among local customers.

Questions:

1. Western companies must approach newly empowered Asian companies as equals.

2. Executives positions of Western firms to be filled with locals.
3. Asian executives can secure deals with local business and governments.
4. Foreigners with no Asian experience are not required.
5. Recruitment of Asian executives is a strategic necessity.
6. Locals may better navigate a business culture.
7. Asian natives steeped in local culture but educated in the U.S. or Europe are most sought after.
8. Local could quickly tap local business partners.
9. Many local officials don't speak English.
10. Most top Asian executives simply rotate from one Western company to another.
11. Campbell Soup Co. last week announced the appointment of Daniel Saw as its first-ever president of Asian operations.
12. China was the fastest growing source of foreign applicants for the top 10 American M.B.A. programs.
13. Foreigners with no Asia experience, on the other hand, need not apply.
14. Mr.Johnson advises that "there is nothing about their experience that is interesting or relevant to Asia.'
15. Employing expatriated cost too much.
16. Canadian Conglomerate Bombardier Inc. hired Albert Li to fill a new role overseeing its aerospace business in China.
17. Having grown up in their markets, managers understand customer needs.
18. Business dealings by natives are less 'transactional' and more 'trust-based'
19. Hiring Asia-bred regional leads is the single biggest competitive advantage.
20. China has become the biggest earning driver for Yum Brand Inc.

Answers:

1. 2	6. 4	11.5	16.3
2. 1	7. 2	12.3	17.4
3. 4	8. 4	13.2	18.2
4. 2	9. 2	14.3	19.2
5. 1	10.3	15.2	20.2

Paper IV

SECTION I - ANALYSES OF BUSINESS SITUATIONS

Directions:

This section comprises two passages. After each passage questions consisting of items relating to the preceding passage are given. Evaluate each item separately in terms of the respective passage and choose your answer as per in the following guidelines.

1. if the item is a MAJOR OBJECTIVE in making the decision; that is, the outcome or result sought by the decision maker.
2. if the item is a MAJOR FACTOR in arriving at the decision; that is consideration, explicitly mentioned in the passage that is basic in determining the decision.
3. If the item is a MINOR FACTOR in making the decision; a less important element bearing on or affecting a Major Factor, rather than a Major Objective directly.
4. If the item is a MAJOR ASSUMPTION made deliberately; that is a supposition or projection made by the decision maker before considering the factors and alternatives.
5. If the item is an UNIMPORTANT ISSUE in getting to the point; that is a factor that is insignificant or not immediately relevant to the situation.

PASSAGE 1

The Parks Company, located in New York City, had engaged exclusively in the manufacture of baking powder for seventy five years since its founding. Sales were approximately $ 800,000 annually. The sales volume, measured in commodity units instead of dollars, had showed a decline of about 11 percent over the past decade. The company had a small office force and employed approximately 50 people in the production process, which was divided into (l) the mixing department, (2) the assembly department, and (3) the final inspection and packing department.

In 1935, distribution had been foreign as well as national. Forty years later, the sale of the product was confined to New England and the Middle Atlantic states. Mr. Andrew H. Pendler, the president, attributed this significant decrease in both market area and sales volume to high tariff rates, sterner competition, and trade dislocations caused by World War II.

Mr. Gordon Janis, the sales manager, after studying the market closely, arrived at a different set of reasons why sales had been dropping. In the first place, according to Janis, sales to commercial consumers had diminished to practically nothing. Many modern bakeries bought the necessary chemicals and manufactured their own baking powder. Secondly, the population had become urbanised. Formerly, when a larger portion of the citizenry was suburban, many housewives had done

their own baking. People in cities were close to bakeries and other outlets where they could buy the finished product, and improved transportation had enabled fresh bakery products to be readily available at retail outlets. The third reason which Mr. Janis considered significant was the growing popularity of ready-mixes. The natural tendency of practically all human beings is to get as much as they can for a minimum of effort. Since ready-mixes did save housewives a good deal of labour, this type of product had been well received. Mr. Janis believed that the company could not cope with the first two factors, and therefore his suggestion for increasing sales was to branch out and manufacture ready-mix baking products which would compare favourably with nationally-known brands. Management was particularly receptive to Jani's idea because production of readymixes would require only minor changes in personnel and the cost of additional machinery would be relatively small. Two additional machines were necessary, each costing approximately $10,000.

Mr.Pendlar was determined to succeed in the marketing of the new products. He believed that a thorough market analysis was a prerequisite to making a final decision as to whether Jani's idea was commercially sound. Pender wanted to know whether a small company like Parks could battle for a share of the ready-mix market against much bigger competitors. His concern centred on two key variables. First, he questioned the ability of his marketing people to develop a product which would be sufficiently differentiated from competitor's products. Parks would have to market a product which had some distinct advantage over competing products. This advantage could be in the form of an improvement over existing brands, for example, a mix that was easier to prepare. Second, a strong advertising campaign was necessary to enter the market with an unknown product. Potential consumers would have to be made aware of the new brand and its advantages. Pendler wanated to know how much such an advertising campaign would cost and whether the company had the financial resources to finance it.

Janis was given the task of preparing a marketing research report which would provide answers to Pendler's questions. Graduate students were hired to poll housewives as they entered supermarkets. Each student questioned a number of housewives about their purchases of ready-mixes, how frequently they used the products, what they liked and/or disliked about the mixes. Respondents were also asked to recall any advertising they remembered about ready-mixes. After about fifty interviews, Janis believed that he had collected enough information to reach certain conclusions.

Janis tabulated the research data and found the following trends. Most housewives said that they purchased ready-mixes and preferred to prepare their own cakes, rather than buy them from a bakery or supermarket. Housewives felt that ready-

mixes were preferable to commercially prepared cakes because of their freshness and economy. In particular, respondents liked the convenience of being able to bake a cake "in an emergency" if unexpected company came to visit. Other reasons mentioned for preferring rady-mixes were: "Tastes fresh," "modern thing to do," "my neighbours use it," and "I can choose some of the ingredients."

Few respondents using ready-mixes mentioned any dislikes. Some of the negative reactions mentioned were: "Lack of recipe variety," "my husband doesn't like them," and "all the mixes are the same." Most of the housewives polled recalled seeing some advertising for ready-mixes during the last week. Half of the respondents recalled specific advertising themes of the major producers. Overall reaction to the advertising was favourable.

Examining the survey results, Janis concluded that Parks should market a ready-mix of its own. He reasoned that since consumer reaction was so favourable, there was room in the market for another brand. Janis recommended, however, that since the research did not reveal how Parks might difference its product from those already on the market, the best marketing strategy would be to charge a lower price than that of competing products. With a lower price, he asserted, Park's ready-mix would sell well to the economy-minded housewife.

Advertising was a problem. It was clear that, given the relatively small marketing budget available to Janis, Parks could not emulate the sort of advertising campaign used by existing ready-mix manufacturers. Janis believed that if Parks would concentrate solely on the economy-minded market segment, advertising themes could be developed and a campaign launched within the company's budget constraints. Janis's report and conclusions were forwarded to Mr. Pendler. After a short deliberation, Pendler approved the ready-mix project.

Without further investigation, the manufacture of Park's ready-mixes was started. After several months, rady-mix sales still amounted to. less than 10 percent of gross sales, and 85 percent of ready-mix sales were in New York City. The entire position of the company was in jeopardy. Both Mr. Pendler and Mr. Janis were worried about the business, but neither seemed to know what to do.

Questions:

1. Declining sales volume.
2. New York City location of Parks Company.
3. Production of successful ready-mix baking product.
4. Urbanisation of the population.
5. Start-up costs for development of ready-mix product.
6. Differentiation of Park's ready-mix from competing products.
7. Specific advertising themes recalled by shoppers being interviewed.
8. Park's ability to compete with bigger companies.

9. Number of housewives interviewed for marketing survey.
10. Cost of Park's advertising campaign.

PASSAGE II

The Allied Industrial Rubber Company is a multinational corporation which is based in the United States with additional plants in Africa and Brazil. Sales have been increasing to levels exceeding one billion dollars. Production has gone up and the corporation itself is doing well. All plants concerned have responsible, intelligent management and employees so that labour relations. public relations and basic operations have run smoothly. The plants in America and Africa are managed by Americans, while the plant in Brazil is managed by Brazilian nationals.

Allied had been conducting extensive economic scanning. This entailed the use of standard economic measurement to provide a general comparison of the possibilities of different countries for setting up another firm. The firm had studied India for quite some time, and it was-believed that India had the potential needed to become a site for an Allied plant. India had been considered because rubber is readily available and plentiful in supply, and is easily extracted. Jobs are scarce in India and thus cheap labour is available. The plant would offer a chance for many in the Indian population to better themselves and earn money from jobs supplied by the company.

After closer examination, the Allied Company decided to invest in India. After seven months the factory is nearing completion. It has already been decided that the labour force will be recruited from the native Indian population. Whether managements-level, positions will be filled by Americans or Indian nationals has not yet been decided.

Of course as with all foreign investments, requirements of the host country have to be considered and dealt with. Few regulations were specified as to the country from which managerial candidates would be selected. The consensus managerial candidates would be selected. The consensus at Allied was that the majority of managerial jobs would be filled by either Indian nationals or American expatriates. It was decided that an even split would have the possibility of causing great internal conflict between management personnel. It is a well-known fact that European companies favour centralised control of operations by a select group of key executives. This gives precedence to a functionally oriented organization structures. In the United States, on the other hand, companies favour a decentralized decision-making type of structure. However, in United States firms, there seem to be stricter control devices. However, whatever organization is selected, the company must remember that management must be amenable to the traditions and expectations of the labour force. If not, conflict may occur which will result in labour management

strife. Faced with the problem of how to select management, the Allied Industrial Rubber Company felt it was necessary to examine both the pros and the cons of hiring from either population. This was done through review of their two foreign plants in Africa and Brazil.

Allied's experience with American expatriate managers was examined first. Allied's African subsidiary, which has been operating successfully for the past six years, has Americans in key managerial positions. The pros of hiring Americans for managerial positions in Africa have been many. First and foremost, Allied has always felt more comfortable with American managers, because Allied is an American-based company. Another advantage has been that Allied has been able to transfer expatriate managers wherever and whenever necessary.

Hiring Americans has also been essential for the transfer and proper applications of Allied technology. This has enabled Allied to receive maximum feedback from its plant. It has also provided a training ground for inexperienced, young executives. American expatriate managers have "the advantage of gaining years of experience in a different and difficult \ environment. Also, by employing Americans, the company has eliminated the language barrier between subsidiary managers and those at the home base. Because of this, the geographic gap separating them has been narrowed. American expatriate managers seem to be more motivated and loyal. All of these qualifications are necessary for the successful operation of Allied. A final benefit of the use of expatriates has been elimination of the training sessions on company operations which these managers have already received in the United States.

Despite these advantages, there have been disadvantages to contend with. One major disadvantage has been the high costs of transferring Americans to Africa. Numerous incentives were necessary to lure them abroad. All costs of relocating were the firm's responsibility. The firm paid for transportation overseas, transportation while in Africa, housing, and domestic services, and provided a liberal expense account. In addition to this, managers were compensated by an increase in their base salary and a hardship premium.

An ever bigger problem has been the cultural gap these managers and their families have experienced. Friends and relatives had to be left behind. Establishing new ties has been difficult because of the language barrier. There appears to be higher rate of alcoholism, especially among the women, and rates of divorce also seem abnormally high. Furthermore, managers who returned to America had to take an unwelcome cut in salary. The managers remaining in Africa felt insecure with their position in the firm because of extended periods of time away from the home base. Allied operations in Brazil have been relatively successful. Although Allied (Brazil) has been in operation for only four years, the use of Brazilian management has proved to be successful.

One of the major advantages of employing Brazilian managers has been the savings in costs through lower national salary levels. By offering salaries" slightly above these low levels, Allied has succeeded in attracting brighter, more experienced people. On the average, this salary has been lower than what Allied would have had to pay an expatriate manager at the same level of expertise.

Through using Brazilian managers, Allied has eliminated the need for cross-cultural training and, of course, there is no language barrier between them and the other employees. These managers have also provided continuity of leadership for the past four years and presumably will do so for many more since the opportunity for advancement with the firm is very high.

Brazilians were hired not because the host country required that local nationals fill positions of importance, but mainly because there was a large pool of trained manpower. However, it was well known that the Brazilian government wanted local nationals to run the factory and was considering the adoption of national controls to achieve this goal. Therefore, Allied would not be affected if and when such legislation were to be enacted.

Hiring Brazilians, however, also had disadvantages. Local managers require extensive training because of their lack of knowledge of Allied's technology, products and managerial techniques. This training is costly, and several trainees left the company upon completion of the course. It was assumed that they used this training to obtain jobs elsewhere.

Allied was reluctant to transfer its technology to foreign employees, as this increased the potential for expropriation. Another fear concerned the vast differences in personal values. Most foreign employees cannot help but want to put the needs of their country first. Brazilians are no exception. Their lack of knowledge and experience in other cultures leaves them ill prepared to work for multinational corporations. This may make them not always the best choice. However, they have run the Brazilian plant quite efficiently and effectively, and profit levels even exceed that of the African plant.

Given the experience of Allied with both expatriates and local nationals in the management of its plants in Africa and Brazil, management had to make a policy decision with regard to hiring in India.

Questions:

11. Availability of rubber in India.
12. Recruiting managers in India.
13. Centralisation of European company management.
14. Respecting labour force traditions.
15. Divorce rates of expatriate managers.
16. Cost of transporting expatriates.

17. Possibility of internal conflict.
18. Allied's experience in Africa and Brazil.
19. Costs of housing expatriates.
20. Cross-cultural training in Brazil.

Answers:

11.	2	13.	5	15.	2	17.	4	19.	3
12.	1	14.	2	16.	3	18.	2	20.	3

Reading Comprehension

1.

The coconut is an unusual food for many reasons. It is technically a seed, produced by the coconut palm tree, and as such is one of the largest edible seeds produced by any plant. Its unusual contents also make it unique in the seed world—the interior consists of both "meat" and "water." The meat is the white pith with which we are all familiar, as it is used extensively for cooking and flavorings; the coconut water is a white liquid that is very sweet and thirst-quenching.

Portuguese explorers gave the nut its name in the 15th century, referring to it as coco, meaning "ghost" in their language. The three dimples and the hairy texture reminded them of a ghost's face, and the tree has retained that name ever since.

The coconut has many varied uses. It is used to make margarine, as well as various cooking oils, and these cooking oils are used by fast-food restaurants around the world to make such diet staples as French fries. The coconut fluid is a favorite drink in hot climates, providing a cool and refreshing beverage right off the tree. This water is also used by manufacturers of various sports drinks because of its isotonic electrolyte properties. Even the shell itself has many uses, including cattle food and fertilizer. Yet the coconut is also useful in many ways that have nothing to do with food. Coconut oil is used for cosmetics, medicines, and can even be used in place of diesel fuel. Dried coconut shells are used in many countries as a tool, such as a buffer for shining wood floors. The shells are also used for shirt buttons, and are commonly found on Hawaiian clothing. They are even used for musical instruments and bird houses!

And all these are only some of the uses found for the coconut fruit. The coconut palm tree, which produces the nut, also produces countless useful items. It's no wonder that the coconut palm has been called "the tree of life."

1. The underlined word *pith*, as used in the passage, most nearly means
a. helmet.
b. hairy material.
c. black.
d. meaty substance.

2. The coconut earned the nick name "ghost" because
a. of its pale color.
b. it resembles a face.
c. it is round.
d. of its smell.

3. What is the main focus of this passage?
a. the history of coconuts
b. coconut trees have many uses
c. how cooking oil is made
d. Portuguese discoveries

4. The passage implies that
a. coconut palms are a valuable plant.
b. coconut oil is the best way to cook.
c. Portuguese explorers loved coconuts.
d. coconut palms are good shade trees.

5. Which of the following is NOT a use for the coconut palm?
a. margarine
b. buttons
c. helium balloons
d. diesel fuel

6. The underlined word staples, as used in the passage, most nearly means
a. fasteners.
b. plans.
c. paperwork.
d. foods.

7. The coconut palm is sometimes called “the tree of life” because
a. the Portuguese thought it cured disease.
b. nearly every part of the tree is useful to mankind.
c. it grows near the Equator.
d. of its green color.

2.

Saving energy means saving money. Homeowners and renters know this basic fact, but they often don’t know what kinds of adjustments they can make in their homes and apartments that will result in savings.

For those willing to spend some time and money to reap long-term energy savings, an energy audit is the way to go. An energy auditor will come into your home and assess its energy efficiency. The auditor will pinpoint areas of your home that use the most energy and offer solutions to lower your energy use and costs. Trained energy auditors know what to look for and can locate a variety of flaws that may be resulting in energy inefficiency, including inadequate insulation, construction flaws, and uneven heat distribution.

There are quicker and less costly measures that can be taken as well. One way to save money is to replace incandescent lights with fluorescents. This can result in a savings of more than 50% on your monthly lighting costs.

When it’s time to replace old appliances, it’s wise to spend a bit more for an energy-efficient model, and be sure that you are taking advantage of energy-saving settings already on your current refrigerator, dishwasher, washing machine, or dryer.

Windows provide another opportunity to cut your energy costs. Caulk old windows that might be leaky to prevent drafts, and choose double-paned windows if you're building an addition or replacing old windows.

Most areas of your home or apartment offer opportunities to save energy and money. The results are significant and are well worth the effort.

1. Which two main organizational schemes can be identified in this passage?
   a. hierarchical order and order by topic
   b. order by topic and cause and effect
   c. hierarchical order and chronological order
   d. chronological order and compare and contrast

2. Which of the following ideas is NOT included in this passage?
   a. You can reduce your $130 monthly lighting costs to $65 by using fluorescent bulbs instead of incandescent.
   b. Double-paned windows can cut energy costs.
   c. Your local energy company will send an energy auditor at your request.
   d. Some appliances have energy-saving settings.

3. Which of the following best expresses the main idea of this passage?
   a. There are many things a homeowner or renter can do to save energy and money.
   b. Hiring an energy auditor will save energy and money.
   c. Homeowners and renters don't know what they can do to save energy and money.
   d. Replacing windows and light bulbs are well worth the effort and cost.

4. According to the passage, which of the following would an energy auditor NOT do?
   a. Check for construction flaws.
   b. Look for problems with heat distribution.
   c. Offer solutions to lower your energy costs.
   d. Locate a variety of flaws that may result in energy inefficiency and fix them.

5. According the passage, double-paned windows
a. are energy efficient.
b. should only be used as replacement windows.
c. should only be used in new additions to homes.
d. will lower your heating costs by 50%.

3.

Book clubs are a great way to meet new friends or keep in touch with old ones, while keeping up on your reading and participating in lively and intellectually stimulating discussions. If you're interested in starting a book club, you should consider the following options and recommendations.

The first thing you'll need are members. Before recruiting, think carefully about how many people you want to participate and also what the club's focus will be. For example, some book clubs focus exclusively on fiction, others read nonfiction. Some are even more specific, focusing only on a particular genre such as mysteries, science fiction, or romance. Others have a more flexible and open focus. All of these possibilities can make for a great club, but it is important to decide on a focus at the outset so the guidelines will be clear to the group and prospective member.

After setting the basic parameters, recruitment can begin. Notify friends and family, advertise in the local newspaper, and hang flyers on bulletin boards in local stores, colleges, libraries, and bookstores. When enough people express interest, schedule a kick-off meeting during which decisions will be made about specific guidelines that will ensure the club runs smoothly. This meeting will need to establish where the group will meet (rotating homes or a public venue such as a library or coffee shop); how often the group will meet, and on what day of the week and at what time; how long the meetings will be; how books will be chosen and by whom; who will lead the group (if anyone); and whether refreshments will be served and if so, who will supply them. By the end of this meeting, these guidelines should be set and a book selection and date for the first official meeting should be finalized.

Planning and running a book club is not without challenges, but when a book club is run effectively, the experience can be extremely rewarding for everyone involved.

1. Which of the following organizational patterns is the main one used in the passage?

a. chronological
b. hierarchical
c. comparison-contrast
d. cause and effect

2. According to the passage, when starting a book club, the first thing a person should do is

a. hang flyers in local establishments.
b. put an ad in a local newspaper.
c. decide on the focus and size of the club.
d. decide when and where the group will meet.

3. Which of the following would NOT be covered during the book club's kick-off meeting?

a. deciding on whether refreshments will be served
b. discussing and/or appointing a leader
c. choosing the club's first selection
d. identifying what kinds of books or genre will be the club's focus

4. A good title for this passage would be

a. Book Clubs: A Great Way to Make New Friends.
b. Starting a Successful Book Club: A Guide.
c. Five Easy Steps to Starting a Successful Book Club.
d. Reading in Groups: Sharing Knowledge, Nurturing Friendships.

5. Which of the following is NOT something that successful book clubs should do?

a. focus exclusively on one genre
b. have guidelines about where and when to meet
c. have a focus
d. decide how to choose and who will choose book selections

6. Which of the following inferences can be drawn from the passage?
a. Smaller groups are better for a variety of reasons.
b. The social aspect of book clubs is more important than the intellectual.
c. Starting your own book club is better than joining an existing one.
d. When starting and running a book club, a casual approach is risky.

4.

The walnut tree produces wood that is used for countless purposes, and is considered the finest wood in the world. The wood is easy to work with, yet it is very hard and durable—and when it is polished, it produces a rich, dark luster. It also shrinks and swells less than any other wood, which makes it especially desirable for fine furniture, flooring, and even gun stocks.

In fact, just about every part of the walnut is unusually hard and strong. The nut of the tree is encased inside a very hard shell, which itself is enclosed in a leathery outer covering called a husk. It requires real effort to break through those layers to get at the tasty meat inside.

Yet every part of the walnut is useful to people. The outer husk produces a dark reddish stain that is hard to remove from the hands of the person who opens the nut, and this pigment is widely used in dyes and wood stains. The inner shell is used as an abrasive to clean jet engines. And the meat of the nut is extensively used in cooking, ice cream, flavorings—and just eaten raw.

Walnut trees exude a chemical into the soil near their roots which can be poisonous to some trees and shrubs. Fruit trees, for example, will not survive if planted too close to a walnut. Many other plants, such as maple trees or ivy, are not affected by the walnut's presence, and are well-suited to grow in its vicinity.

1. What is the topic of this passage?
a. the use of walnut wood in furniture
b. walnut trees
c. where to plant walnuts
d. trees of North America

2. What is the main idea of the passage?
a. Trees are used for many things.
b. Maple trees grow well with walnuts.
c. Walnuts can kill other trees.
d. Walnut trees are valuable when planted correctly.

3. As used in the passage, the underlined word abrasive most nearly means
a. rough.
b. disagreeable.
c. soft.
d. fragrant.

4. The author of the passage probably believes that
a. walnut trees are endangered.
b. people should recycle more
c. people should grow walnut trees if possible.
d. maple trees are not good for furniture making.

5. As used in the passage, the underlined word exude most nearly means
a. give off.
b. naked.
c. smell bad.
d. leave the area.

5.

Today, bicycles are elegantly simple machines that are common around the world. Many people ride bicycles for recreation, whereas others use them as a means of transportation. The first bicycle, called a draisienne, was invented in Germany in 1818 by Baron Karl de Drais de Sauerbrun. Because it was made of wood, the draisienne wasn't very durable nor did it have pedals. Riders moved it by pushing their feet against the ground.

In 1839, Kirkpatrick Macmillan, a Scottish blacksmith, invented a much better bicycle. Macmillan's machine had tires with iron rims to keep them from getting worn down. He also used foot-operated cranks, similar to pedals, so his bicycle could be ridden at a quick pace. It didn't look much like the modern bicycle, though, because its back wheel was substantially larger than its front wheel. Although Macmillan's bicycles could be ridden easily, they were never produced in large numbers.

In 1861, Frenchman Pierre Michaux and his brother Ernest invented a bicycle with an improved crank mechanism. They called their bicycle a vélocipède, but most people called it a "bone shaker" because of the jarring effect of the wood and iron frame. Despite the unflattering nickname, the vélocipède was a hit. After a few years, the Michaux family was making hundreds of the machines annually, mostly for fun-seeking young people.

Ten years later, James Starley, an English inventor, made several innovations that revolutionized bicycle design. He made the front wheel many times larger than the back wheel, put a gear on the pedals to make the bicycle more efficient, and lightened the wheels by using wire spokes. Although this bicycle was much lighter and less tiring to ride, it was still clumsy, extremely top-heavy, and ridden mostly for entertainment.

It wasn't until 1874 that the first truly modern bicycle appeared on the scene. Invented by another Englishman, H. J. Lawson, the safety bicycle would look familiar to today's cyclists. The safety bicycle had equal-sized wheels, which made it much less prone to toppling over. Lawson also attached a chain to the pedals to drive the rear wheel. By 1893, the safety bicycle had been further improved with air-filled rubber tires, a diamond-shaped frame, and easy braking. With the improvements provided by Lawson, bicycles became extremely popular and useful for transportation. Today, they are built, used, and enjoyed all over the world.

1. There is enough information in this passage to show that
   a. Several people contributed to the development of the modern bicycle.
   b. Only a few vélocipèdes built by the Michaux family are still in existence.
   c. For most of the nineteenth century, few people rode bicycles just for fun.
   d. Bicycles with wheels of different sizes cannot be ridden easily.

2. The first person to use a gear system on bicycles was
a. H. J. Lawson.
b. Kirkpatrick Macmillan.
c. Pierre Michaux.

d. James Starley.

3. This passage was most likely written in order to
a. Persuade readers to use bicycles for transportation.
b. Describe the problems that bicycle manufacturers encounter.
c. Compare bicycles used for fun with bicycles used for transportation.
d. Tell readers a little about the history of the bicycle.

4. Macmillan added iron rims to the tires of his bicycle to
a. Add weight to the bicycle.
b. Make the tires last longer.
c. Make the ride less bumpy.
d. Make the ride less tiring.

5. Read the following sentence from the fourth paragraph:
Ten years later, James Starley, an English inventor, made several innovations that revolutionized bicycle design. As it is used in the sentence, the underlined word revolutionized most nearly means
a. Cancelled.
b. Changed drastically.
c. Became outdated.
d. Exercised control over.

6. Which of the following statements from the passage represents the writer's opinion?
a. The safety bicycle would look familiar to today's cyclists.
b. Two hundred years ago, bicycles didn't even exist.
c. The Michaux brothers called their bicycle a vélocipède.
d. Macmillan's machine had tires with iron rims.

6.

One of the most hazardous conditions a firefighter will ever encounter is a backdraft (also known as a smoke explosion). A backdraft can occur in the hot-

smoldering phase of a fire when burning is incomplete and there is not enough oxygen to sustain the fire. Unburned carbon particles and other flammable products, combined with the intense heat, may cause instantaneous combustion if more oxygen reaches the fire.

Firefighters should be aware of the conditions that indicate the possibility for a backdraft to occur. When there is a lack of oxygen during a fire, the smoke becomes filled with carbon dioxide or carbon monoxide and turns dense gray or black. Other warning signs of a potential backdraft are little or no visible flame, excessive heat, smoke leaving the building in puffs, muffled sounds, and smoke-stained windows.

Proper ventilation will make a backdraft less likely. Opening a room or building at the highest point allows heated gases and smoke to be released gradually. However, suddenly breaking a window or opening a door is a mistake, because it allows oxygen to rush in, causing an explosion.

1. A backdraft is a dangerous condition for firefighters mainly because
   a. there is not enough oxygen for breathing.
   b. the heat is extremely intense.
   c. the smoke is dangerously thick.
   d. an explosion occurs.

2. Which of the following is not mentioned as a potential backdraft warning sign?
   a. windows stained with smoke
   b. flames shooting up from the building
   c. puffs of smoke leaving the building
   d. more intense heat than usual

3. To prevent the possibility of a backdraft, a firefighter should
   a. carry an oxygen tank.
   b. open a door to allow gases to escape.
   c. make an opening at the top of the building.
   d. break a window to release carbon particles.

4. When compared with a hot, smoldering fire, a fire with visible, high-reaching flames

a. Has more oxygen available for combustion.
b. Has more carbon dioxide available for consumption.
c. Produces more dense gray smoke.
d. Is more likely to cause a backdraft.

7.

Arteries of the heart blocked by plaque can reduce the flow of blood to the heart possibly resulting in heart attack or death. Plaque is actually fat and cholesterol that accumulates on the inside of the arteries. The arteries of the heart are small and can be blocked by such accumulations. There is a medical procedure that creates more space in the blocked artery by inserting and inflating a tiny balloon into the blood vessel. It is called coronary balloon angioplasty. Angioplasty means “blood vessel repair.” When the balloon is inflated, it compresses the plaque against the wall of the artery, creating more space and improving the flow of blood.

Many doctors choose this technique, because it is less invasive than bypass surgery. Yes, both involve entering the body cavity, but in bypass surgery, the chest must be opened, the ribs must be cut, and the section of diseased artery must be removed and replaced. To replace it, the patient’s body is opened, once again, to acquire a healthy section of artery. Usually, this blood vessel is removed from an artery located in the calf of the leg. This means the patient now has two painful incisions that must heal at the same time. There is far more risk in such bypass surgery than in angioplasty, which involves threading a thin tube, called a catheter, into the circulatory system and working it to the damaged artery.

Angioplasty may take between 30 minutes to 3 hours to complete. It begins with a distinctive dye that is injected into the bloodstream. A thin catheter is then inserted into the femoral artery of the leg, near the groin. The doctor monitors the path of the dye using x-rays. He moves the tube through the heart and into the plaquefilled artery. He inflates the balloon, creating more space, deflates the balloon, and removes the tube. It is important to note that the plaque has not been removed; it has just been compressed against the sides of the artery. Sometimes, a stent may be implanted, a tiny tube of stainless steel that is expandable when necessary. Its function is to keep the artery open.

There is good news and there is bad news. The good news is that the statistics compiled are superb. Ninety percent of all angioplasty procedures are successful.

The risk of dying during an operation of this type is less than 2%. The risk of heart attack is also small: 3–5%. Yet heart surgeons do not take any risk lightly; therefore, a team of surgeons stands ready to perform bypass surgery if needed. The length of hospitalization is only three days. The bad news is twofold. First, this procedure treats the condition but does not eradicate the cause. In 20% of the cases, there is a recurrence of plaque. Second, angioplasty is not recommended for all patients. The surgeons must consider the patient's age, physical history, how severe the blockage is, and, finally, the degree of damage to the artery before they make their determination.

1. When coronary arteries are blocked by plaque, one of the results could be
   a. stroke.
   b. heart attack.
   c. hospitalization.
   d. femoral artery deterioration.

2. According to the passage, angioplasty is defined as
   a. a tiny balloon.
   b. a plaque-laden artery.
   c. blood vessel repair.
   d. bypass surgery.

3. It can be inferred from the passage that invasive most closely means
   a. entering the body cavity.
   b. causing infection.
   c. resulting in hospitalization.
   d. requiring a specialist's opinion.

4. The angioplasty procedure begins with
   a. a thin catheter being inserted into the femoral artery.
   b. a balloon being inflated in the heart.
   c. a special dye being injected into the bloodstream.
   d. a healthy artery being removed from the calf.

5. It can be inferred from the passage that
   a. a healthy artery is removed and awaits possible bypass surgery.

b. patients have trouble accepting the idea that a tiny balloon will cure the problem.
c. 3–5% of the patients refuse to undergo this procedure.
d. surgeons do not take even a 2% chance of death lightly.

6. Which one of the following statements is true?
a. The plaque that has caused the problem is not removed during angioplasty.
b. The risk of dying during an angioplasty procedure is 3–5%.
c. The coronary balloon angioplasty is a separate procedure from inflating a balloon into a blocked artery.
d. All of the above statements are true.

8.

(1) The atmosphere forms a gaseous, protective envelope around Earth. It protects the planet from the cold of space, from harmful ultraviolet light, and from all but the largest meteors. After traveling over 93 million miles, solar energy strikes the atmosphere and Earth's surface, warming the planet and creating what is known as the biosphere, the region of Earth capable of sustaining life. Solar radiation in combination with the planet's rotation causes the atmosphere to circulate. Atmospheric circulation is one important reason that life on Earth can exist at higher latitudes because equatorial heat is transported poleward, moderating the climate.

(2) The equatorial region is the warmest part of the earth because it receives the most direct and, therefore, strongest solar radiation. The plane in which the earth revolves around the sun is called the ecliptic. Earth's axis is inclined 23 1/3 degrees with respect to the ecliptic. This inclined axis is responsible for our changing seasons because, as seen from the earth, the sun oscillates back and forth across the equator in an annual cycle. On or about June 21 each year, the sun reaches the Tropic of Cancer, 231/3 degrees north latitude. This is the northernmost point where the sun can be directly overhead. On or about December 21 of each year, the sun reaches the Tropic of Capricorn, 23 1/3 degrees south latitude. This is the southernmost point at which the sun can be directly overhead. The polar regions are the coldest parts of the earth because they receive the least direct and, therefore, the weakest solar radiation. Here solar radiation strikes at a very oblique angle and thus spreads the same amount of energy over a greater area than in the equatorial regions. A static

envelope of air surrounding the earth would produce an extremely hot, uninhabitable equatorial region, while the polar regions would remain inhospitably cold.

(3) The transport of water vapor in the atmosphere is an important mechanism by which heat energy is redistributed poleward. When water evaporates into the air and becomes water vapor, it absorbs energy. At the equator, air saturated with water vapor rises high into the atmosphere where winds aloft carry it poleward. As this moist air approaches the polar regions, it cools and sinks back to earth. At some point, the water vapor condenses out of the air as rain or snow, releasing energy in the process. The now-dry polar air flows back toward the equator to repeat the convection cycle. In this way, heat energy absorbed at the equator is deposited at the poles and the temperature gradient between these regions is reduced.

(4) The circulation of the atmosphere and the weather it generates is but one example of the many complex, interdependent events of nature. The web of life depends on the proper functioning of these natural mechanisms for its continued existence. Global warming, the hole in the atmosphere's ozone layer, and increasing air and water pollution pose serious, long-term threats to the biosphere. Given the high degree of nature's interconnectedness, it is quite possible that the most serious threats have yet to be recognized.

1. Which of the following best expresses the main idea of the passage?
   a. The circulation of atmosphere, threatened by global warming and pollution, protects the biosphere and makes life on Earth possible.
   b. If the protective atmosphere around the earth is too damaged by human activity, all life on Earth will cease.
   c. Life on Earth is the result of complex interdependent events of nature, and some of these events are a result of human intervention.
   d. The circulation of atmosphere is the single most important factor in keeping the biosphere alive, and it is constantly threatened by harmful human activity.

2. Which of the following best represents the organization of the passage?
   a. I. Definition and description of the circulation of the atmosphere
   II. How the atmosphere affects heat and water in the biosphere
   III. How the circulation of the atmosphere works

IV. What will happen if human activity destroys the atmosphere and other life-sustaining mechanisms

b. I. Origin of the atmosphere and ways it protects the biosphere
II. How the circulation of the atmosphere affects the equator and the poles
III. How the circulation of the atmosphere interrelates with other events in nature to protect life on Earth
IV. Threats to life in the biosphere

c. I. Definition and description of the circulation of the atmosphere
II. Protective functions of the circulation of the atmosphere
III. Relationship of the circulation of the atmosphere to other life-sustaining mechanisms
IV. Threats to nature's interconnectedness in the biosphere

d. I. The journey of the atmosphere 93 million miles through space.
II. How the atmosphere circulates and protects the biosphere
III. How the atmosphere interrelates with weather in the biosphere
IV. How damage to the biosphere threatens life on Earth

3. Which of the following is the best definition of the underlined word biosphere as it is used in the passage?

a. the protective envelope formed by the atmosphere around the living earth
b. that part of the earth and its atmosphere in which life can exist
c. the living things on Earth whose existence is made possible by circulation of the atmosphere
d. the circulation of the atmosphere's contribution to life on Earth

4. Which of the following sentences from the passage best supports the author's point that circulation of the atmosphere is vital to life on Earth?

a. The equatorial region is the warmest part of the earth because it receives the most direct and, therefore, strongest solar radiation.
b. The circulation of the atmosphere and the weather it generates is but one example of the many complex, interdependent events of nature.
c. [The atmosphere] protects Earth from the cold of space, from harmful ultraviolet light, and from all but the largest meteors.

d. A static envelope of air surrounding the earth would produce an extremely hot, uninhabitable equatorial region, while the polar regions would remain inhospitably cold.

5. Based on the passage, which of the following is directly responsible for all temperature changes on Earth?
a. variations in the strength of solar radiation
b. variations in the amount of ultraviolet light
c. variation of biologic processes in the biosphere
d. variation in global warming

6. The first paragraph of the passage deals mainly with which of the following effects of the atmosphere on the earth?
a. its sheltering effect
b. its reviving effect
c. its invigorating effect
d. its cleansing effect

9.

(1) The immune system is equal in complexity to the combined intricacies of the brain and nervous system. The success of the immune system in defending the body relies on a dynamic regulatory communications network consisting of millions and millions of cells. Organized into sets and subsets, these cells pass information back and forth like clouds of bees swarming around a hive. The result is a sensitive system of checks and balances that produces an immune response that is prompt, appropriate, effective, and self-limiting.

(2) At the heart of the immune system is the ability to distinguish between self and non-self. When immune defenders encounter cells or organisms carrying foreign or non-self molecules, the immune troops move quickly to eliminate the intruders. Virtually every body cell carries distinctive molecules that identify it as self. The body's immune defenses do not normally attack tissues that carry a self-marker. Rather, immune cells and other body cells coexist peaceably in a state known as self-

tolerance. When a normally functioning immune system attacks a non-self molecule, the system has the ability to remember the specifics of the foreign body. Upon subsequent encounters with the same species of molecules, the immune system reacts accordingly. With the possible exception of antibodies passed during lactation, this so-called immune system memory is not inherited. Despite the occurrence of a virus in your family, your immune system must learn from experience with the many millions of distinctive non-self molecules in the sea of microbes in which we live. Learning entails producing the appropriate molecules and cells to match up with and counteract each non-self invader.

(3) Any substance capable of triggering an immune response is called an antigen. Antigens are not to be confused with allergens, which are most often harmless substances (such as ragweed pollen or cat hair) that provoke the immune system to set off the inappropriate and harmful response known as allergy. An antigen can be a virus, a bacterium, a fungus, a parasite, or even a portion or product of one of these organisms. Tissues or cells from another individual (except an identical twin, whose cells carry identical self-markers) also act as antigens; because the immune system recognizes transplanted tissues as foreign, it rejects them. The body will even reject nourishing proteins unless they are first broken down by the digestive system into their primary, non-antigenic building blocks. An antigen announces its foreignness by means of intricate and characteristic shapes called epitopes, which protrude from its surface. Most antigens, even the simplest microbes, carry several different kinds of epitopes on their surface; some may even carry several hundred. Some epitopes will be more effective than others at stimulating an immune response. Only in abnormal situations does the immune system wrongly identify self as non-self and execute a misdirected immune attack. The result can be a so-called autoimmune disease such as rheumatoid arthritis or systemic lupus erythematosis. The painful side effects of these diseases are caused by a person's immune system actually attacking itself.

1. What is the analogy used to describe the communications network among the cells in the immune system?

a. the immune system's memory
b. immune troops eliminating intruders
c. bees swarming around a hive
d. a sea of microbes

2. The immune cells and other cells in the body coexist peaceably in a state known as

a. equilibrium.
b. self-tolerance.
c. harmony.
d. tolerance.

3. What is the specific term for the substance capable of triggering an inappropriate or harmful immune response to a harmless substance such as ragweed pollen?
a. antigen
b. microbe
c. allergen
d. autoimmune disease

4. How do the cells in the immune system recognize an antigen as foreign or non-self?
a. through an allergic response
b. through blood type
c. through fine hairs protruding from the antigen surface
d. through characteristic shapes on the antigen surface

5. After you have had the chicken pox, your immune system will be able to do all of the following EXCEPT
a. prevent your offspring from infection by the chicken pox virus.
b. distinguish between your body cells and that of the chicken pox virus.
c. remember previous experiences with the chicken pox virus.
d. match up and counteract non-self molecules in the form of the chicken pox virus.

6. Which of the following best expresses the main idea of this passage?
a. An antigen is any substance that triggers an immune response.
b. The basic function of the immune system is to distinguish between self and non-self.
c. One of the immune system's primary functions is the allergic response.
d. The human body presents an opportune habitat for microbes.

7. Why would tissue transplanted from father to daughter have a greater risk of being detected as foreign than a tissue transplanted between identical twins?

a. The age of the twins' tissue would be the same and, therefore, less likely to be rejected.
b. The identical twin's tissue would carry the same self-markers and would, therefore, be less likely to be rejected.
c. The difference in the sex of the father and daughter would cause the tissue to be rejected by the daughter's immune system.
d. The twins' immune systems would remember the same encounters with childhood illnesses.

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10.

(1) An upsurge of new research suggests that animals have a much higher level of brainpower than previously thought. If animals do have intelligence, how do scientists measure it? Before defining animals' intelligence, scientists defined what is not intelligence. Instinct is not intelligence. It is a skill programmed into an animal's brain by its genetic heritage. Rote conditioning is also not intelligence. Tricks can be learned by repetition, but no real thinking is involved. Cuing, in which animals learn to do or not to do certain things by following outside signals, does not demonstrate intelligence. Scientists believe that insight, the ability to use tools, and communication using human language are all effective measures of the mental ability of animals.

(2) When judging animal intelligence, scientists look for insight, which they define as a flash of sudden understanding. When a young gorilla could not reach fruit

from a tree, she noticed crates scattered about the lawn near the tree. She piled the crates into a pyramid, then climbed on them to reach her reward. The gorilla's insight allowed her to solve a new problem without trial and error.

(3) The ability to use tools is also an important sign of intelligence. Crows use sticks to pry peanuts out of cracks. The crow exhibits intelligence by showing it has learned what a stick can do. Likewise, otters use rocks to crack open crab shells in order to get at the meat. In a series of complex moves, chimpanzees have been known to use sticks and stalks in order to get at a favorite snack—termites. To make and use a termite tool, a chimp first selects just the right stalk or twig. He trims and shapes the stick, then finds the entrance to a termite mound. While inserting the stick carefully into the entrance, the chimpanzee turns it skillfully to fit the inner tunnels. The chimp attracts the insects by shaking the twig. Then it pulls the tool out without scraping off any termites. Finally, he uses his lips to skim the termites into his mouth. (4) Many animals have learned to communicate using human language. Some primates have learned hundreds of words in sign language. One chimp can recognize and correctly use more than 250 abstract symbols on a keyboard. These symbols represent human words. An amazing parrot can distinguish five objects of two different types. He can understand the difference between the number, color, and kind of object. The ability to classify is a basic thinking skill. He seems to use language to express his needs and emotions. When ill and taken to the animal hospital for his first overnight stay, this parrot turned to go. "Come here!" he cried to a scientist who works with him. "I love you. I'm sorry. Wanna go back?"

(5) The research on animal intelligence raises important questions. If animals are smarter than once thought, would that change the way humans interact with them? Would humans stop hunting them for sport or survival? Would animals still be used for food, clothing, or medical experimentation? Finding the answer to these tough questions makes a difficult puzzle even for a large-brained, problem-solving species like our own.

9. Crows use sticks to pry peanuts out of cracks. Which of the following is the kind of intelligence or conditioning the situation describes?
a. rote learning
b. tools
c. communication
d. instinct

10. The underlined word upsurge, as it is used in the first paragraph of the passage, most nearly means
a. an increasingly large amount.
b. a decreasing amount.
c. a well-known amount.
d. an immeasurable amount.

11. The concluding paragraph of this passage infers which of the following?
a. There is no definitive line between those animals with intelligence and those without.
b. Animals are being given opportunities to display their intelligence.
c. Research showing higher animal intelligence may fuel debate on ethics and cruelty.
d. Animals are capable of untrained thought well beyond mere instinct.

12. According to the passage, which of the following is true about animals communicating through the use of human language?
a. Parrots can imitate or repeat a sound.
b. Dolphins click and whistle.
c. Crows screech warnings to other crows.
d. Chimpanzees and gorillas have been trained to use sign language or geometric shapes that stand for words.

13. In paragraph 3, what conclusion can be reached about the chimpanzee's ability to use a tool?
a. It illustrates high intelligence because he is able to get his food and eat it.
b. It illustrates instinct because he faced a difficult task and accomplished it.
c. It illustrates high intelligence because he stored knowledge away and called it up at the right time.
d. It illustrates high intelligence because termites are proteinpacked.

14. Which of the following is not a sign of animal intelligence?
a. shows insight
b. cues
c. uses tools
d. makes a plan

Explanation

1.

1. **d.** The word *pith* means meat or core, and it refers here to the edible part of the coconut.
2. **b.** The passage states that Portuguese explorers thought the coconut resembled a face, because of its three dimples (like eyes and mouth) and its hairy texture.
3. **b.** The passage does touch briefly on most of these choices, but the main focus is on the many ways that coconut palms are used.
4. **a.** The passage details the many valuable uses for the coconut palm, so choice a is best. None of the other choices is implied.
5. **c.** All of the choices are included in the passage except helium balloons, which are not mentioned.
6. **d.** The word *staples* in this context refers to commonly used items. The best choice for "diet staples" is *foods*.
7. **b.** The final paragraph implies that the tree's many uses and foods earned it the name "tree of life." None of the other choices is supported by the passage.

2.

1. **b.** Ideas are listed by topic, but there is some cause and effect as well since the passage explains the reasons for the various steps. The other choices are incorrect because the passage does not list the ideas in order of importance (hierarchical) or in the order in which they have occurred or should occur (chronological). These steps can occur in any order.
2. **c.** The passage does say that a homeowner can have an energy audit, but it says nothing about a local energy company providing that service. Choice **a** may seem attractive at first since those specific figures are not mentioned in the passage, but the third paragraph does say that fluorescent bulbs can save 50% on lighting costs, and $65 is almost 50% less than $135. Choices **b** and **d** are clearly stated in the passage.
3. **a.** The passage is offering recommendations about the many things homeowners and renters can do to save money and energy. The other choices may all be mentioned in the passage, but they are too specific to be the main idea.

4. **d.** The passage says nothing about an energy auditor actually fixing the flaws him- or herself, simply that the auditor will locate the flaws and offer possible money-saving solutions.
5. **a.** The fifth paragraph states that double-paned windows can cut energy costs, so we can infer that this means that they are energy efficient. The other three choices are not stated in the passage.

3.

1. **a.** The passage is organized chronologically. The steps for starting a book club are listed in the order in which they should occur.
2. **c.** The second sentence of the second paragraph states this clearly.
3. **d.** Deciding on the club's focus—the kinds of books or genre the club will read—should be done prior to this meeting and prior to recruiting members, according to the second paragraph.
4. **b.** This is the only appropriate title. Choice a is too specific, since the passage indicates that making new friends is just one component of a book club. Choice c is incorrect because this passage does not contain numbered steps. Choice d is too vague, and the tone is inappropriate.
5. **a.** The passage states this is one possible focus but does not say successful book clubs must focus exclusively on one genre. The other choices are all in the passage. Choice c might seem attractive at first, but the passage clearly states that a focus should be chosen, even if that focus is defined as flexible and open.
6. **d.** The tone and specificity of the passage infer that a successful book club requires careful planning.

4.

1. **b.** The topic is the broad, general subject of a passage. The passage tells the reader about walnut trees, so that is its topic.
2. **d.** The main idea is more specific than the topic—it's the point or idea which the author wants to prove to the reader. Choice **a** is too broad; the passage is about walnut trees, not trees in general. Choices **b** and **c** are true, but they are merely part of the passage's main idea. Choice **d** summarizes the entire passage.

3. **a.** Something that is *abrasive* is rough or coarse, and cause friction when rubbed against other objects.
4. **c.** The reader can infer that the author supports planting walnut trees, since he speaks of their great value and also gives instructions on what to plant next to them. None of the other choices can be supported from the passage.
5. **a.** To *exude* is to exhale or to give off, the way that perfume "gives off" an odor. The walnut roots give off chemicals, exuding them out to the soil.

5.

1. **a.** This is the best choice because each paragraph of the passage describes an inventor whose machine was a step toward the modern bicycle. There is no evidence to support choice b. Choices c and d are incorrect because they both make statements that, according to the passage, are untrue.
2. **d.** The fourth paragraph states that James Starley added a gear to the pedals.
3. **d.** The passage gives the history of the bicycle. Choice **a** is incorrect because few opinions are included in the passage. There is no support for choices **b** and **c**.
4. **b.** This information is clearly stated in the second paragraph. The iron rims kept the tires from getting worn down, and, therefore, the tires lasted longer. Choice a is incorrect because although the iron rims probably did make the machine heavier, that was not Macmillan's goal. Choice **c** is incorrect because no information is given about whether iron-rimmed or wooden tires moved more smoothly. There is no support for **choice d.**
5. **b.** Based on the paragraph, this is the only possible choice. Starley revolutionized the bicycle; that is, he made many innovative changes. Based on the context, the other choices make no sense.
6. **a.** This is the only choice that states an opinion. The writer cannot be certain that the safety bicycle would look familiar to today's cyclists; it is his or her opinion that this is so. The other choices are presented as facts.

6.

1. **d.** The first two sentences of the passage indicate that a backdraft is dangerous because it is an explosion. The other choices are dangers, but they do not define a backdraft.

2. **b.** The second paragraph indicates that there is little or no visible flame with a potential backdraft. The other choices are listed at the end of the second paragraph as warning signs of a potential backdraft.
3. **c.** This is stated in the last paragraph. Choice a is not mentioned in the passage. The other choices would be useless or harmful.
4. **a.** The passage indicates that hot, smoldering fires have little or no visible flame and insufficient oxygen. It can reasonably be inferred, then, that more oxygen would produce more visible flames.

7.

1. **b.** This answer is explicitly stated in the first sentence of the selection. Choices a and d are not mentioned as a result of plaqueladen arteries. Choice c is too general to be the best answer.
2. **c.** This answer is explicitly stated in the sixth sentence of paragraph 1. Choice a only names one medical instrument used during the procedure. Choice b offers the reason for the angioplasty, because it is done to compress the plaque in an artery. Choice d offers a procedure that would be chosen as an alternative to angioplasty.
3. **a.** The first and second sentences of paragraph 2 state how both procedures, angioplasty and bypass surgery, are invasive because "both involve entering the body cavity." None of the other choices are supported or implied as a definition for invasive.
4. **c**. The procedure is detailed in paragraph 3. It begins with injecting a special dye. Choices a and b follow later in the procedure, whereas choice d deals with bypass surgery rather than the angioplasty procedure.
5. **d.** This answer can be found in paragraph 4. A team of surgeons stands ready to perform bypass surgery even though the risk factor of death is only 2%. Choice a is not supported in the passage. Choices c and d are incorrect because the passage does not discuss patient reaction at all.
6. **a.** This choice is supported in the last sentence of paragraph 3. Choice b is incorrect: The risk factor is 2%. Choice c is a complete misunderstanding of the text. Inflating a balloon into a blocked artery is coronary balloon angioplasty. Because two answers are incorrect, d is not a viable choice.

8.

1. **a.** Choice b emphasizes only damage to the atmosphere; the passage encompasses more than that. Choice c does not mention the atmosphere, which is the main focus of the passage. Choice d is too narrow—the final paragraph of the passage emphasizes that the circulation of the atmosphere is but one example of the complex events that keeps the earth alive.
2. **c.** This question assesses the ability to see the organization of a reading passage and to organize material for study purposes. Choice a is wrong because the passage does not explain exactly what will happen as a result of damage to the atmosphere and other life-sustaining mechanisms. Choice b is wrong because the passage does not explain the origin of the atmosphere. Choice d is wrong because it is solar energy that travels 93 million miles through space, not the atmosphere.
3. **b.** The biosphere, as defined in paragraph 1, is a region (or part) of the earth; it is not the envelope around the earth, the living things on Earth, or the circulation of the atmosphere (choices a, c, and d).
4. **d.** This question assesses the ability to recognize supported and unsupported claims. Choice a deals with solar radiation, not with circulation of the atmosphere. Choice b is an assertion without specific supporting detail. Choice c describes how the atmosphere protects Earth but does not speak of the circulation of the atmosphere. Only choice d explains that conditions would be inhospitable at the equator and poles without the circulation of the atmosphere; therefore, it is the best choice.
5. **a.** This question assesses the ability to see cause and effect. Paragraph 2 deals with how variations in the strength with which solar radiation strikes the earth affects temperature. None of the other choices is discussed in terms of all temperature changes on Earth.
6. **a.** There is no mention in the first paragraph of any reviving or cleansing effect the atmosphere may have (choices b and d). In a sense, enabling the earth to sustain life is invigorating; however, choice a is a better choice because the first two sentences talk about how the atmosphere protects the earth from harmful forces

9.

1. **c.** In the first paragraph, the communication network of the millions of cells in the immune system is compared to bees swarming around a hive.

2. **b**. All the answers indicate peaceful coexistence. However, according to the fifth sentence of paragraph 2, in this instance, the state is referred to as self-tolerance.
3. **c.** See the last paragraph. The substances known as allergens are responsible for triggering an inappropriate immune response to ragweed pollen.
4. **d.** The last paragraph of the passage mentions that an antigen announces its foreignness with intricate shapes called epitopes that protrude from the surface.
5. **a.** Every individual's immune system must learn to recognize and deal with non-self molecules through experience. However, the last section of paragraph 2 mentions that the immune system is capable of choices b, c, and d.
6. **b.** According to paragraph 2, the ability to distinguish between self and non-self is the heart of the immune system. This topic is set up in the first paragraph and further elucidated throughout the body of the passage.
7. **b.** The last paragraph mentions that tissues or cells from another individual may act as antigens except in the case of identical twins whose cells carry identical self-markers.
8. **a.** The context leads to the meaning: The first sentence speaks of complexity, from which we can infer an elaborate system of interconnections, especially in light of the second sentence. There is no mention of confusion in the passage (choice b). The word perplexity means bewilderment and is unrelated to the passage (choice c). Choice d is a newspaper and TV term that is unrelated to the passage.

10.

1. **b.** The crow is using the stick as a tool to assist it in getting food.
2. **a.** In the first paragraph, upsurge (a swelling of the ocean) is used as an analogy to illustrate the large and increasing amount of research in animal intelligence.
3. **c.** The questions in this paragraph ask the reader to consider the use of animals in our world and questions whether knowing that they have more intelligence than previously thought might make a difference in human treatment of them.
4. **d.** This choice is the only one that shows animals using human language.
5. **c.** Although each conclusion is an example of some intelligence, the most accurate conclusion the reader should make is that this action shows high intelligence. The complexity of what the chimpanzee is doing to get his food

and the many thinking activities he must accomplish in order to realize his goal of getting the termites—learning a new skill, selecting and shaping a tool, remembering stored knowledge, using the correct knowledge in order to take proper action for the situation—shows intelligence.

6. **b.** Cuing does not demonstrate animal intelligence because the animal learns to do or not to do certain things by following outside signals.

Para jumble

The four sentences (labeled a, b, c, d) given in this question, when properly sequenced, form a coherent paragraph. Decide on the proper order for the sentences.

1.

a. of tracking the level as well as the dynamics of CPI
b. economists constructed an online price index
c. using food and beverage data from a prominent
d. online marketplace to show that the index is capable

a.) dcba b) abdc c) bcda d) cbad

2.

a. the dignity of the government lies in its moral
b. capacity to perceive and confront the lived truth,
c. such as the widespread despair, frustration, and
d. irreparable loss of dignity leading to farmers' suicides

a) bcad b) cdba c) adcb d) abcd

3.

a. of plastic articles also show little
b. remain on paper while the producers
c. the Solid Waste Management Rules mostly
d. concern about their negative environmental impact

a. cabd b) cbad c) dbca d) dabc

4.

a. even though the e-commerce industry is
b. penetration has largely taken place only in
c. growing at the rate of over 60% per year, market
d. the 10-odd major metropolitan areas of India

a) badc b) dbac c) cadb d) acbd

5.

a. 2016, but little money has come in as retailers want
b. like soaps and shampoos for customers
c. permission to stock a few non-food items
d. 100% FDI was allowed in the food retail business in

a) cbad b) bacd c) badc d) dacb

6.

a. This includes looking after the children and doing all of the housework, which is fairly labor intensive.
b. A stereotype that has existed a long time is that females ought to stay home, taking care of the family once they got married.
c. Nowadays an ever-increasing number of women work full time, and in this reality it is widely believed that house chores should be shared between men and women equally.
d. One of the reasons for sharing housework between males and females is to promote gender equality.

a) cdba b) bcda c) acdb d) adcb

7.

a. The facts speak for themselves so, they need exposition only, not demonstration.
b. At the present moment, it is widely recognized that India holds the balance in the world-wide competition between rival ideologies.
c. It is not, of course, only in geographical sense that India is in a key position.
d. India's key position simply needs pointing out.

a) dacb b) cdab c) bcda d) bdac

8.

I. Unhappiness and discontent spring not only from poverty.
II. We suffer from sickness of spirit and hence, we should discover our roots in the eternal.

a. Man is a strange creature, fundamentally different from other animals.
b. If they are undeveloped and unsatisfied, he may have all the comforts of the wealth, but still feel that life is not worthwhile.
c. He has far horizons, invariable hopes, spiritual powers.
d. What is missing in our age is the soul, there is nothing wrong with the body.

a) acdb b) dacb c) dabc d) acbd

9.

I. Now-a-days, soap is going almost out of use as a washing agent.
II. There are better washing agents than soap, but scientists are not yet sure if their use is harmless to man.
a. They produce lather due to the presence of calcium salts in water.
b. Its place has been occupied by a new range of chemicals, called detergents.
c. So, they are called soap less soaps.
d. Detergents are not soaps because they are not sodium or potassium derivatives of fatty acids, as a normal soap is.

a) dbca b) bdca c) dbac d) bacd

10.

I. His wrist watch had gone out of order.
II. His estimate appeared reasonable.
a. He took it to a watch repairer.
b. He gave an idea of the likely cost of the replacement based on the examination of the watch.
c. He found that some parts needed checked the parts replacement.
d. The repairer opened the outer case and

a) abdc b) cbda c) adcb d) cadb

11.

a. Man has used poisons for assassination purposes ever since the dawn of civilization, against individual enemies but also occasionally against armies.

b. These dangers were soon recognized, and resulted in two international declarations—in 1874 in Brussels and in 1899 in The Hague—that prohibited the use of poisoned weapons.

c. The foundation of microbiology by Louis Pasteur and Robert Koch offered new prospects for those interested in biological weapons because it allowed agents to be chosen and designed on a rational basis.

d. Though treaties were all made in good faith, they contained no means of control, and so failed to prevent interested parties from developing and using biological weapons.

a) abcd b) bdca c) acbd d) bcda

12.

a. If you've seen a little line of text on websites that says something like "customers who bought this also enjoyed that" you have experienced this collaborative filtering firsthand.

b. The problem with these algorithms is that they don't take into account a host of nuances and circumstances that might interfere with their accuracy.

c. If you just bought a gardening book for your cousin, you might get a flurry of links to books about gardening, recommended just for you! – the algorithm has no way of knowing you hate gardening and only bought the book as a gift.

d. Collaborative filtering is a mathematical algorithm by which correlations and concurrences of behaviors are tracked and then used to make recommendations.

a) dabc b) dcab c) abcd d) bcad

13.

a. The eventual diagnosis was skin cancer and after treatment all seemed well.

b. The viola player didn't know what it was; nor did her GP.

c. Then a routine scan showed it had come back and spread to her lungs.

d. It started with a lump on Cathy Perkins' index finger.

a) dbac b) acdb c) adcb d) cabd

14.

a. They would rather do virtuous side projects assiduously as long as these would not compel them into doing their day jobs more honourably or reduce the profit margins.

b. They would fund a million of the buzz wordy programs rather than fundamentally question the rules of their game or alter their own behavior to reduce the harm of the existing distorted, inefficient and unfair rules.
c. Like the dieter who would rather do anything to lose weight than actually eat less, the business elite would save the world through social-impact-investing and philanthrocapitalism.
d. Doing the right thing — and moving away from their win-win mentality — would involve real sacrifice; instead, it's easier to focus on their pet projects and initiatives.

a) cadb b) acbd c) cbda d) bacd

15.

a. Self-management is thus defined as the 'individual's ability to manage the symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent in living with a chronic condition'.
b. Most people with progressive diseases like dementia prefer to have control over their own lives and health-care for as long as possible.
c. Having control means, among other things, that patients themselves perform self-management activities.
d. Supporting people in decisions and actions that promote self-management is called self-management support requiring a cooperative relationship between the patient, the family, and the professionals.

a) bcda b) cabc c) cdba d) bcad

Answer & Explanation

1. **c) bcda**

The first fragment is clearly **b** as no other fragment fits in.
Connectors:
b: Economists constructed an online price index
c: using food and beverage data from a prominent

c: using food and beverage data from a prominent
d: online marketplace to show that the index is capable

d: online marketplace to show that the index is capable

a: of tracking the level as well as the dynamics of CPI
The correct sequence is B-C-D-A.
Hence, option C is correct.

2. c) abcd

3. b) cbad
The ideal first fragment is **c** clearly.
Connectors:
c and b:
c: The Solid Waste Management Rules mostly
b: remain on paper while the producers

b and **a**:
b: remain on paper while the producers
a: of plastic articles also show little

a and **d:**
a: of plastic articles also show little
d: concern about their negative environmental impact

The correct sequence is c-b-a-d.
Hence, option b is correct.

4. d) acbd
Connectors:
a: Even though the e-commerce industry is
c: growing at the rate of over 60% per year, market

c: growing at the rate of over 60% per year, market
b: penetration has largely taken place only in

b: penetration has largely taken place only in
d: the 10-odd major metropolitan areas of India
The correct sequence is a-c-b-d.
Hence, option d is correct.

5. d) dacb

The fragment most suitable as the first one is **d**.
Connectors:
d and a:
d: 100% FDI was allowed in the food retail business in
a: 2016, but little money has come in as retailers want

a and **c**:
a: 2016, but little money has come in as retailers want
c: permission to stock a few non-food items

c and **b**:
c: permission to stock a few non-food items
b: like soaps and shampoos for customers

the correct sequence is d-a-c-b.
Hence, option d is correct.

6. a) cdba

7. c) bcda

8. b) dacb

9. d) bacd

10. c) adcb

11. c) acbd

The passage moves from the broader idea of “historical use of poisons” to a narrower idea of “biological weapons”. **a** opens the paragraph. It then moves to

biological weapons in **b**. In **b** treaties are signed against the use poisoned weapons. In **d** there is additional info about the treaties, that they contained no means of control. Thus acbd is the right sequence.

12. a) dabc

Statement **d** opens the para by introducing the idea of collaborative filtering. **a** takes the idea further by giving a first-and example of collaborative filtering. **b** talks about a problem with the algorithms of collaborative filtering, and **c** gives an example of that problem. Thus dabc form a coherent paragraph.

13. a) dbac

The clue to the sequence lies in the pronoun 'it', and in the phrase 'had come back', which suggests that it must have gone first, and then it must have come back. The pronoun 'it' refers to a disease, and is most likely to refer to the noun 'skin cancer'. Also, we must look for that sentence in which 'the skin cancer' must have gone back. Sentence **a** has the noun 'skin cancer' and says that the treatment had gone well. This connects sentence **a** with **c**. **ac** is a pair. Statement **d** is likely to start the paragraph because it opens the idea by suggesting that something had started. So the idea goes like this: it started with a lump and no one knew what it was. Thus, **d** and **b** form a pair. After this must have come the diagnosis. Thus dbac is the right sequence.

14. c) cbda

Statements **a** and **b** have the pronoun 'they', which is likely to refer to a noun. That noun is 'business elite' in statement **c**. Thus statement **c** would come before statement **a** and **b**. Statement **c** opens the paragraph by comparing a dieter with the business elite. The idea of social impact- investing and philanthro-capitalism in statement **c** connects with 'they would fund a million of the buzz wordy programs…' in statement **b**. Thus **cb** form a pair. **d** and **a** form a pair because in statement **d** 'doing the right thing would demand real sacrifice' and 'they would rather do virtuous side project assiduously'. The ideas connect. Thus cbda form a coherent paragraph.

15. d) bcad

There is no doubt that statements **b** and **c** form a pair because they both speak of 'having control'. Statement **b** says 'most people … prefer to have control…', while statement **c** says 'having control means…'. Thus **b** and **c** form a pair. The idea of self-management is further elaborated on by 'self-management support', which has been introduced in statement **d**. Now we come to the placement of statement **a**. As we see, statement **a** is not about self-management support, but about self management. Thus **a** must come before **d** because in **d** we have shifted our discussion from self-management to self-management support. Thus bcad is the right sequence. Statement **a** is the intermediate conclusion for statements **b** and **c**.

One word Substitution

Study / Science / Branch

The branch of philosophy concerned with the study of principles of beauty, especially in art	Aesthetics
The branch of medical science which deals with the problems of the old	Geriatrics
Science of diseases	Pathology
Science of Human mind and behavior	Psychology
Science of the races of mankind	Ethnology
Science regarding principles of classification	Taxonomy
The study of the human face.	Physiognomy
The art of metal-working	Metallurgy
The art of making fireworks.	Pyrotechnics
The art of elegant speech or writing.	Rhetorics
Study of caves	Speleology
The study of ancient writings.	Palaeography
The art of preserving skins.	Taxidermy
Study of mankind	Anthropology
Study of the nature of Gods	Theology
The scientific study of elections	Psephology
The study of ancient civilization	Archaeology
The study of birds	Ornithology
The study of plant life	Botany
The study of religion and religious ideas and beliefs	Theology
The study of the origin and history of words	Etymology
The study of worms and insects	Entomology
The study or collection of coins	Numismatics
The study of stamps.	Philately
Someone who scientifically studies the birds	Ornithologist
The study of animals.	Zoology
The study of rocks and soils	Geology

Cultivating and managing gardens.	Horticulture
The study or practice of dancing or composing ballets	Choreography

Person

A person who betrays someone or something	Traitor
A person who is the legal property of another and is forced to obey them	Slave
A person who accompanies and looks after another person or group of people	Chaperon
A person who is talkative	Garrulous
A person who settles a dispute or has ultimate authority in a matter	Arbiter
A handsome man	Adonis
A brave, noble – minded or chivalrous man	Gallant
One who sets type for books, newspapers, etc.	Compositor
A rough, violent, troublesome person	Tartar
A person who has lost protection of law	Outlaw
A person from the countryside who is considered to be awkward and stupid	Bumpkin
A person who sneaks into a country	Infiltrator
One who is reckless and wasteful with his money	Spendthrift
An unimportant person	Nonentity
A man having no hair on scalp	Bald
A man of lax moral	Licentious
A man who does not know how to read or write	Illiterate
A man who knows a lot about things like food, music and art	Connoisseur
A man who waste his money on luxury	Extravagant
A man with abnormal habits	Eccentric
A political leader appealing to popular desires and prejudices	Demagogue
A professional soldier hired to serve in a foreign army	Orator
A proficient public speaker	Sermon
A specialist who tests eyesight	Optometrist
A woman with dark brown hair	Brunette
A workman who fits and repairs pipes	Plumber

Experts who scientifically study insects	Entomologists
Men living in the same age	Contemporary
One absorbed in his own thoughts and feelings rather than on things outside	Introvert
One living on vegetables	Vegetarian
One not concerned with right or wrong	Amoral
One who believes in no government and therefore incites disorder in a state	Anarchist
One who believes in offering equal opportunities to women in all spheres	Feminist
One who believes in that gaining pleasure is the most important thing in life	Hedonist
One who believes that all things and events in life are predetermined is a	Fatalist
One who can think about the future with imagination and wisdom	Visionary
One who can walk on ropes (tightrope walker)	Funambulist
One who caters to the low desires of others	Panderer
One who collects coins	Numismatist
One who compiles a dictionary	Lexicographer
One who deserts his principle or believes	Renegade
One who deserts his religion	Apostate
One who destroys images or attacks popular beliefs	Iconoclast
One who does not care for literature or art	Philistine
One who does not follow the usual way of life	Bohemian
One who does not marry, especially as a religious obligation	Celibate
One who eats both vegetables and meat	Omnivorous
One who eats human flesh	Cannibal
One who enjoys inflicting pain on himself	Masochist
One who finds nothing good in anything	Critic
One who gains benefits from something	Beneficiary
One who gives free rein to his appetites	Libertine
One who goes to settle in another country	Emigrant
One who has become dependent on something or drugs	Addict
One who has narrow and prejudiced religious views	Fanatic
One who has obstinate and narrow religious views	Bigot
One who has suddenly gained new wealth, power or prestige	Parvenu
One who hates mankind	Misanthrope

One who hates women	Misogynist
One who hides away on a ship to obtain a free passage	Stowaway
One who is all powerful	Omnipotent
One who is always doubting	Sceptic
One who is beyond reforms	Incorrigible
One who is converted from one religion to other	Proselyte
One who is fond of fighting	Bellicose
One who is greedy	Voracious
One who is honourably discharged from service	Emeritus
One who is in charge of museum	Curator
One who is indifferent to pain and pleasure	Stoic
One who is unable to pay one's debt	Bankrupt
One who journeys from place to place	Itinerant
One who knows everything	Omniscient
One who knows many languages	Polyglot
One who lends money at a very high interest	Usurer
One who loves books	Bibliophile
One who loves or supports his or her country and is willing to defend it	Patriot
One who offers his services of his own freewill	Volunteer
One who performs daring gymnastics feats	Acrobat
One who plays for pleasure rather than as a professional	Amateur
One who practices one of fine arts	Artist
One who pretend to be what he is not	Hypocrite
One who resides in a country of which he is not a citizen	Alien
One who secretly listens to talks of others	Eavesdropper
One who sneers at the aims and beliefs of his fellow men	Cynic
One who speaks for others	Spokesman
One who stays away from school without permission	Truant
One who studies election trend by means of opinion polls	Psephologist
One who takes care of a building	Warden
One who thinks or speaks too much of himself	Egoist
One who uses fear as a weapon of power	Terrorist
One who walks in sleep	Somnambulist
One whose motive is merely to get money	Mercenary
Person believing in free will	Libertarian
Person leading a life of strict self-discipline	Ascetic

Person who believes that God is everything and everything is God	Pantheist
Person who eats too much	Glutton
Person who files a suit	Plaintiff
Person who insists on adherence to formal rules or literary meaning	Pedant
Someone who is designated to hear both sides of a dispute and make a judgement	Arbitrator
Those who do malicious damage	Saboteurs

Group / Collection

A body of persons appointed to hear evidence or judge and give their verdict (decision)	Jury
A collection of slaves	Coffle
A group of girls	Bevy
A group of cattle or sheep	Herd
A series of stars	Constellation
A group of sheep	Flock
A family of young animals	Brood
An exclusive circle of people with a common purpose	Clique
A group of followers hired to applaud at a performance	Claque
A group of three powerful people	Triumvirate
A large number of fish swimming together	Shoal
An assembly of worshippers	Congregation
A short journey made by a group of persons together	Excursion

Mania & Phobia

Obsession with books	Bibliomania
Delusion that one is incredibly intelligent	Sophomania
The form of madness which gives a person the idea that his importance is very great	Megalomania

Excessive desire to work	Ergomania
Obsession with writing	Graphomania
Excessive tendency towards materialism	Hylomania
Irresistible desire to repeat certain words	Onomatomania
fear of insects	entomophobia
fear of work	ergophobia
fear of marriage	gamophobia
fear of birth	genophobia
fear of old age	geraphobia
fear of knowledge	gnosiophobia
fear of writing	graphophobia
fear of women	gynaephobia
fear of blood	haemetophobia
fear of pleasure	hedonophobia
fear of travel	hodophobia
fear of water	hydrophobia
Irrational fear of crowds	Ochlophobia

Instrument / Device

An instrument for measuring electric current.	Ammeter
An instrument for measuring the force or variation of the wind.	Anemometer
An instrument for measuring air pressure.	Barometer
An instrument for recording revolutions.	Gyrograph
An instrument for distinguishing precious stones.	Lithoscope
An instrument for measuring gases.	Manometer
An instrument for beating or keeping time during a musical performance.	Metronome
An instrument for measuring minute distances.	Micrometer
Instrument used for measuring the intensity of sound.	Audiometer

Instrument used for improving imperfect sense of hearing.	Audiophone
An apparatus which records the fight data of an aeroplane and is also a voice recorder.	Black Box
A medical instrument for tracing heat movements.	Cardiograph
Instrument used for measuring the growth of plants.	Crescograph
Instrument used for measuring the depth of the ocean.	Fathometer
Instrument used for measuring the specific gravity of liquids.	Hydrometer
Instrument used for recording sound under water.	Hydrophone
Instrument used for measuring humidity in air.	Hygrometer
Instrument used for magnifying minute object by lens systems.	Microscope

Synonyms And Antonyms List

Synonyms And Antonyms List		
Words	**Synonyms - Same Meaning**	**Antonyms - Opposites**
Abate	Moderate, decrease	Aggravate
Adhere	Comply, observe	Condemn, disjoin
Abolish	Abrogate, annual	Setup Establish
Acumen	Awareness, brilliance	Stupidity, Ignorance
Abash	Disconcert, rattle	Uphold, Discompose
Absolve	Pardon, forgive	Compel, Accuse
Abjure	Forsake, renounce	Approve, Sanction
Abject	Despicable, servile	Commendable, Praiseworthy
Abound	Flourish, proliferate	Deficient, Destitute
Abortive	Vain, unproductive	Productive
Acrimony	Harshness, bitterness	Courtesy, Benevolence
Accord	Agreement, harmony	Discord
Adjunct	Joined, Added	Separated, Subtracted
Adversity	Misfortune, calamity	Prosperity, Fortune
Adherent	Follower, disciple	Rival, Adversary

Adamant	Stubborn, inflexible	Flexible, Soft
Admonish	Counsel, reprove	Approve, Applaud

Allay	Pacify, soothe	Aggravate, Excite
Alien	Foreigner, outsider	Native, Resident
Ascend	Climb Escalate	Descend, Decline
Alleviate	Abate, relieve	Aggravate, Enhance
Allure	Entice, fascinate	Repulse Repel
Arraign	Incriminate, indict	Exculpate, Pardon
Amplify	Augment, deepen	Lessen, Contract
Axiom	Adage, truism	Absurdity, Blunder
Audacity	Boldness, Courage	Mildness, Cowardice
Authentic	Accurate, credible	Fictitious, unreal
Awkward	Rude, blundering	Adroit, clever
Barbarous	Frustrate, perplex	Civilized
Bleak	Grim, Austere	Bright, Pleasant
Bewitching	Alluring, charming	Repulsive, Repugnant
Baroque	Florid, gilt	Plain, unadorned
Brittle	Breakable, crisp	Tough, Enduring
Barrier	Barricade, Obstacle	Link, Assistance

Baffle	Astound, Faze	Facilitate, Clarify
Bustle	Commotion, Tumult	Slowness, Quiet
Barren	Desolate, Sterile	Damp, Fertile
Bawdy	Erotic, Coarse	Decent, Moral
Bind	Predicament	Release

Batty	Insane, silly	Sane
Benevolent	Benign, Generous	Malevolent, Miserly
Befogged	Becloud, Dim	Clear headed, Uncloud
Base	Vulgar, Coarse	Summit, Noble
Benign	Favorable, friendly	Malignant, Cruel
Busy	Active, Engaged	Idle, Lazy
Bleak	Austere, Blank	Bright, Cheerful
Bold	Adventurous	Timid
Boisterous	Clamorous, rowdy	Placid, Calm
Blunt	Dull, Insensitive	Keen, Sharp
Callous	obdurate, unfeeling	Compassionate, Tender
Capable	competent, able	Incompetent, Inept
Calamity	adversity, misfortune	Fortune
Calculating	Canny, Devious	Artless, honest

Calumny	defamation, aspersion	Commendation, Praise
Captivity	imprisonment, confinement	Freedom, Liberty
Captivate	Charm, fascinate	Disillusion offend
Chaste	virtuous, pure	Sullied, Lustful
Cease	terminate, desist	Begin, Originate
Compassion	kindness, sympathy	Cruelty, Barbarity
Chastise	punish, admonish	Cheer, encourage
Concede	yield, permit	Deny, reject

Comprise	include, contain	Reject, lack
Consent	agree, permit	Object Disagree
Concur	approve, agree	Differ, disagree
Consolidate	solidify, strengthen	Separate, Weaken
Consequence	effect, outcome	Origin, Start
Contempt	scorn, disregard	Regard, Praise
Conspicuous	prominent, obvious	Concealed, hidden
Contrary	dissimilar, conflicting	Similar, Alike
Contradict	deny, oppose	Approve, Confirm
Callous	Insensitive, indurated	Kind, merciful
Calm	Harmonious, unruffled	Stormy, turbulent

Candid	Blunt, bluff	Evasive
Camouflage	Cloak, disguise	Reveal
Carnal	Earthly, fleshly	Spiritual
Captivate	Beguile, bewitch	Repel
Celebrated	Acclaimed, lionized	Unknown, Inglorious
Catholic	Generic, liberal	Narrow- minded
Censure	Rebuke, reprimand	Praise, Acceptance
Cement	Plaster, mortar	Disintegrate
Clandestine	Covert, fruitive	Open, Legal

Cheap	Competitive, Inexpensive	Dear, unreasonable
Coarse	Bawdy, Boorish	Fine, Chaste
Classic	Simple, Typical	Romantic, Unusual
Compact	Bunched, thick	Loose, Diffuse
Comic	Clown, Jester	Tragic, tragedian
Conceit	Egotism, Immodesty	Modesty
Compress	Abbreviate, Shrink	Amplify, Expand
Condemn	Castigate, Chide	Approve, Praise
Concord	Agreement, accord	Discord
Consolidate	Centralize, Fortify	Weaken

Confident	Bold, Undaunted	Diffident, cowardly
Creation	Formation, foundation	Destruction
Courtesy	Generosity, Reverence	Disdain, Rudeness
Cunning	Acute, Smart	Nave, Coarse
Decipher	interpret, reveal	Misinterpret, distort
Decay	Collapse, decompose	Flourish, Progress
Deceit	deception, artifice	Veracity, Sincerity
Defray	spend, pay	Disclaim, Repudiate
Defile	contaminate, pollute	Purify, sanctity

Demolish	Ruin, devastate	Repair, construct
Deliberate	cautious, intentional	Rash, Sudden
Deride	mock, taunt	Inspire, Encourage
Deprive	despoil, divest	Restore, Renew
Dissuade	Remonstrate, Counsel	Insite, Persuade
Disdain	detest, despise	Approve, praise
Dense	Opaque, piled	Sparse, brainy
Denounce	Blame, boycott	Defend
Despair	Depression, misery	Contentment, Hope
Derogatory	Sarcastic, critical	Laudatory, appreciative

Docile	Pliable, pliant	Headstrong, obstinate
Destructive	Catastrophic, pernicious	Creative, Constructive
Dwarf	Diminutive, Petite	Huge, Giant
Eclipse	Diminution, Dimming	Shine, eclipse
Eager	Keen, acquisitive	Indifferent, apathetic
Ecstasy	delight, exultation	Despair, Calamity
Eccentric	strange, abnormal	Natural, Conventional

Encumbrance	hindrance, obstacle	Incentive, stimulant
Efface	destroy, obliterate	Retain, Maintain
Eloquence	expression, fluency	Halting, Stammering
Enormous	colossal, mammoth	Diminutive, negligible
Endeavour	undertake, aspire	Cease, quit
Equivocal	uncertain, hazy	Obvious, lucid
Epitome	precise, example	Increment, expansion
Eradicate	destroy, exterminate	Secure, plant
Fallacy	delusion, mistake	Veracity, Truth
Fabricate	construct, produce	Destroy, Dismantle
Fanatical	narrow-minded, biased	Liberal, Tolerant
Falter	stumble, demur	Persist, Endure

Ferocious	cruel, fierce	Gentle, Sympathetic
Feeble	weak, frail	Strong, Robust
Fluctuate	deflect, vacillate	Stabilize, resolve
Feud	strife, quarrel	Harmony, fraternity
Fragile	weak, infirm	Enduring, Tough
Forsake	desert, renounce	Hold, maintain
Frivolous	petty, worthless	Solemn, significant
Frantic	violent, agitated	Subdued, gentle

Frugality	economy, providence	Lavishness, extravagance
Gloom	obscurity, darkness	Delight, mirth
Gather	Converge, huddle	Disperse, Dissemble
Gorgeous	magnificent, dazzling	Dull, unpretentious
Glut	stuff, satiate	Starve, abstain
Grisly	disgusting, atrocious	Pleasing, attractive
Gracious	courteous, beneficent	Rude, Unforgiving
Guile	cunning, deceit	Honesty, frankness
Grudge	hatred, aversion	Benevolence, Affection
Genuine	Absolute, Factual	Spurious
Generosity	Altruism, bounty	Stinginess, greed

Glory	Dignity, renown	Shame, Disgrace
Gloomy	Bleak, cloudy	Gay, Bright
Harass	irritate, molest	Assist, comfort
Hamper	retard, prevent	Promote, facilitate
Hazard	Peril, danger	Conviction, security

Hapless	unfortunate, ill-fated	Fortunate, Lucky
Haughty	arrogant, pompous	Humble, Submissive
Hideous	frightful, shocking	Attractive, alluring
Heretic	non-conformist, secularist	Conformable, religious
Harmony	Conformity, Amicability	Discord, discord
Hamstrung	Cripple Debilitate	Strengthen, Encourage
Honor	Adoration, Reverence	Denunciation, Shame
Hasty	Abrupt, Impetuous	Leisurely, Cautious
Humility	Resignation, Fawning	Boldness, Pride
Humble	Meek, Timid	Proud, Assertive
Impenitent	Uncontrite, Obdurate	Repentant
Hypocrisy	Deception, Pharisaism	Sincerity, frankness
Indifferent	Equitable, Haughty	Partial, Biased
Impulsive	Flaky, Impetuous	Cautious, Deliberate

Infernal	Damned, Accursed	Heavenly,

Indigent	Destitute, Impoverished	Rich, Affluent
Interesting	Enchanting, Riveting	Dull, Uninteresting
Insipid	Tedious, Prosaic	Pleasing, appetizing
Immense	huge, enormous	Puny, Insignificant
Immaculate	unsullied, spotless	Defiled, Tarnished
Imminent	impending, brewing	Distant, Receding
Immerse	submerge, involve	Emerge, uncover
Impair	diminish, deteriorate	Restore, Revive
Immunity	prerogative, privilege	Blame, Censure
Impediment	hurdle, obstruction	Assistant, Concurrence
Impartial	just, unbiased	Prejudiced, Biased
Impute	attribute, ascribe	Exculpate, support
Impious	irreligious, unholy	Pious, Devout
Incompetent	inefficient, unskilled	Dexterous, Skilled
Inclination	disposition, affection	Indifference, Disinclination
Inevitable	unavoidable, ascertained	Unlikely, Doubtful

Incongruous	inappropriate, absurd	Compatible, harmonious
Ingenuous	undisguised, naive	Wily, Craftly

Infringe	violate, encroach	Comply, Concur
Insipid	tasteless, vapid	Delicious, luscious
Insinuate	allude, hint	Conceal, Camouflage
Instill	inculcate, inject	Eradicate, extract
Insolvent	indigent, destitute	Wealthy, solvent
Intrigue	scheme, conspiracy	Candor, Sincerity
Intricate	tangled, complicated	Regulated, Orderly
Invective	accusation, censure	Approval, acclamation
Intrinsic	genuine, fundamental	Extraneous, incidental
Immaculate	Exquisite, Impeccable	Defiled, Tarnished
Invincible	unconquerable, impregnable	Effeminate, languid
Irrepressible	irresistible, unconfined	Composed, hesitant
Jejune	dull, boring	Interesting, exciting
Jaded	tired, exhausted	Renewed, recreated
Jubilant	rejoicing, triumphant	Melancholy, depressing
Jovial	frolicsome, cheerful	Solemn, morose
Just	honest, impartial	Unequal, unfair
Judicious	thoughtful, prudent	Irrational, foolish
Juvenile	young, tender	Dotage, antiquated

Justify	defend, exculpate	Impute, arraign
Knave	dishonest, scoundrel	Paragon, innocent
Knotty	complicated difficult	Simple, manageable
Kindred	relation, species	Unrelated, dissimilar
Keen	sharp, poignant	Vapid, insipid
Knell	death knell, last blow	Reconstruction, rediscovery
Lax	slack, careless	Firm, reliable
Lavish	abundant, excessive	Scarce, deficient
Liable	accountable, bound	Unaccountable, apt to
Lenient	compassionate, merciful	Cruel, severe
Lucid	sound, rational	Obscure, hidden
Lure	attract, entice	Repel, dissuade
Linger	loiter, prolong	Hasten, quicken
Liberal	magnanimous, generous	Stingy, malicious
Lunacy	delusion, insanity	Normalcy, sanity
Luxuriant	profuse, abundant	Scanty, meagre

Luscious	palatable, delicious	Unsavory, tart
Languid	Sluggish, apathetic	Energetic, spirited
Mandatory	Imperative, requisite	Optional

Malice	Vengefulness, grudge	Goodwill, Kindness
Merit	Stature, Asset	Demerit, dishonor
Masculine	Gallant, strapping	Feminine, meek
Mitigate	alleviate, relieve	Augment enhance
Miraculous	marvelous, extraordinary	Ordinary, trivial
Molest	harass, tease	Console, soothe
Modest	humble, courteous	Arrogant, pompous
Momentous	notable, eventful	Trivial, insignificant
Mollify	appease, assuage	Irritate, infuriate
Morbid	Nasty, Macabre	Healthy, Cheerful
Monotonous	irksome, tedious	Varied, pleasant
Murky	dusky, dreary	Bright, shining

Munificent	liberal, hospitable	Frugal, penurious
Mutual	joint, identical	Separate, distinct
Mutinous	recalcitrant, insurgent	Submissive, faithful
Nimble	prompt, brisk	Sluggish, languid
Niggardly	miser, covetous	Generous, profuse
Noxious	baneful, injurious	Healing, profitable
Notion	Conceit, Apprehension	Reality, Concrete

Novice	tyro, beginner	Veteran, ingenious
Nonchalant	indifferent, negligent	Attentive, considerate
Nullify	cancel, annual	Confirm, Uphold
Numerous	profuse, various	Scarce, deficient
Obliging	Complaisant, Willing	Mulish, Obstinate
Obstruct	impede, prevent	Hasten, encourage
Obstinate	Stubborn, Adamant	Pliable, flexible
Obscure	Arcane, Vague	Prominent
Obvious	Evident, apparent	Obscure, ambiguous
Obtain	Access, Inherit	Forfeit
Offensive	Abhorrent, obnoxious	Engaging, fascinating
Odious	Malevolent, obnoxious	Engaging, fascinating
Offspring	descendant, sibling	Ancestor, forefather

Occult	latent, ambiguous	Intelligible, transparent
Opaque	obscure, shady	Transparent, bright
Ominous	Menacing, Foreboding	Auspicious
Oracular	cryptic, vague	Lucid, distinct
Optimist	Idealist	Pessimist
Ornamental	decorative, adorned	Unseemly, plain

Ordain	Order, impose	Revoke abolish
Outrage	offence, maltreatment	Praise, favour
Outbreak	eruption, insurrection	Compliance, subjection
Persuade	Cajole, Impress	Dissuade, halt
Pacify	Appease, Chasten	Irritate, worsen
Propagate	Inseminate, fecundate	Suppress, deplete
Perturbed	Flustered, anxious	Calm
Prompt	Precise, Punctual	Slow, Negligent
Progress	Pace, Betterment	Retrogress, worsening
Pamper	Flatter, indulge	Deny, disparage
Prudence	Vigilance, Discretion	Indiscretion
Peerless	matchless, unrivalled	Mediocre, commonplace

Paramount	foremost, eminent	Trivial, inferior
Pertness	flippancy, impudence	Modesty, diffidence
Peevish	perverse, sullen	Suave, amiable
Placid	tranquil, calm	Turbulent, hostile
Perverse	petulant, obstinate	Complacent, docile
Precarious	doubtful, insecure	Assured
Pompous	haughty, arrogant	Unpretentious, humble

Predicament	plight, dilemma	Resolution, confidence
Quaint	Queer, strange	Familiar, usual
Quack	Impostor, deceiver	Upright, unfeigned
Quell	subdue, reduce	Exacerbate, agitate
Quarantine	seclude, screen	Befriend, socialize
Quibble	equivocate, prevaricate	Unfeigned, plain
Rapidity	Quickness, Velocity	Inertia, lanquidity
Raid	Incursion, Foray	Retreat, release
Rebellious	Restless, attacking	Submissive, Compliant
Reason	Acumen, Bounds	Folly, Speculation
Reluctant	Cautious, Averse	anxious, Eager
Rectify	Amend, Remedy	Falsify, Worsen

Ravage	Destroy, ruin	Reconstruct, renovate
Remnant	Residue, piece	Entire, whole
Ratify	consent, approve	Deny, dissent
Restrain	Detain, Confine	Incite
Redeem	Recover, liberate	Conserve lose
Remorse	Regret, penitence	Ruthlessness, obduracy
Remonstrate	Censure, protest	Agree, loud

Resentment	Displeasure, wrath	Content, Cheer
Rescind	Annul, abrogate	Delegate, permit
Reverence	Respect, esteem	Disrespect, affront
Retract	Recant, withdraw	Confirm, assert
Rustic	Rural, uncivilized	Cultured, Refined
Rout	Vanquish, overthrow	Succumb, withdraw
Ruthless	Remorseless, inhumane	Compassionate, lenient
Savage	Wild, untamed	Polished, Civilized
Sacred	Cherish, Divine	Ungodly, Profane
Steep	Course, lofty	Flat, gradual
Startled	Frightened, Shocked	Waveringly

Sublime	Magnificent, eminent	Ridiculous
Stranger	Immigrant, guest	Acquaintance, national
Sympathy	Tenderness, harmony	Antipathy, Discord
Succinct	Concise, Terse	Lengthy, polite
Sarcastic	Ironical, derisive	Courteous, gracious
System	Scheme, Entity	Chaos, Disorder
Shrewd	Cunning, craftly	Simple, imbecile
Saucy	Impudent, insolent	Modest, humble

Servile	Slavish, Docile	Aggressive, Dominant
Scanty	scarce, insufficient	Lavish, multitude
Slander	defame, malign	Applaud, approve
Shabby	miserable, impoverished	Prosperous, thriving
Solicit	entreat, implore	Protest oppose
Sneer	mock, scorn	Flatter, praise
Stain	blemish, tarnish	Honor, purify
Subterfuge	Deceit, Stratagem	Frankness, Openness
Sporadic	intermittent, scattered	Incessant, frequent
Spurious	Fake, Counterfeit	Genuine, Authentic
Squalid	dirty, filthy	Tidy, Attractive
Spry	Nimble, Brisk	Lethargic, Sluggish

Sterile	Barren, Impotent	Profitable, Potent
Successful	Propitious, Felicitous	Destitute, Untoward
Subsequent	consequent, following	Preceding, previous
Stupor	lethargy, unconsciousness	Sensibility, Consciousness
Subvert	Demolish, sabotage	Generate, organize
Substantial	Considerable, solid	Tenuous, fragile
Sycophant	Parasite, flatterer	Devoted, loyal

Superficial	Partial, shallow	Profound, discerning
Taciturn	Reserved, silent	Talkative, extrovert
Taboo	Prohibit, ban	Permit, consent
Temperate	Cool, moderate	Boisterous, violent
Tedious	Wearisome. Irksome	Exhilarating, lively
Tenacious	Stubborn, Dodge	Docile, non- resinous
Tenement	Apartment, Digs	Breakeven, dislodge
Timid	Diffident, coward	Bold, intrepid
Throng	Assembly, crowd	Dispersion, sparsity
Transient	Temporal, transitory	Lasting, enduring
Tranquil	Peaceful, composed	Violent, furious
Treacherous	Dishonest, duplicitous	Forthright, reliable
Trenchant	Assertive, forceful	Feeble, ambiguous
Tumultuous	Violent, riotous	Peaceful, harmonious
Trivial	Trifling, insignificant	Significant, veteran

Tame	Compliant, Subdued	Wild, untamed
Tyro	Beginner, riotous	Proficient, veteran
Thick	Chunky, massive	Thin, attenuated
Terse	Incisive, Compact	Diffuse, Gentle

Tranquil	Amicable, Calm	Agitated, Fierce
Thrifty	Frugal, prudent	Extravagant
Tremble	Vibrate	Steady
Transparent	Diaphanous	Opaque
Utterly	Completely, entirely	Deficiently, incomplete
Uncouth	Awkward, ungraceful	Elegant, Compensate
Uncouth	Boorish, Clownish	Elegant, Compensate
Umbrage	Chagrin, offense	Sympathy, goodwill
Urge	Incite, Implore	Abhorrence, Abomination
Urchin	Foundling, Orphan	Creep, Knave
Vagrant	Wander, roaming	Steady, settled
Vain	Arrogant, egoistic	Modest
Vanity	Conceit, pretension	Modesty, Humility
Valor	Bravery, prowess	Fear, cowardice
Venom	Poison, malevolence	Antidote, Benevolent

Venerable	Esteemed, honored	Unworthy, immature
Vicious	Corrupt, obnoxious	Noble, Virtuous
Veteran	Ingenious, experienced	Novice, tyro
Vivacious	Spirited, Energetic	Dispirited, Unattractive

Vigilant	Cautious, alert	Careless, negligent
Vouch	Confirm, consent	Repudiate, prohibit
Vilify	Malign, Slur, Defame	Cherish, Commend
Vivid	Eloquent, lucid	Dull, Dim
Virtue	Ethic, morality	Vice, dishonesty
Wan	Pale, faded	Bright, healthy
Waive	Relinquish, remove	Impose, Clamp
Wary	cautious, circumspect	Heedless, negligent
Wane	Decline, Dwindle	Ameliorate, Rise
Wicked	vicious, immoral	Virtuous, Noble
Wed	marry, combine	Divorce, Separate
Wile	Trickery, Artifice	Naivety, honor
Wield	Exert, employ	Forgo, avoid

Wilt	wither, perish	Revive, bloom
Winsome	Beautiful, Comely	Alluring, Rapturous
Yield	surrender abdicate	Resist, protest
Yell	shout, shriek	Whisper muted
Yoke	connect, harness	Liberate, Release
Yearn	languish, crave	Content, satisfy

Zenith	summit, apex	Nadir, base
Zeal	eagerness, fervor	Apathy, lethargy
Zig -zag	oblique, wayward	Straight, unbent
Zest	delight, enthusiasm	Disgust, passive

CLOZE TEST

Test I

1. Deepak will be able to speak English well a year from now _____ he works hard.
   a. if b. had c. provided d. because
2. Even if it rains all day I will not be able to _____ my journey
. put away b. put out c. put off d. put by
3. The master dispensed _____ the services of his servant
. with b. off c. up d. for
4. Can I _____ some money from you?
. borrow b. loan c. take d. required
5. He is fond ____ reading novels
. about b. of c. at d. for

Answers:

1. a 2. c 3. a 4. a 5. b

Test II

According to a report in yesterday's newspaper _____1_____ police dog was taken to Raj Bhavan _____2_____ Monday. This was to trace the ____3____ of the "very important horse" which _____4_____ reported missing on Sunday. The dog picked _____5_____ the scent on some traces of _____6_____ and ran a few yards before losing the ____7____. The police have launched a vigorous _____8_____ in this matter. A fingerprint expert and a photographer were ____9_____. _____10____ investigation was going in its own pace and _____11_____ are now fourteen horses at Raj Bhavan. _____12_____ are kept in a large shed near the gate.

1.	a. the	b. an	c. a	d. that
2.	a. at	b. next	c. on	d. last
3.	a. killers	b. dog	c. police	d. cat
4.	a. has	b. were	d. was	d. had
5.	a. up	b. at	c. in	d. on
6.	a. those	b. blood	c. report	d. track
7.	a. race	b. game	c. track	d. bet
8.	a. search	b. campaign	c. hunt	d. investigation
9.	a. reported	b. ordered	c. given up	d. requisitioned

10.	a. the	b. an	c. a	d. that
11.	a. here	b. there	c. we	d. so
12.	a. were	b. who	c. which	d. they

Answers:

1. c	4. d	7. c	10. a
2. d	5. a	8. d	11. b
3. a	6. b	9. d	12. c

Test III

The origin of the caste system in India is ____(1)_____ to the functional division of labour.

The population was divided into classes on the basis of functions or occupations of particular families and groups. However, in the course of time, these divisions between various sections of the society became very ___(2)__. It seems that, in the former times, the caste system gave ____(3)_____ for specialization and distributed the work in a way that promoted professional skill and expertise. It helped the various art and industries to ____(4)_____. Even the least talented person had the opportunity to _____(5)_____ his living.

1.	a. opulent	b. attributed	c. effusive	d. derived
2.	a. rigid	b. untenable	c. abrasion	d. defiance
3.	a. articulate	b. arcane	c. earnest	d. scope
4.	a. generic	b. brisk	c. flourish	d. draught
5.	a. earn	b. iota	c. tardy	d. gaudy

Answers:

1. b.	2. a	3. d	4. c	5. a

Test IV

1. I forgot to carry my _____ to school, I therefore, had to share with my friend.
   a. bat b. class c. cassette d. book
2. He ate _____ papaya and threw its seeds away.
   a. that b. the c. a d. this
3. _____ for half an hour left me breathless.

a. Sleeping b. slept c. exercising d. exercised

4. His father _____ (touch) him on his back in admiration as he told him about his promotion.

a. slapped b. patted c. touched d. hit

5. The director, being the head, _____ the meeting of the council

. a. attended b. absented c. chaired d. abstained

Answers:

1. d 2. a 3. c 4. b 5. c

Test V

Jill was walking to her class slowly. She was worried ___1___ the History test she would have to ___2___ that morning. As she was reaching the classroom, a piece of paper suddenly fluttered down and ___3___ near her feet. As Jill glanced down at the paper, her heart nearly ___4___ a beat. It was the History test paper complete ___5___ answers!

Jill's very first thought was not to ___6___ anyone about what she had found. She would memorize ___7___ the answers and do extremely ___8___ in the test. After some hard thinking, however, she knew that it would be a very ___9___ thing to do. Besides, it would not be ___10___ to her classmates. In the ___11___, Jill returned the paper to her History teacher, Miss James.

"Thanks, Jill. I have been searching high and ___12___ for it," said the teacher.

"I...I've read all the questions ___13___, Miss James," Jill confessed.

Miss James ___14___ her not to worry as she would think of new questions for the test. Jill's ___15___ sank. She was half hoping that the test ___16___ be cancelled. Nevertheless, she did her best in the new test later that day.

A few days later, the test papers were ___17___ to the class. To her pleasant surprise, Jill discovered that she had ___18___ eighty marks.

"You know something," she told her friends. "I could easily have scored ___19___ marks if I had cheated on this test. But I wouldn't be as pleased as I am ___20___ with the eighty marks I obtained."

1.	a. on	b. about	c. with	d. in
2.	a. give	b. buy	c. take	d. get
3.	a. landed	b. fell	c. right	d. felt
4.	a. pumped	b. left	c. charged	d. missed
5.	a. full	b. with	c. in	d. filled
6.	a. call	b. tell	c. say	d. said

7.	a. of	b. few	c. all	d. some
8.	a. well	b. super	c. perfect	d. better
9.	a. bad	b. worst	c. dishonest	d. negative
10.	a. unfair	b. moral	c. good	d. fair
11.	a. process	b. end	c. hall	d. room
12.	a. low	b. top	c. everywhere	d. bottom
13.	a. answers	b. paper	c. already	d. now
14.	a. said	b. told	c. replied	d. questioned
15.	a. thought	b. brain	c. reputation	d. heart
16.	a. will	b. shall	c. would	d. finally
17.	a. valued	b. returned	c. questioned	d. opened
18.	a. score	b.get	c. secured	d. won
19.	a. centum	b. high	c. low	d. full
20.	a. then	b. later	c. now	d. good

Answers:

1. b	5. b	9. c	13. c	17. b
2. c	6. b	10. d	14. b	18. c
3. a	7. c	11. b	15. d	19. d
4. d	8. a	12. a	16. c	20. c

Test VI

One day my son called me after his exams. I could make out from his voice that he was (1) __. “The exam did not go so well. It was not that know but I made a careless mistake.” I tried to (2) __ him saying, “Don’t worry, you will do better next time.” He was not pleased to hear my words. “You don’t realise how competitive it is here and how difficult It is to (3) __ anything.” A few days later I got another call from him. “A (4) __ thing happened”, he said. “When I got my paper I saw that I had (5) __ marks for the question I had answered incorrectly. My friends (6) __ me to keep quiet as the Professor must have made a mistake. But you taught me the value of honesty so I emailed him saying I did not (7) __ the marks.” His reply was more surprising. “It was (8) __ ,” he said. “My interaction with you throughout the year (9) __ me that you knew how to solve the problem. That is the reason I gave you those marks.” I was happier about my son’s (10) __ than his marks.

1.	a. distress	b. bother	c. sad	d. confused
2.	a. pity	b. console	c. forgive	d. sympathise

3.	a. strive	b. triumph	c. succeed	d. achieve
4.	a. funny	b. thrilling	c. sad	d. different
5.	a. assigned	b. awarded	c. received	d. given
6.	a. suggested	b. advised	c. warn	d. recommended
7.	a. justify	b. qualify	c. need	d. deserve
8.	a. intend	b. deliberate	c. oversight	d. mistaken
9.	a. convinced	b. persuade	c. proved	d. informed
10.	a. value	b. moral	c. honesty	d. truth

Answers:

1.	c	3.	d	5.	b	7.	d	9.	a
2.	b	4.	a	6.	a	8.	b	10.	c

Test VI

Plastic and other pieces of debris have ___ A ___ found in the deepest parts of the ocean, according to a new study. A single-use plastic bag was among the 3,500 fragments ___ B ___ at a depth of 11,000 metres. More than one third of what was found was macroplastic – visible pieces of plastic larger than 5mm. The research ___ C ___ the deepest evidence of the ocean's pollution problem. "As the deep sea is likely to be the final destination of floating plastic debris, the frequent ___ D ___ and widespread distribution of plastic debris in the deep sea indicate that large numbers of plastic debris pieces are distributed ___ E ___ the water column and in the high seas," the researchers said.

A.	a. been	b. recently	c. being	d. never
B.	a. extracted	b. surfaced	c. discovered	d. sailing
C.	a. indicate	b. foresees	c. culminates	d. demonstrates
D.	a. occurrence	b. occurring	c. development	d. happen
E.	a. whole	b. throughout	c. everywhere	d. during

Answers:

A.	a	B.	c	C.	d	D.	a	E.	b

Test VII

Two weeks after the country's top court ordered the telecom industry to pay Rs. 92,000 crore in ____ A ____ to the government, operators have pinned their hopes on a government panel that was set up to suggest relief measures for the sector that is struggling with heavy debt and mounting losses. The relief measures, experts said, will not only help the telecom industry stay viable and protect billions of dollars in ____ B ____, but also prevent the digital economy, which runs on the mobile services infrastructure, from being disrupted.

"The demand of Rs.92,000 crore will dampen the sentiment of telecom operators, and raising funds for broadband, network expansion and Digital India will hit a significant roadblock. The impact is not limited to telecom operators but will have a ____ C ____ effect on the larger digital value chain. This requires immediate ____ D ____ by all stakeholders to get the sector back in shape," said Prashant Singhal, emerging markets, technology, media and telecom leader, EY India.

Following the court verdict, the Centre last week set up a Committee of Secretaries under the cabinet secretary to suggest measures to alleviate ____ E ____ stress in the sector. The Cellular Operators Association of India (COAI) has sought an easier payment schedule for spectrum bought in previous auctions, ____ F ____ penalty and interest arising out of adjusted gross revenue (AGR) dues, and a 14-year period to pay the principal amount of AGR dues.

A.	a. dues	b. Surplus	c. last	d. tax
B.	a. money	b. gain	c. revenue	d. investments
C.	a. weaker	b. stronger	c. domino	d. weird
D.	a. protest	b. intervention	c. interference	d. deadlock
E.	a. horizontal	b. vertical	c. financial	d. welcome
F.	a. augmenting	b. waiving	c. lactating	d. catapulting

Answers:

A. a B. d C. c D. b E. c F. b

Test VIII

Three American spies were long known for having stolen U.S. atomic secrets between 1940 and 1948, sharing that information with the Soviets. Their actions fast-tracked the U.S.S.R's development of nuclear weapons and set the ____ A ____ for the Cold War. But in fact, there was a fourth spy — code-name "Godsend" — who handed over atomic secrets to Soviet intelligence. This person's identity was ____ B ____ from public view until now. His real name was Oscar Seborer, and he

worked at the Los Alamos National Laboratory in New Mexico, home of the Manhattan Project where the first nuclear weapons were designed. For decades, Seborer's name ____ C ____ in relative ____ D ____ , mentioned in a few dozen pages amid tens of thousands of secret documents compiled by the FBI. But once these files were declassified in 2011, they came to the attention of two historians, John Earl Haynes and Harvey Klehr. The researchers named Seborer as the fourth Los Alamos spy, based on the 2011 declassified FBI documents, as well as ____ E ____ records from a decades-long initiative called Operation SOLO. The operation, which ran from 1952 to 1980, centered on two brothers in the U.S. Communist Party who were FBI informants. To date, only the SOLO files up to 1956 have been released, and many open questions remain about Seborer's activities as a spy and what happened to him after he later ____ F ____ to the U.S.S.R., the researchers wrote.

A. a. plate	b. stage	c. sand	d. water
B. a. hurdled	b. blindfolded	c. concealed	d. darkened
C. a. declined	b. deteriorated	c. crumbled	d. languished
D. a. obscurity	b. absence	c. anonymity	d. oblivion
E. a. doctored	b. falsified	c. partial	d. absolute
F. a. betrayed	b. defected	c. delivered	d. convicted

Answers:

A. b B. c C. d D. a E. c F. b

Test IX

Monday's record rally in stocks should be seen as one that was ___A___ primarily by investor sentiments rather than by market fundamentals. As with any purely sentiment-driven rally, things can take a turn for the worse if subsequent events ___B___ to meet the market's expectations. There is very little in the form of market fundamentals to warrant the kind of exuberance shown by investors on Monday. Corporate earnings data released as of now for the January-March quarter

suggest that earnings might actually witness a ___C___ fall from what they were a year ago. Growth has also been slowing down in core sectors as consumer demand has ___D___ to pick up and liquidity remains a concern across the economy. Still, investors may be hoping that things could get ___E___ in the coming years as a stable government at the Centre will be able to undertake economic reforms. While the fact remains that no big-bang reforms that could give a strong boost to economic growth have been implemented in the last five years, investors may still view the NDA government as less-populist than any other realistic alternative. Trade tension between the U.S. and China is another immediate ___F___ that will determine the direction of equity markets, including India's, as China tries to find new markets for ___G___ that it can't sell to Americans. Given these various uncertainties, it would be prudent not to over-read the message in the stock market fluctuations.

A. a. detrimental b. driven c. decayed d. ride
B. a. pass b. proceed c. fail d. attempt
C. a. significant b. impromptu c. consistency d. exonerated
D. a. continue b. unable c. crossed d. failed
E. a. worsen b. better c. resistant d. improve
F. a. tie b. match c. risk d. fix
G. a. products b. ideas c. consumers d. people

Answers:

A. b B. c C. a D. d E. b F. c G. a

Problems on Age

1. Present ages of Sameer and Anand are in the ratio of 5 : 4 respectively. Three years hence(after), the ratio of their ages will become 11 : 9 respectively. What is Anand's present age in years?

a)26yrs b)38yrs c)24yrs d)32yrs

Answer: Option C

Basic Formula:

If the present age of A is 'x' years, the age of A, n years ago was (x-n) years, and the age of a after n years will be (x+n) years.

Explanation note :

Given : The ratio of the present ages of Sameer and Anand is 5:4

Let the present ages of Sameer be 5x years

Let the present ages of Anand be 4x years

Given: 3years hence (after), the ratio is 11 : 9

$5x + 3 : 4x + 3$

$11 : 9$

$\frac{5x+3}{4x+3} = 11/9$

$(5x+3)\ 9 = 11\ (4x + 3)$

$45x + 27 = 44x + 33$

$45x - 44x = 33 - 27$

$X = 6$

To find: Present age of Anand

∴The present age of Anand is 4(6) years = 24 years

2. At present, the ratio between the ages of Arun and Deepak is 4 : 3. After 6 years, Arun's age will be 26 years. What is the age of Deepak at present?

a)15yrs b)18yrs c)34yrs d)22yrs

Answer: Option A

Explanation note:

Given : The ratio between the ages of Arun and Deepak = 4 : 3

Let the present age of Arun be 4x

Let the present age of Deepak be 3x

Given : After 6 years, Arun's age is 26 years

$4x + 6 = 26$

$4x = 20 \Rightarrow x = 5$

To find : Deepak's present age

$3x = ? \Rightarrow 3(5) = 15$ years

3.The ratio of the ages of Meena and Meera is 4:3, The sum of their ages is 28 years. The ratio of their ages after 8 years will be ?

a)5:5 b)4:3 c)4:5 d)6:5

Answer: Option D

Explanation note:

Let the present age of Meena be 4x years

Let the present age of Meera be 3x years

Given : The ratio of the ages of Meena & Meera is 4 : 3

$4x : 3x$

Given : The sum of their ages is 28 years

$4x + 3x = 28$

$7x = 28 \Rightarrow 4$

To find : The ratio of their ages after 8 years

$4x + 8 : 5x + 8$

$4(4) + 8 : 5(4) + 8 \Rightarrow 24 : 20$

$6 : 5$

4.The ratio of the present ages of two brothers is 1 : 2 and 5 years back, the ratio was 1 : 3. What will be the ratio of their ages after 5 years?

a)3:5 b)4:5 c)2:5 d)5:3

Answer: Option A

Explanation note :

Let the two brothers be X and Y

Given: The ratio of the present ages of X and Y is 1:2

Let the present age of X be x years

Let the present age of Y be 2x years

$\therefore$ X : Y

$\Rightarrow$ x : 2x

Given : 5 years back (before), the ratio was 1:3

x-5 = 1 : 2x-5 = 3

$\frac{x-5}{2x-5}$ = 1/3

3 (x-5) = 2x-5

3x-15 = 2x-5 $\Rightarrow$ 3x-2x = -5 +15 $\Rightarrow$ x = 10

To find : The ratio of their ages after 5 years

X+5 = ? : 2x + 5 = ?

10 + 5 = 15 : 2(10)+5 = 25

$\Rightarrow$ 15 : 25 $\Rightarrow$ 3 : 5

5.The present ages of three persons are in proportions 4 : 7 : 9. Eight years ago, the sum of their ages was 56. Find their present ages (in years).

a)16,28,36 b)14,26,34 c)16,26,38 d)14,38,26

Answer: Option A

Explanation note :

Let the 3 persons be A, B and C

Given : The ratio of the present ages of 3 persons is 4:7:9

Let the present age of A be 4x years

Let the present age of B be 7x years

Let the present age of C be 9x years

A : B : C $\Rightarrow$ 4x : 7x : 9x

Given : 8 years ago, the sum of their ages was 56.

8 years ago, the ratio of the ages is

A : B : C $\Rightarrow$ 4x – 8 : 7x – 8 : 9x – 8

Given : The sum of the above ages was 56

4x -8 + 7x-8 + 9x-8 = 56

20x – 24 = 56 $\Rightarrow$ 20x = 56+24 $\Rightarrow$ 20x=80

x = 4

To find : A, B and C's present age.

A : B : C

4x : 7x : 9x $\Rightarrow$ 4 (4) : 7 (4) : 9 (4)

$\therefore$ A's Age = 16 ; B's Age = 28 ; C's Age = 36

6.A person's present age is two-fifth of the age of his mother. After 8 years, he will be one-half of the age of his mother. How old is the mother at present?

a)40 yrs b)56yrs c)52yrs d)42yrs

Answer: Option A

Basic Formula:

The present ages of A and B are x years and y years respectively. If the age of A is 3 times the age of B, than the equation will be,

X = 3y $\Rightarrow$ x – 3y = 0

Explanation note :

Let the present age of Mother be x years

Let the present age of Son be y years

Given : Son's present age is two fifth of the age of his mother

Y = $\frac{2}{5}$ (x) $\Rightarrow$ 5y = 2x $\Rightarrow$ 2x – 5y = 0 ----------(1)

Given : After 8 years, son will be one-half of his mother

Y+8 = ½ (x+8) $\Rightarrow$ 2 (y+8) = x + 8 $\Rightarrow$ x-2y = 16-8

x-2y = 8 ---------- (2)

Multiplying (2) by 2 and Subtracting form (1)

2x – 5y = 0 (-)

2x – 4y = 16 $\Rightarrow$ y = 16

To find : Present age of mother x = 40 years.

7.The age of father 10 years ago was thrice the age of his son. Ten years hence, father's age will be twice that of his son. The ratio of their present ages is:

a)7:5 b)8:5 c)8:3 d)7:3

Answer: Option D

Explanation note :

Let the present age of father b 'x' years and son be 'y' years

10 years ago, father age = x-10; son's age = y – 10

Given : The age of father 10 years ago was thrice the age of son

X – 10 = 3 (y-10)

X – 10 = 3y – 30 $\Rightarrow$ x – 3y = - 20 ---------- (1)

Given : Then 10 years after, father age is twice of his son

X + 10 = 2 (y+10)

X + 10 = 2y + 20 $\Rightarrow$ x – 2y = 10 ----------(2)

(1) - (2) we get y = 30 and x = 70

To find : x : y

70 : 30 $\Rightarrow$ 7 : 3

8. The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages was 34. The ages of the son and the father are respectively:

a)5yrs b)6yrs c)8yrs d)7yrs

Answer: Option B

Explanation note :

Let the father age be x years and son age be y years

Given : The sum of the ages of father and his son is 45 years

X + y = 45 ----------(1)

Given : 5 years ago, the product of their ages was 34 years

(x-5) (y-5) = 34 ---------(2)

From (1), y = 45 – y ; (2) becomes(x-5) (40-x) = 34

$40x - x^2 - 200 + 5x = 34$

- $x^2 + 45x - 200 - 34 = 0$

$x^2 - 45x + 234 = 0$ (234 = 39 x 6)

x-39; x-6

Put x = 39 in (1)

Y = 6

Therefore, father's age is 39 years and Son's age is 6 years

9.A father is twice as old as his son. 20 years ago, the age of the father was 12 times the age of the son. The present age of the father (in years) is :

a)44yrs b)56yrs c)48yrs d)57yrs

Answer: Option A

Explanation note :

Let the present age of father be x years

Let the present age of son be y years

Given : a father is twice as old as his son

X = 2y

X – 2y = 0 ----------(1)

Given : 20 years ago, father age is 12 times the son age

X – 20 = 12 (y-20)

x-12y = -220 ----------(2)

(1) – (2) we get

Y = 22; put y value in equation 1

X – 2(22) = 0 $\Rightarrow$ x = 44

To find : present age of father

Present age of father is x = 44 years.

10.Five years ago, the total of the ages of a father and his son was 40 years, the ratio of their present ages is 4:1. What is the present age of the father?

a)43yrs b)51yrs c)40yrs d)45yrs

Answer: Option C

Explanation note :

Given : The ratio of the present age of father and son is 4 : 1

Let the present age of father be 4x

Let the present age of son be x

Given : 5 years ago, the total ages of father and son is 40 years

(4x – 5) + (x -5) = 40

5x – 10 = 40

X = 10

To find : Present age of father

4x = ?

4 (10) = 40 years

Present age of father = 4x = 4 (10) = 40 years

Blood Relationship

1. Introducing Ramu, Chitra said, "He is the son of the daughter of the father of my uncle." How is the Mr Ramu related to the Chitra?

a) Brother b) Nephew c) Uncle d) Son-in-law

Answer: Option A

Explanation Note:

The father of the boy's uncle → the grandfather of the boy and daughter of the grandfather → sister of father.

2. Meena who is the sister-in-law of Anand, is the daughter-in-law of Devi. Sunil is the father of pradeep who is the only brother of Anand. How Devi is related to Anand?

a) Mother-in-law b) Aunt c) Wife d) Mother

Answer: Option D

Explanation Note:

Anand is the only brother of Pradeep and Meena is the sister-in-law of Anand. Hence Meena is the wife of Pradeep. Devi is the mother-in-law of Meena. Devi is the mother of Anand.

3. A is the mother of B; B is the sister of E; E is the father of L. How is A related to L?
a) Mother b) Sister c) Grandmother d) Aunt

Answer: Option C

Explanation Note:
A is the mother of B
B is the sister of E
E is the father of L.
Therefore, L is the nephew or niece of B and A is the grandmother of L.

4. A is the son of C; C and Q are sisters; Z is the mother of Q and P is the son of Z. Which of the following statements is true?
a) P and A are cousins b) C and P are sisters c) Q is the maternal grandfather of A d) P is the maternal uncle of A

Answer: Option D

Explanation Note:
C and Q are sisters and A is the son of C. Hence, C is the mother of A or Z is the mother Q.
Hence, Z is the maternal grandmother of A. P is the son of Z. Hence, P is the maternal uncle of A.

5. In a family, there are six members A, B, C, D, E and F. A and B are a married couple, A being the male member. D is the only son of C, who is the brother of A. E is the sister of D. B is the daughter-in-law of F, whose husband has died. How is E related to C ?
a) Mother b) Cousin c) Daughter d) Sister

Answer: Option C
Explanation Note:
A is a male and married to B. So, A is the husband and B is the wife. C is the brother of A. D is the son of C. E. who is the sister of D will be the daughter of C. B is the daughter-in-law of F whose husband has died means F is the mother of A. Clearly. E is the daughter of C.

6. There are six persons A. B, C, D, E and F. C is the sister of F. B is the brother of E's husband. D is the father of A and grandfather of F. There are two fathers, three brothers and a mother in the group. Who is the mother?
a) E b) B c) F d) C

Answer: Option A

Explanation Note:
D is father of A and grandfather of F. So, A is father of F.
Thus. D and A are the two fathers. C is the sister of F So. C is the daughter of A.
Since there is only one mother, it is evident that E is the wife of A and hence the mother of C and F. So, B is brother of A There are three brothers. So. F is the brother of C.
Clearly, A is E's Husband and E is the mother in the group

7. If X + Y means X is the daughter of Y; X - Y means X is the brother of Y; X % Y means X is the father of Y and X x Y means X is the sister of Y. Which of the following means I is the niece of J?
a) J - N % C x I b) I x C - N % J c) J + M x C % I d) I x C + N – J

Answer: Option D
Explanation Note:
I x C → I is the sister of C
C + N → C is the daughter of N
and N - J → N is the brother of I.
Hence, I is niece of J.

8. If A $ B means A is the brother of B; B * C means B is the son of C; C @ D means C is the wife of D and A # D means A is the son of D, how C is related to A?
a) Aunt b) Mother c) Maternal grandmother d) Maternal aunt

Answer: Option B

Explanation Note:
A $ B → A is the brother of B
B * C → B is the son of C
C @ D → C is the wife of D
Hence, → C is the mother of A.

9. If M x N means M is the daughter of N; M + N means M is the father of N; M % N means M is the mother of N and M - N means M is the brother of N then P % Q + R - T x K indicates which relation of P to K?
a) Daughter-in-law b) Sister-in-law c) Mother-in-law d) Aunt

Answer: Option C

Explanation Note:
P % Q → P is the mother of Q
Q + R → Q is the father of R
R - T → R is the brother of T
Hence, → Q is the father of T
T x K → T is the daughter of K
Hence, → Q is the husband of K.

Therefore, P is the mother-in-law of K.

10. If M $ N means M is the brother of N; M # N means M is the mother of N; M * N means M is the daughter of N. Then in I # J $ K * L, who is the father ?
a) L b) M c) J d) N
Answer: Option A
Explanation Note:
I is the mother of J, J is the brother of K and K is the daughter of L. Hence , L is the Father.

Mensuration /Measurement

1. Find the perimeter of a rectangular park with length 20 cm and breadth 40 cm.
a) 120 cm b) 110 cm c) 160 cm d) 210 cm
Answer: Option A
Explanation Note:
Length of the rectangular park = 20 cm
Breadth of the rectangular park =40cm
Perimeter of a rectangle= 2 (L+B)
=2 (20 + 40) cm
= 2(60) cm
= 120 cm
The perimeter of the rectangular park is 120 cm

2. The perimeter of a rectangular field is 480 m and the ratio between the length and breadth 5:3. the area of the field is

a) 13540 m^2 b) 13500 m^2 c) 13400 m^2 d) 13700 m^2

Answer: Option B

Explanation Note:

Perimeter of a rectangle =2(l+b)

Given l:b = 5:3

L=5x, b = 3 x

P=480m

2(5x+3x) = 480

16 x = 480

x = 30

l = 5 x = 5 x 30 = 150

b= 3 x = 3x30 = 90

area = l x b = 150 x 90

area of rectangle = 13500 m^2

3. What will be the cost of building a fence around a square plot with area equal to 289 sq ft, if the price per foot of building the fence is Rs. 58?

a) Rs3744 b) Rs4532 c) Rs4246 d) Rs3944

Answer: Option D

Explanation Note:

Let the side of the square plot be a ft.

$a^2 = 289 \Rightarrow a = 17$

Length of the fence = Perimeter of the plot = 4a = 68 ft.

Cost of building the fence = 68 * 58 = Rs. 3944.

4. A milk tank is in the form of cylinder whose radius is 1.5 m and length is 7 m. find the quantity of milk in litres that can be stored in the tank?

a) 46500litres b)49500litres c) 48800litres d) 44700litres

Answer: Option B

Explanation Note:

Quantity of milk that can be stored in the tank

= Volume of the tank= $\pi r^2 h$, where r = 1.5 and h = 7 m

$= \left(\frac{22}{7} \times 1.5 \times 1.5 \times 7\right) m^3 = 49.5\ m^3$

= (49.5 × 1000) litres [∵ 1 m^3 = 1000 ltr.]

= 49500 litres.

5. The volume of a solid right circular cone is 11088 cm^3. If its height is 24 cm then find the radius of the cone.

a) 21cm b) 24cm c) 22cm d)26cm

Answer: Option A

Explanation Note:

Let *r* and *h* be the radius and height of the cone respectively.

Given that, volume of the cone = 11088 cm^3

volume of the cone = $1/3\pi r^2 \times h$

$11088 = 1/3\pi r^2 \times h$

$11088 = 1/3 * 22/7 * r^2 \times h$

$441 = r^2$. Therefore, radius of the cone *r*=21 cm

6. Riya carries water to the school in a cylindrical flask with radius 4 cm and height 28 cm. Determine the amount of water she carries in the flask.

a)1145cm b)1908cm c)1087cm d)1056cm

Answer: Option D

Explanation Note:

Radius of cylindrical flask= 4 cm

Height of cylindrical flask= 28 cm

volume of cylindrical flask = $\pi r^2 \times h$

=22/7 x 4x4x 21

= 22 x4x4x3

= 1,056 cubic cm

7. A cuboidal water tank is 6 m long, 5 m wide and 4.5 m deep. How many litres of water can it hold?

a) 115000 litres b) 135000 litres c) 125000 litres d) 130000 litres

Answer: Option B

Explanation Note:

Length of water tank (l) = 6 m

Breadth (b) = 5 m

depth (h) = 4.5 m

Volume of water in it = lbh

= 6 x 5 x 4.5 m^3 = 135 m^3

Capacity of water in litres = 135 x 1000 litres (1 m^3 = 1000 l)
= 135000 litres

8. Rohit stays in a cuboidal hotel room with dimensions 21x 10x 8. Find the total surface area of the room.

a)916cm b) 906cm c) 826cm d) 826cm

Answer: Option A

Explanation Note:

Length of the room= 21cm

Breadth of the room= 10 cm

Height of the room= 8cm

Total surface area of a cuboid= 2 (LB + BH + LH)

= 2 (21×10 + 10×8 + 21×8)

= 2 (210 + 80 + 168)

= 2 (458)

= 916 cubic cm

9. A cubical tank can hold 64,000 litres of water. Find the length of its side in metres.

a)7m b)9m c)4m d)6m

Answer: Option C

Explanation Note:

Let 'a' be the side of cubical tank.

Here, volume of the tank = 64,000 litres

i.e., a3 = 64,000 = 64000/ 1000 [since,1000 litres=1m^3]

a3 = 64 m^3

a = 4 m Therefore, length of the side of the tank is 4 metres.

10. The hollow sphere, in which the circus motorcyclist performs his stunts, has a diameter of 7 m. Find the area available to the motorcyclist for riding

a) 124 m^2 b) 154 m^2 c) 144 m^2 d) 134 m^2

Answer: Option B

Explanation Note:

Diameter of the sphere = 7 m. Therefore, radius is 3.5 m.

So, the riding space available for the motorcyclist is the total surface area of the sphere

Total Surface Area of the Sphere = $4\pi r^2$ = 4 × 22 7 × 3.5 × 3.5 m^2 = 154 m^2

Profit and Loss

1. The cost of an item is Rs. 12.60. If the profit is 10% over cost price what is the selling price?

A) Rs13.86 B) Rs14.80 C) Rs13.60 D) Rs13.78

Answer: Option A

Basic Formula:
Selling Price = Cost price + profit

Explanation Note:
Cost Price = 12.60
Profit = 10% of CP

$= \frac{10}{100} \times 12.60$

$= \frac{126}{100} = 1.26$

Selling Price = CP + Profit
= 12.60 + 1.26
=Rs13.86

2. If by selling an article for RS.100, a man gains Rs.15 then his gain percent is

a)13 12/17% b)11 17/14% c)13 11/14% d)17 11/17%

Answer: Option D

Basic Formula
Cost price = selling price - profit
Gain percentage = profit / cost price x 100

Explanation Note:
Cost price = selling price - profit
= 100 – 15 = 85

$\therefore$ Profit per cent $= \frac{15}{85} \times 100$
= 300 / 17 = 17

3. Peter buys an old scooter for Rs.4700 and spends Rs.800 on its repairs. If he sells the scooter for Rs.5800, his gain percent is?

a)6.5% b)5.45% c)7.5% d)8%

Answer: Option B

Basic Formula:
Cost price = selling price - profit

Profit Percentage = Profit / cost price x 100

Explanation Note:

Cost price = 4700 +800 = 5500

Profit = 5800 – 5500 = 300

Profit percentage = 300 / 5500 x 100

= 5.45%

4. A retailer buys a radio for Rs.225. His overhead expenses are Rs.15 he sells the radio for Rs.300. The profit percent of the retailer is

A) 20% B)25% C)30% D)35%

Answer: Option B

Basic Formula:
Cost price + profit = selling price
Explanation Note:

Cost price = 225 + 15 = 240

Profit is X%

Ie., 240 + X x 240 x 1/100 = 300

240 + $\frac{24x}{10}$ = 30

2400 + 24x = 3000

24x = 3000 – 2400

24x = 600

X = 600/24

X = 25.

5. If the selling price of 18 articles is equal to the CP of 21 articles the loss or gain percent

   a)50/3% b)55/3% c)44/3% d)64/3%

Answer: Option A

Basic Formula:

$\frac{costprice - sellingrice}{sellingprice}$ x 100

Result is +ve = we get a profit
Result is –ve = we get a loss

Explanation Note:

$\frac{21-18}{18}$ X 100

$\frac{3}{18}$ X 100

100 6 = 50/3 % profit

6. A man sold an article for Rs.247.50, thereby gaining 12 ½% . The cost of the article was?

A) Rs260 B)Rs280 C)Rs220 D)Rs240

Answer: Option C

Basic Formula:

Cost price + Profit = Selling price

Explanation Note:

Let us assume cost price is x

X + X x 25/2 x 1/100 = 247.50

X + 25x/200 = 247.50 (taking LCM)

200x + 25x = 247.50 x 200

225x = 49500

X = 49500 / 225

X = 220

The cost price is Rs. 220/-

7. Rahim buys mangoes at the rate of 3kg for Rs.21 and sells them at 5kg for Rs.50. To earn Rs.102 as profit, he must sell

A) 42kg B)24kg C)40kg D)34kg

Answer: Option D

Explanation Note:

Cost :

3 kg Mangoes Rs. 21 $\Rightarrow$ 1 kg = Rs. 7

Selling Cost:

5 kg = 50 $\Rightarrow$ 1 kg = 10

Difference for 1 kg is (10-7) = 3

1 kg = Rs.3

? = Rs.102

102 / 3 **= 34 kg**

8. A man bought apples at the rate of 8 for Rs.34 and sold them at the rate of 12 for

Rs.57. How many apples should be sold to earn a net profit of Rs. 45?

A) Rs80 B) Rs90 C)Rs75 D)Rs65

Answer: Option B

Explanation Note:

To find cost price per apple:
8 apples = Rs. 34
1 apple = Rs. 4.25
Selling price per apple:
12 apples = Rs. 57
1 apple = Rs. 4.75
Profit per apple = selling price – cost price
4.75 – 4.25 = .50
Therefore X x 0.50 = 45
X = Rs. 90

9. Mani bought 15 kg of rice at the rate of Rs.14.50 per kg and 10kg at the rate of Rs.13 per kg. He mixed the two and sold the mixture at the rate of Rs.15 per kg. What was his total gain in this transaction?

a)Rs22.50 b)Rs26.45 c)Rs27.50 d)Rs24.50

Answer: Option C

Explanation Note:

15 $\rightarrow$ 14.50
10 $\rightarrow$ 13

The difference rate is
15 (15 – 14.50) $\Rightarrow$ 15 x 0.50 = 7.5

10 (15 – 13) $\Rightarrow$ 10 x 2 = 20.0

Total =Rs 27.5

10. A sells a bicycle to B at a profit of 20%. B sells it to C at a profit of 25%. If C pays Rs.225 for it, the cost price of the bicycle for A is

a)Rs150 b)Rs230 c)Rs320 d)Rs120

Answer: Option A
Answer with Explanation:

Selling price for C is Rs. 225
Cost price + profit = 225
X + $\frac{25x}{100}$ = 225
X = 180
Cost price of B is 180
Selling price for B is 180
Cost price + profit = 180
Y + $\frac{20y}{100}$ = 180
Y = 150 .
The cost price of A is Rs. 150.

Series Pattern

1. What number should come next in the series 0.5, 0.55, 0.65, 0.8?

a. 0.7 b) 0.9 c) 0.95 d) 1

Answer: Option D

Explanation Note:
The pattern is + 0.05, + 0.10, + 0.15, ...
So, missing term = 0.8 + 0.20 = 1.

2.Complete the series 2, 2, 5, 13, 28, ?
a) 47 b) 49 c) 50 d) 52

Answer: Option D

Explanation Note:
The pattern is + 0, + 3, + 8, + 15, ...
i.e. + (1^2 - 1), + (2^2 - 1), + (3^2 - 1) + (4^2 - 1),...
So, missing term = 28 + (5^2 - 1) = 28 + 24 = 52.

3.Which number would replace the question mark in serie1, 4, 27, 16, ?, 36, 343
a) 50 b) 78 c) 125 d) 132

Answer: Option C

Explanation Note:
Clearly, the given series consists of cubes of odd numbers and square of even numbers i.e., 13, 22, 33, 42, ...
So, missing term = 53 = 125.

4. Which is the number that comes next in the sequence:2, 6, 12, 20, 30, 42, 56, ?
a) 50 b) 60 c) 72 d) 78

Answer: Option C

Explanation Note:
The sequence is 1 × 2, 2 × 3, 3 × 4, 4 × 5, 6 × 7, 7 × 8.
So missing term = 8 × 9 = 72.

5. What will come at the place of the question mark 7, 26, 63, 124, 215, 342, ?

a) 612 b) 465 c) 498 d) 511

Answer: Option D

Explanation Note:
The terms are given in a series
$(2^3 -1) = 7$
$(3^3 -1) = 26$
$(4^3 -1) = 63$
$(5^3 -1) = 124$
$(6^3 -1) = 215$
$(7^3 -1) = 342$
So, the missing term is,
(83 -1) = 511.

6.Which is the number that comes next in the following sequence 2, 12, 36, 80, 150, ?

a) 252 b) 189 c) 211 d) 197

Answer: Option A

Explanation Note:
Series - I: 2 12 36 80 150 ?

Series - II: 10 24 44 70 ?

Series - III: 14 20 26 ?
Series - IV: 6 6
Clearly, the pattern in series III is +6.
So, missing term in series III = 26 + 6 = 32

Missing term in series II = 70 + 32 = 102
Missing term in series I = 150 + 102 = 252
Thus the missing term = 252
(i.e. 150 + 70 + 26 + 6)

7.Complete the series given below by finding the missing term. P 3 C, R 5 F ,T 8 I, V 12 L ,?
a) Y17O b) X160 c) Y15O d) X17O

Answer: Option D

Explanation Note:
First letter: P→R→T→V→X
Second letter: 3→5→8→12→17
Third letter: C→F→I→L→O

8. Find the missing term in the given series. Q1F, S2E, U6D, W21C,?
a) Y44B b) Y88B c) X66B d) Z66B

Answer: Option B

Explanation Note:
In the following series the first letter is moved two steps forward to form he next term,the number series is followed by :
1*!+1=2
2*2+2=6
6*3+3=21
the third letter is moved one step backward to form the next term.
Hence following the series next term will be Y(21*4+4)=88

9. Complete the series by finding the missing term from the given alternatives. Alternatives are in the same order of missing terms.
? ab a a a b a ? a ? a

a) abb b) aba c) aab d) aba

Answer: Option C

Explanation Note:

The series is aaba/aaba/aaba/aaba

10. The following question is based on the letter series. In each of these series, some of the letters are missing. Select the correct alternative.
aa _ aaa _ aaaa _ aaaa _ b

a) bbba b) bbaa c) bbbb d) baaa

Answer: Option A

Explanation Note:

The series is aab/aaab/aaaab/aaaaab.

Thus, the number of a's is increasing by one in the successive sequence.

Hence the answer is (A).

Simple Interest and Compound Interest

1. What is the SI onRs.2500/- at the rate of 12% per annum for 8 years?

a)3800 b)3400 c)2400 d)2700

Answer: Option B

Explanation note :

Given P = 2500, N = 8 Years, R = 12%

There fore S.I = $\frac{PNR}{100}$

S.I = $\frac{2500X12X8}{100}$

S.I = 2400

2. In what time, Ms Geetha get Rs.1200/- as SI on Rs.5000/- at the rate of 8%?

a)3yrs b)5yrs c)7yrs d)6yrs

Answer: Option A

Explanation note :

Given :

S.I. = Rs. 1200/-
P = Rs. 5000/-
R = 8%

To find time (Number of years (N))

$$1200 = \frac{5000XNX8}{100}$$

1200 = 400 N
N = 1200/400

Therefore N = 3 years

3.Mr. Manoj took a loan of Rs.25000/- for 5years at SI. If the interest paid were Rs.12500/- what is the rate of interest per annum?

a)12% b)9% c)8% d)10%

Answer: Option D

Explanation note :

Given :

P = Rs. 25000/-
S.I = Rs. 12500/-
N = 5 Years

To find R

$$12500 = \frac{25000X5XR}{100}$$

R = 12500 / 1250
= 10%

Therefore the Rate of Interest = 10%\

4.Mr Babu borrowed Rs.5000/- at the rate of 8% SI and to clear the debt after 6 years, how much he has to return to the bank?

a)Rs7600 b)Rs8300 c)Rs8700 d)Rs7400

Answer: Option D

Explanation note :

Given P = 5000, N = 6 Years, R = 8%

Therefore S.I = PNR / 100

$$S.I = \frac{5000X8X6}{100}$$

= 50 X 6 X 8

S.I **= 2400**

Total repayment = S.I + Principal amount

Answer = 2400 + 5000 = Rs 7400

5. Mr.Gopal received a loan at 13% p.a. SI. After 4 years he returned the principal and interest. If he returned Rs.9120/- what will be principal amount?

a)Rs6000 b)Rs8300 c)Rs8700 d)Rs7400

Answer: Option A

Explanation note :

Given

R = 13%, N = 4 years, S.I + P = Rs.9120/-

First we are calculating for Rs. 100/-

100 = 13 X 4 (R X N) for number of years

100 = 152 is repayment (Amount =100 and the Interest = 52)

? = 9120

P = 100 X 9120 / 152

P = 6000

Principal Amount = Rs.6000/-

6.Mr.A borrowed Rs.12000/- at the rate of 10% and lent the same amount to Mr.B at the rate of 13% what will be gain of A, after 5 years

a)Rs2100 b)Rs1800 c)Rs4700 d)Rs3400

Answer: Option B

Explanation note :

Given P = 12000, N = 5 years,

(i) R = 10%, (ii) R = 13%

Case (i)

S.I = $\frac{PNR}{100}$

= $\frac{12000X5X10}{100}$

= Rs. 6000/-

Case (ii):

S.I = $\frac{PNR}{100}$

= $\frac{12000X5X13}{100}$

= Rs. 7800/-

Difference = Rs. 7800 – Rs. 6000

= Rs. 1800/-

Therefore Gain = Rs. 1800/-

8. A bank offers 5% compound interest calculated on half-yearly basis. A customer deposits Rs. 1600 each on 1st January and 1st July of a year. At the end of the year, the amount he would have gained by way of interest is:

a)Rs120 b)Rs121 c)Rs122 d)Rs123

Answer: Option B

Explanation note :

Amount = Rs. $1600 \times \left(1 + \frac{5}{2}\right) + 1600 \times \left(1 + \frac{5}{}\right)$

$$\left[\left(\overline{2 \times 100} \right) \quad \left(\overline{2 \times 100} \right) \right]$$

$$= \text{Rs.} \left[1600 \times \frac{41}{40} \times \frac{41}{40} + 1600 \times \frac{41}{40} \right]$$

$$= \text{Rs.} \left[1600 \times \frac{41}{40} \left(\frac{41}{40} + 1 \right) \right]$$

$$= \text{Rs.} \left[\frac{1600 \times 41 \times 81}{40 \times 40} \right]$$

= Rs. 3321.

∴ C.I. = Rs. (3321 - 3200) = Rs. 121

9. The compound interest on Rs. 30,000 at 7% per annum is Rs. 4347. The period (in years) is:

a)2 b)1.5 c)3 d)4

Answer: Option A

Explanation note :

Amount = Rs. (30000 + 4347) = Rs. 34347.

Let the time be *n* years.

Then, $30000 \left(1 + \frac{7}{100} \right)^{n} = 34347$

$$\Rightarrow \left(\frac{107}{100} \right)^{n} = \frac{34347}{30000} = \frac{11449}{10000} = \left(\frac{107}{100} \right)^{2}$$

∴ *n* = 2 years.

10. At what rate of compound interest per annum will a sum of Rs. 1200 become Rs. 1348.32 in 2 years?

a)6% b)6.5% c)7% d)7.5%

Answer: Option A

Explanation note :

Let the rate be R% p.a.

Then, $1200 \times \left(1 + \frac{R}{100}\right)^2 = 1348.32$

$\Rightarrow \left(1 + \frac{R}{100}\right)^2 = \frac{134832}{120000} = \frac{11236}{10000}$

$\therefore \left(1 + \frac{R}{100}\right)^2 = \left(\frac{106}{100}\right)^2$

$\Rightarrow 1 + \frac{R}{100} = \frac{106}{100}$

R = 6%

10.The difference between simple interest and compound on Rs. 1200 for one year at 10% per annum reckoned half-yearly is

a)Rs2.50 b)Rs3 c)Rs3.75 d)Rs4

Answer: Option B

Explanation note :

S.I. = Rs $\left(\frac{1200 \times 10 \times 1}{100}\right)$ = Rs. 120.

C.I. = Rs. $1200 \times \left(1 + \frac{5}{2}\right)^2 - 1200$ = Rs. 123.

$$\left[\quad \left(\quad \overline{100} \right) \quad \right]$$

∴ Difference = Rs. (123 - 120) = Rs. 3.

CODING AND DECODING

1. **If EDUCATION is written as 5421312091514 then how is CAT written?**

a. 13120
b. 312
c. 3120
d. 31209

2. 2. In a code language QUEEN is written as OVCFL, then KING is written as

a. IJLH
b. MKOF
c. PHIK
d. FOKM

3. 3. In a code language, BROKE is written as DOSFK, START is written as UQEMZ, then INDIA is written as

a. KHDKG
b. KKHDG
c. DHGKK
d. KHGKD

Answer: b. KKHDG

Explanation:

Alphabet Series - A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
The coding follows the rule +2, -3, +4, -5, +6, etc.
That means B+2=D
R-3=O
O+4=S, etc.

4. 4. If DOOR = 25, LOWER=37, TOWER=18, then OVER = ?

a. 81
b. 45
c. 60
d. 06
Rule=add positions of alphabets and then reverse the result
DOOR = 4+15+15+18 = 52 = reverse 52 to give 25

5. 5. If 7 x 5 = VIII ; 5 x 6 = III ; 5 x 3 = VI , then 9 x 4 = ?

a. IX
b. II
c. VIII
d. XXII
Explanation:

7 x 5 = 35 ; 3+5 = 8 = VIII in roman numeral format
5 x 6 = 30 ; 3+0 = 3 = III in roman numerals.
9 x 4 = 36 = 3+6 = 9 = IX in roman numerals
6. 10 (87) 7 ; 5 (59) 9 ; then 7 (?) 4.

a. 29
b. 39
c. 42
d. 30
Explanation:

10 x 7 = 70 ; 70 + (10+7) = 87
5 x 9 = 45 ; 45 + (5+9) = 59
7 x 4 = 28 ; 28 + (7 + 4) = 39

7. CEGI : JHFD :: KMOQ : ?

a. LPNR
b. RNPL
c. LNPR
d. RPNL
Answer: d. RPNL

Explanation:

Alphabet Series - A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
Write the next letters after the letters CEGI. We get DFHJ. Reverse them to get JHFD
Next letters after KMOQ is LNPR. Reversing them we get RPNL.

8. **6 : 49 :: 7 : ?**

a. 64
b. 63
c. 50
d. 81
Answer: a. 64

Explanation:

$6 : 49 = 6 : 7^2 = 6 : (6+1)^2$
So, $7 : ? = 7 : (7+1)^2 = 7 : 64$

9. **If % x ^ = 20 ; ^ x & = 32 ; % x & = 40 ; * x & = 72. Then what is the value of * ?**

a. 8
b. 7
c. 9
d. 6
Answer: c. 9

Explanation:

***** cannot be 7 as 72 is not divisible by 7.
If ***** is 6, then **&** becomes 72/6 = 12.
But 40 is not divisible by 12.
Let ***** be 8, then **&** becomes 72/8 = 9
But 40 and 32 are not divisible by 9.
So ***** is 9. Answer is option c.

10. **Given are some words decoded from artificial language - chikerkurrip means birdhouse; phyckurrip means bluebird and phycbrell means bluebell. Select the code for 'houseguest' in this artificial language.**

a. bellchicker
b. chikerrdrop
c. chickerrphyc
d. dropchiker

11. **11. 34 : 12 :: 59 : ?**

a. 45
b. 14
c. 42
d. 38

12. **12. Study the given information and select the most appropriate term for 'save more money'**

'time and money' is coded as 'tis nim jes'
'manage money judiciously' is coded as 'lop xer nim'
'save more time' is coded as 'jes kib dob'
'save enough judiciously' is coded as 'xer kib hix'.

a. nim hix kib
b. jes nim dob
c**. nim kib dob**
d. There is not enough information for figuring out code of 'more'
Comparing 1st and 2nd sentence, 'money' is 'nim'.
Comparing 1st and 3rd sentence, 'time' is 'jes'.
So from 3rd sentence we can say that, 'save more' means 'kib dob'
So answer is option c

13. If KGLFT is written as PTOUG, the MERSA is written as ?

a. NVIHZ
b. VIHNZ
c. NVLHZ
d. NVIHA

Alphabet Series - A B C D E F G H I J K L M | N O P Q R S T U V W X Y Z
Here the series is divided exactly in the center.
A will be replaced by Z and Z will be written as A.
Same way **K** which is **3rd from center towards left** is written as **P** which **3rd from center towards right.**
Answer is option a.

14. **If 2 x 8 = 20 ; 3 x 9 = 31 ; 5 x 8 = 44 , then 30 x 5 = ?**

a. 150
b. 154
c. 158
d. 145

Explanation:

2 x 8 = 16 ; 16 + 4 = 20
3 x 9 = 27 ; 27 + 4 = 31
So, 4 is added to the product.
So, 30 x 5 = 150 ; 150+4 = 154

15. If DOUBLE is written as GSXFOI, then MISTER will be written as

a. PMVXHV
b. PMVXGU
c. PMVXGV
d. PLWXHV

Alphabet Series - A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
Here,
D**+3** = G ; O**+4** = S ; U**+3**=X ; B**+4** = F and so on

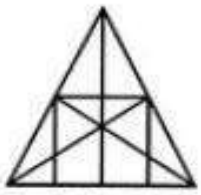
So the pattern is **+3+4+3+4+3,...**
Use it to get the answer as option c

15. **In a code language, TAPE is written as 4825; SHART is written as 93814 and TUBE is written as 4675. Then how is BASERA written?**

a. 785198
b. 789518
c. 985718
d. 758918
Comparing codes of TAPE and SHART, A is coded as 8.
Comparing codes of TUBE and SHART, T is coded as 4.
Comparing codes of TAPE and TUBE, E is coded as 5.
In BASERA, E is in 5^{th} position and in code word, 5 should be in 5^{th} position.
Answer is option b.

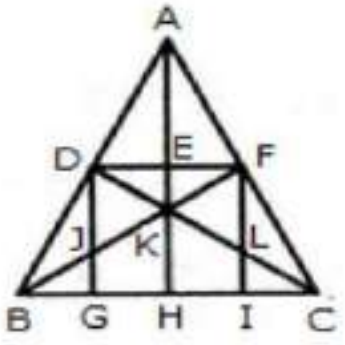
Counting of Figures

In the counting of figures, you have a shape or a figure. From the given shape you will have to identify a given known shape and count the number of times it is present in the given shape. For example, consider the following figure:



A typical counting figures question will ask you to find out how many triangles can you identify here? This may seem easy but as you will see it can get very tricky! Let us name the different vertices of the triangle and also give names to every point of intersection inside or on the triangle. This will help us identify and keep track of the number of triangles in the figure.

An Easier Approach



There are some triangles that are easily identifiable. They are triangles (A D E), (A E F), (D E K), (E F K), (D J K), (F L K), (D J B), (F L C), (B J G), and (L I C) as you can see in the figure. The number of these triangles is ten.

There are other triangles composing of two portions or two components. They are triangles (A D F), (A F K), (D F K), (A D K), (D K B), (F C K), (B K H), (K H C), (D G B), and (F I C).

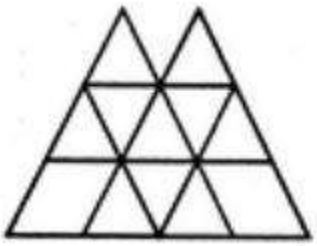
Similarly, we can find the triangles that are made up of three components. They are the triangles (D F J), and (D F L).

Also, the triangles that have four components are (A B K), (A C K), (B F I), (C D G), (D F B), (D F C) and (B K C). Thus they are seven in number. There are no triangles that have five components.

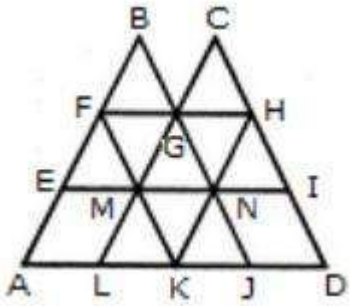
Now we can also find the triangles that are composed of six components. They are the triangles (A B H), (A C H), (A B F), (A C D), (B F C), and (C D B). Thus they are six in number.

At last, we see that there are no triangles with seven, eight, nine, ten or eleven components. And there is only one triangle which has all the twelve components i.e. the triangle A B C. Therefore, the total number of triangles in the above figure is 10 + 10 + 2 + 7 + 6 + 1 = 36.

1. What is the number of triangles in the following figure?



Answer: The first step should be to label every vertex and point of intersection of lines as shown in the following figure:



Now let us see the triangles that are formed by a single component from the figure. These are the triangles (B F G), (C G H), (E F M), (F M G), (G M N), (G H N), (H N I), (L M K), (M N K), and (K N J). They are ten in number.

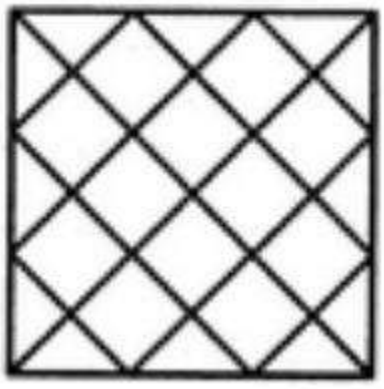
Two components when joined won't make a triangle, therefore there are no such triangles. The triangles that have three components are (F A K) and (H K D). These are two in number.

Also, the triangles with four parts are (B E N), (C M I), (G L J), and (F H K), hence four in number.

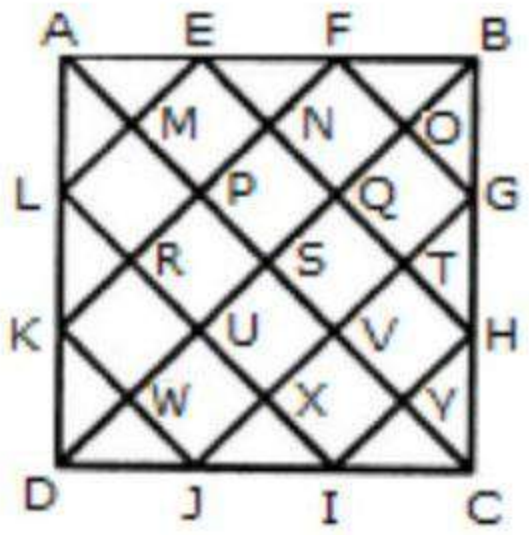
Similarly, we see that five, six, and seven components won't make a triangle. We thus move on to count the number of triangles that are formed from eight components each. They are (B A J), and (O L D). This is the maximum number of components here. Therefore the total number of triangles here is 10+2+4+2 = 18. Thus, the figure that was present above has 18 triangles in it.

Example 2

What is the number of triangles in the following figure?



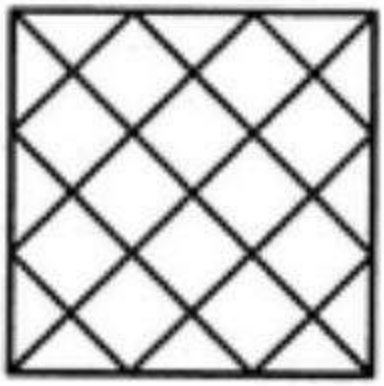
Answer: The first step as usual is to label every vertex and point of intersection in the given figure as shown below:



Now that we have taken care of the labelling, let us see what we can do with the counting, Here we have small triangular shapes present towards the edges of the large square and in between, we have small squares.
The triangles that are easily spotted are (A M L), (L R K), (K W D), (D W J), (J X I), (I Y C), (C Y H), (H T G), (G O B), (B O F), (F N E) and the triangle (E M A). These are twelve in number.
Now let us count the triangles made from two components. These are the triangles (A E L), (K D J), (H I C) and (F B G). These are four in number.
Also we can count the number of triangles that are made up of three components each. These are (A P F), (E Q B), (B Q H), (G V C), (C V J), (I U D), (D U L) and the (K P A). These are eight in number.
Similalry we see that the triangles (A S B), (B S G), (C S D), (D S A), (A K F), (E B H), (G C J) and (I D L) are made up of six components.
And the triangles (A D B), (A B C), (B C D) and (C D A) are made up of twelve components. Thus the total number of triangles in the figure is 12+4+8+8+4 =36.

Practice Question

Q1: What is the minimum number of straight line segments used to form the following figure?



A) 36 B) 46 C) 66 D) 14 E) 21
Ans: D) 14

DATA INTERPRETATION

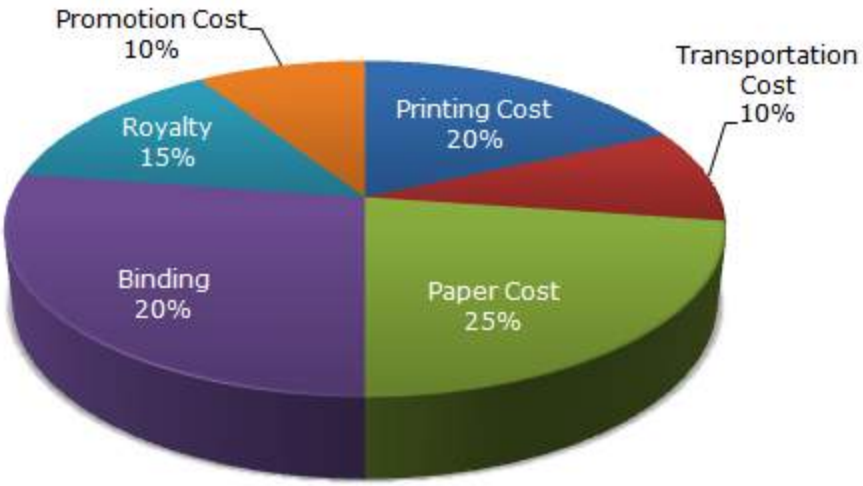
Data Interpretation is the process of making sense out of a collection of data that has been processed. This collection may be present in various forms like bar graphs, line charts and tabular forms and other similar forms and hence needs an interpretation of some kind. Here we will learn about data interpretation with the help of many important techniques and examples. We will see how we can make sense out of the graphical data and other forms of it. We shall learn to use it to solve the most common questions that are present in this section of the quantitative aptitude.

- Bar Graph
- Line Chart
- Tabular Form
- Caselet Form
- Radar/Web
- Pie Chart
- Missing Data Interpretation

PIE CHART

he following pie-chart shows the percentage distribution of the expenditure incurred in publishing a book. Study the pie-chart and the answer the questions based on it.

Various Expenditures (in percentage) Incurred in Publishing a Book



1. If for a certain quantity of books, the publisher has to pay Rs. 30,600 as printing cost, then what will be amount of royalty to be paid for these books?

A. Rs. 19,450

B. Rs. 21,200

C. Rs. 22,950

D. Rs. 26,150

Answer: Option **C**

Explanation:

Let the amount of Royalty to be paid for these books be Rs. *r*.

Then, 20 : 15 = 30600 : *r* $\Rightarrow$ *r* = Rs. $\left(\frac{30600 \times 15}{}\right)$ = Rs. 22,950.

2. What is the central angle of the sector corresponding to the expenditure incurred on Royalty?

A. 15°

B. 24°

C. 54°

D. 48°

Answer: Option **C**

Explanation:

Central angle corresponding to Royalty = (15% of 360)°

$$= \left(\frac{15}{100} \times 360\right)^\circ$$

= 54°.

3. The price of the book is marked 20% above the C.P. If the marked price of the book is Rs. 180, then what is the cost of the paper used in a single copy of the book?

A. Rs. 36

B. Rs. 37.50

C. Rs. 42

D. Rs. 44.25

Answer: Option **B**

Explanation:

Clearly, marked price of the book = 120% of C.P.

Also, cost of paper = 25% of C.P

Let the cost of paper for a single book be Rs. *n*.

Then, 120 : 25 = 180 : *n* $\Rightarrow$ *n* = Rs. $\left(\frac{25 \times 180}{120}\right)$ = Rs. 37.50 .

4. If 5500 copies are published and the transportation cost on them amounts to Rs. 82500, then what should be the selling price of the book so that the publisher can earn a profit of 25%?

A. Rs. 187.50

B. Rs. 191.50

C. Rs. 175

D. Rs. 180

Answer: Option **A**

Explanation:

For the publisher to earn a profit of 25%, S.P. = 125% of C.P.

Also Transportation Cost = 10% of C.P.

Let the S.P. of 5500 books be Rs. x.

Then, $10 : 125 = 82500 : x \Rightarrow x = \frac{125 \times 82500}{10} = 1031250$.

5. Royalty on the book is less than the printing cost by:

A. 5%

B. $33\frac{1}{3}\%$

C. 20%

D. 25%

Answer: Option **D**

Explanation:

Printing Cost of book = 20% of C.P.

Royalty on book = 15% of C.P.

Difference = (20% of C.P.) - (15% of C.P) = 5% of C.P.

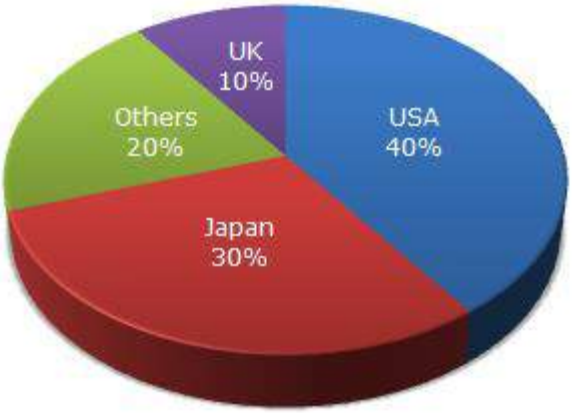
$\therefore$ Percentage difference $= \left(\frac{\text{Difference}}{\text{Printing Cost}} \times 100\right)\%$

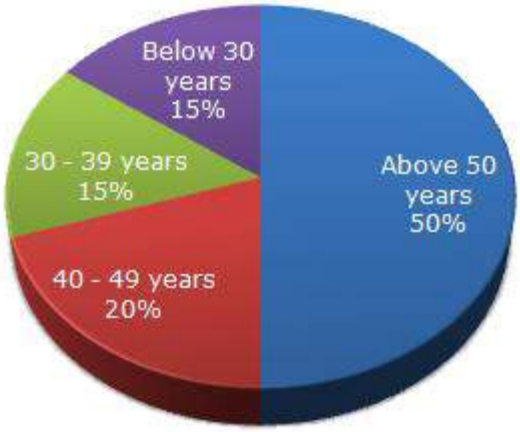
$$= \left(\frac{\text{5\% of C.P.}}{\text{Printing Cost}} \times 100 \right)\% = 25\% \text{ Rs.}$$

$\therefore$ S.P. of one book = Rs. $\left(\frac{1031250}{5500} \right) = \text{Rs. } 187.50$.

2. The following pie charts exhibit the distribution of the overseas tourist traffic from India. The two charts shows the tourist distribution by country and the age profiles of the tourists respectively.

Distribution of Overseas Tourist Traffic from India.





1. What percentage of Indian tourist went to either USA or UK ?

A. 40 %

B. 50 %

C. 60 %

D. 70 %

Answer: Option **B**

Explanation:

(40+10) = 50% (from first chart)

2. The ratio of the number of Indian tourists that went to USA to the number of Indian tourists who were below 30 years of age is ?

A. 2:1

B. 8:3

C. 3:8

D. Cannot be determined

Answer: Option **B**
Explanation:
40:15 = 8:3

Directions to Solve
The following pie charts exhibit the distribution of the overseas tourist traffic from India. The two charts shows the tourist distribution by country and the age profiles of the tourists respectively.

Distribution of Overseas Tourist Traffic from India.

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What percentage of Indian tourist went to either USA or UK ?

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Explanation:

(40+10) = 50% (from first chart)

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2.
The ratio of the number of Indian tourists that went to USA to the number of Indian tourists who were below 30 years of age is ?

A. 2:1
B. 8:3
C. 3:8
D. Cannot be determined
Answer: Option B

Explanation:

40:15 = 8:3
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3.
If amongst other countries, Switzerland accounted for 25% of the Indian tourist traffic, and it is known from official Swiss records that a total of 25 lakh Indian tourists had gone to Switzerland during the year, then find the number of 30-39 year old Indian tourists who went abroad in that year ?

A. 18.75 lakh
B. 25 lakh
C. 50 lakh
D. 75 lakh
Answer: Option D

Explanation:

Tourist traffic from other countries to Swiz is 20%.

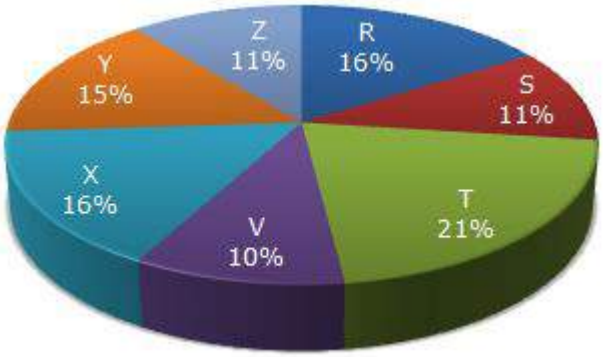
Amongst this 20%, 25% of traffic from India.

So, 25% of 20% = 5% corresponds to the Indian traffic in Switzerland.

5 % corresponds to Switzerland's 25 lakh. Hence 15% will be 75 lakh.

Study the following pie-chart and the table and answer the questions based on them.

Proportion of Population of Seven Villages in 1997



Village	% Population Below Poverty Line
X	38
Y	52
Z	42
R	51
S	49
T	46
V	58

1. If the population of village R in 1997 is 32000, then what will be the population of village Y below poverty line in that year?

A. 14100

B. 15600

C. 16500

D. 17000

Answer: Option **B**

Explanation:

Population of village R = 32000 (given).

Let the population of village Y be *y*.

Then, 16 : 15 = 32000 : *y* $\Rightarrow y = \left(\frac{15 \times 32000}{16}\right) = 30000.$

$\therefore$ Population of village Y below poverty line = 52% of 30000 = 15600.

2. The ratio of population of village T below poverty line to that of village Z below poverty line in 1997 is:

A. 11 : 23

B. 13 : 11

C. 23 : 11

D. 11 : 13

Answer: Option **C**

Explanation:

Let N be the total population of all the seven villages.

Then, population of village T below poverty line = 46% of (21% of N)

and Population of villages Z below the poverty line = 42% of (11% of N)

$\therefore$ Required ratio = $\frac{46\% \text{ of } (21\% \text{ of N})}{42\% \text{ of } (11 \% \text{ of N})} = \frac{46 \times 21}{42 \times 11} = 23/11.$

3. Find the population of village S if the population of village X below poverty line in 1997 is 12160.

A. 18500

B. 20500

C. 22000

D. 26000

Answer: Option **C**

Explanation:

Let the population of village X be x.

Then, 38% of x = 12160 $\Rightarrow$ $x = \frac{12160 \times 100}{38} = 32000$.

Now, if s be the population of village S, then

16 : 11 = 32000 : s $\Rightarrow$ $s = \left(\frac{11 \times 3200}{16}\right) = 22000$.

Study the following pie-chart and the table and answer the questions based on them.

Proportion of Population of Seven Villages in 1997

Village	% Population Below Poverty Line
X	38
Y	52
Z	42
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1.

If the population of village R in 1997 is 32000, then what will be the population of village Y below poverty line in that year?

A. 14100
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Answer: Option B

Explanation:

Population of village R = 32000 (given).

Let the population of village Y be y.

Then, 16 : 15 = 32000 : y => y = (15 x 32000) = 30000.
16
Therefore Population of village Y below poverty line = 52% of 30000 = 15600.

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2.
The ratio of population of village T below poverty line to that of village Z below poverty line in 1997 is:

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B. 13 : 11
C. 23 : 11
D. 11 : 13
Answer: Option C

Explanation:

Let N be the total population of all the seven villages.

Then, population of village T below poverty line = 46% of (21% of N)

and Population of villages Z below the poverty line = 42% of (11% of N)

Therefore Required ratio = 46% of (21% of N) = 46 x 21 = 23/11.
42% of (11 % of N) 42 x 11
View Answer Discuss in Forum Workspace Report
3.
Find the population of village S if the population of village X below poverty line in 1997 is 12160.

A. 18500
B. 20500
C. 22000
D. 26000
Answer: Option C

Explanation:

Let the population of village X be x.

Then, 38% of x = 12160 => x = 12160 x 100 = 32000.
38
Now, if s be the population of village S, then

16 : 11 = 32000 : s => s = (11 x 3200) = 22000.
16
View Answer Discuss in Forum Workspace Report

4.If in 1998, the population of villages Y and V increase by 10% each and the percentage of population below poverty line remains unchanged for all the villages, then find the population of village V below poverty line in 1998, given that the population of village Y in 1997 was 30000.

A. 11250
B. 12760
C. 13140
D. 13780
Answer: Option B

Explanation:

Population of village Y in 1997 = 30000 (given).

Let the population of village V in 1997 be v.

Then, 15 : 10 = 30000 : v => v = 30000 x 10 = 20000.
15
Now, population of village V in 1998 = 20000 + (10% of 20000) = 22000.

Therefore Population of village V below poverty line in 1998 = 58% of 22000 = 12760.

TABLE CHART:

Study the following table and answer the questions based on it.
Expenditures of a Company (in Lakh Rupees) per Annum Over the given Years.

Year	Item of Expenditure				
	Salary	Fuel and Transport	Bonus	Interest on Loans	Taxes
1998	288	98	3.00	23.4	83
1999	342	112	2.52	32.5	108
2000	324	101	3.84	41.6	74
2001	336	133	3.68	36.4	88
2002	420	142	3.96	49.4	98

1. What is the average amount of interest per year which the company had to pay during this period?

A. Rs. 32.43 lakhs

B. Rs. 33.72 lakhs

C. Rs. 34.18 lakhs

D. Rs. 36.66 lakhs

Answer: Option **D**
Explanation:

Average amount of interest paid by the Company during the given period

$= \text{Rs.} \left[\frac{23.4 + 32.5 + 41.6 + 36.4 + 49.4}{5}\right] \text{lakhs}$

$= \text{Rs.} \left[\frac{183.3}{5}\right] \text{lakhs}$

= Rs. 36.66 lakhs.

The total amount of bonus paid by the company during the given period is approximately what percent of the total amount of salary paid during this period?

A. 0.1%

B. 0.5%

C. 1%

D. 1.25%

Answer: Option C
Explanation:

$\text{Required percentage} = \left[\frac{(3.00 + 2.52 + 3.84 + 3.68 + 3.96)}{(288 + 342 + 324 + 336 + 420)} \times 100\right]\%$

$= \left[\frac{17}{1710} \times 100\right]\%$

$\approx$ 1%.

Total expenditure on all these items in 1998 was approximately what percent of the total expenditure in 2002?

A. 62%

B. 66%

C. 69%

D. 71%

Answer: Option C
Explanation:

$$\text{Required percentage} = \left[\frac{(288 + 98 + 3.00 + 23.4 + 83)}{(420 + 142 + 3.96 + 49.4 + 98)} \times 100\right]\%$$

$$= \left[\frac{495.4}{713.36} \times 100\right]\%$$

$$\approx 69.45\%$$

The total expenditure of the company over these items during the year 2000 is?

A. Rs. 544.44 lakhs

B. Rs. 501.11 lakhs

C. Rs. 446.46 lakhs

D. Rs. 478.87 lakhs

Answer: Option A
Explanation:
Total expenditure of the Company during 2000
= Rs. (324 + 101 + 3.84 + 41.6 + 74) lakhs
= Rs. 544.44 lakhs.

Expenditures of a Company (in Lakh Rupees) per Annum Over the given Years.

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2002	420	142	3.96	49.4	98

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A. Rs. 32.43 lakhs

B. Rs. 33.72 lakhs

C. Rs. 34.18 lakhs

D. Rs. 36.66 lakhs

Answer: Option **D**

Explanation:

Average amount of interest paid by the Company during the given period

$$= \text{Rs.} \left[\frac{23.4 + 32.5 + 41.6 + 36.4 + 49.4}{5}\right] \text{ lakhs}$$

$$= \text{Rs.} \left[\frac{183.3}{5}\right] \text{ lakhs}$$

= Rs. 36.66 lakhs.

2. The total amount of bonus paid by the company during the given period is approximately what percent of the total amount of salary paid during this period?

A. 0.1%

B. 0.5%

C. 1%

D. 1.25%

Answer: Option **C**

Explanation:

$$\text{Required percentage} = \left[\frac{(3.00 + 2.52 + 3.84 + 3.68 + 3.96)}{(288 + 342 + 324 + 336 + 420)} \times 100\right]\%$$

$$= \left[\frac{17}{1710} \times 100\right]\%$$

$$\approx 1\%.$$

3. Total expenditure on all these items in 1998 was approximately what percent of the total expenditure in 2002?

A. 62%

B. 66%

C. 69%

D. 71%

Answer: Option **C**

Explanation:

$$\text{Required percentage} = \left[\frac{(288 + 98 + 3.00 + 23.4 + 83)}{(420 + 142 + 3.96 + 49.4 + 98)} \times 100\right]\%$$

$$= \left[\frac{495.4}{713.36} \times 100\right]\%$$

$$\approx 69.45\%.$$

4. The total expenditure of the company over these items during the year 2000 is?

A. Rs. 544.44 lakhs

B. Rs. 501.11 lakhs

C. Rs. 446.46 lakhs

D. Rs. 478.87 lakhs

Answer: Option **A**

Explanation:

Total expenditure of the Company during 2000

= Rs. (324 + 101 + 3.84 + 41.6 + 74) lakhs

= Rs. 544.44 lakhs.

5. The ratio between the total expenditure on Taxes for all the years and the total expenditure on Fuel and Transport for all the years respectively is approximately?

A. 4:7

B. 10:13

C. 15:18

D. 5:8

Answer: Option **B**

Explanation:

$$\text{Required ratio} = \left[\frac{(83 + 108 + 74 + 88 + 98)}{(98 + 112 + 101 + 133 + 142)}\right]$$

$$= \left[\frac{451}{586}\right]$$

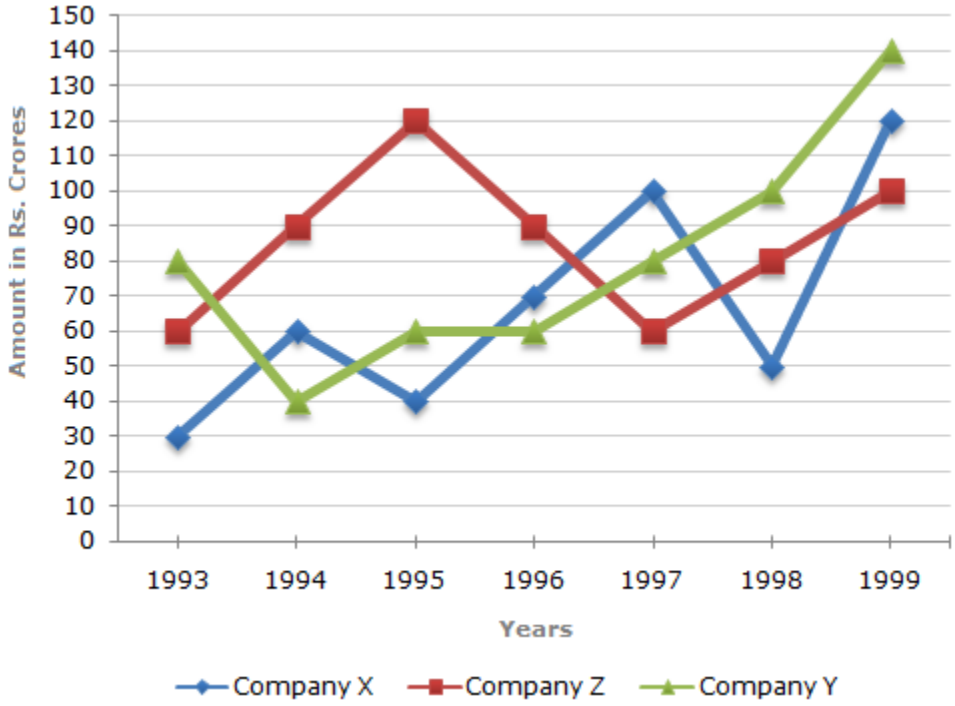
$$= \frac{1}{1.3}$$

$= \frac{10}{13}$.

LINE CHARTS:

tudy the following line graph and answer the questions.

Exports from Three Companies Over the Years (in Rs. crore)



1. For which of the following pairs of the total exports from the three Companies together are equal?

   A. 1995 and 1998

   B. 1996 and 1998

   C. 1997 and 1998

   D. 1995 and 1996

   Answer: Option **D**

   Explanation:

   Total exports of the three Companies X, Y and Z together, during various years are:

   In 1993 = Rs. (30 + 80 + 60) crores = Rs. 170 crores.

   In 1994 = Rs. (60 + 40 + 90) crores = Rs. 190 crores.

In 1995 = Rs. (40 + 60 + 120) crores = Rs. 220 crores.
In 1996 = Rs. (70 + 60 + 90) crores = Rs. 220 crores.
In 1997 = Rs. (100 + 80 + 60) crores = Rs. 240 crores.
In 1998 = Rs. (50 + 100 + 80) crores = Rs. 230 crores.
In 1999 = Rs. (120 + 140 + 100) crores = Rs. 360 crores.
Clearly, the total exports of the three Companies X, Y and Z together are same during the years 1995 and 1996.

2. Average annual exports during the given period for Company Y is approximately what percent of the average annual exports for Company Z?

A. 87.12%

B. 89.64%

C. 91.21%

D. 93.33%

Answer: Option **D**

Explanation:

Analysis of the graph: From the graph it is clear that

The amount of exports of Company X (in crore Rs.) in the years 1993, 1994, 1995, 1996, 1997, 1998 and 1999 are 30, 60, 40, 70, 100, 50 and 120 respectively.

The amount of exports of Company Y (in crore Rs.) in the years 1993, 1994, 1995, 1996, 1997, 1998 and 1999 are 80, 40, 60, 60, 80, 100 and 140 respectively.

The amount of exports of Company Z (in crore Rs.) in the years 1993, 1994, 1995, 1996, 1997, 1998 and 1999 are 60, 90,, 120, 90, 60, 80 and 100 respectively.

Average annual exports (in Rs. crore) of Company Y during the given period

$$= \frac{1}{7} \times (80 + 40 + 60 + 60 + 80 + 100 + 140) = \frac{560}{7} = 80.$$

Average annual exports (in Rs. crore) of Company Z during the given period

$$= \frac{1}{} \times (60 + 90 + 120 + 90 + 60 + 80 + 100) = \frac{600}{} .$$

$\frac{}{7}$ $\left(\frac{}{7}\right)$

$\therefore$ Required percentage $= \left[\frac{80}{\left(\frac{600}{7}\right)} \times 100\right]\% \approx 93.33\%.$

3. In which year was the difference between the exports from Companies X and Y the minimum?

A. 1994

B. 1995

C. 1996

D. 1997

Answer: Option **C**

Explanation:

The difference between the exports from the Companies X and Y during the various years are:

In 1993 = Rs. (80 - 30) crores = Rs. 50 crores.

In 1994 = Rs. (60 - 40) crores = Rs. 20 crores.

In 1995 = Rs. (60 - 40) crores = Rs. 20 crores.

In 1996 = Rs. (70 - 60) crores = Rs. 10 crores.

In 1997 = Rs. (100 - 80) crores = Rs. 20 crores.

In 1998 = Rs. (100 - 50) crores = Rs. 50 crores.

In 1999 = Rs. (140 - 120) crores = Rs. 20 crores.

Clearly, the difference is minimum in the year 1996.

What was the difference between the average exports of the three Companies in 1993 and the average exports in 1998?

A. Rs. 15.33 crores

B. Rs. 18.67 crores

C. Rs. 20 crores

D. Rs. 22.17 crores

Answer: Option **C**

Explanation:

Average exports of the three Companies X, Y and Z in 1993

$= \text{Rs.} \left[\frac{1}{3} \times (30 + 80 + 60)\right] \text{ crores} = \text{Rs.} \left(\frac{170}{3}\right) \text{ crores.}$

Average exports of the three Companies X, Y and Z in 1998

$= \text{Rs.} \left[\frac{1}{3} \times (50 + 100 + 80)\right] \text{ crores} = \text{Rs.} \left(\frac{230}{3}\right) \text{crores.}$

Difference $= \text{Rs.} \left[\left(\frac{230}{3}\right) - \left(\frac{170}{3}\right)\right] \text{ crores}$

$= \text{Rs.} \left(\frac{60}{3}\right) \text{ crores}$

$= \text{Rs. } 20 \text{ crores.}$

5.

In how many of the given years, were the exports from Company Z more than the average annual exports over the given years?

A. 2

B. 3

C. 4

D. 5

Answer: Option **C**

Explanation:

Average annual exports of Company Z during the given period

$= \frac{1}{7} \times (60 + 90 + 120 + 90 + 60 + 80 + 100)$

$= \text{Rs.} \left(\frac{600}{7}\right) \text{crores}$

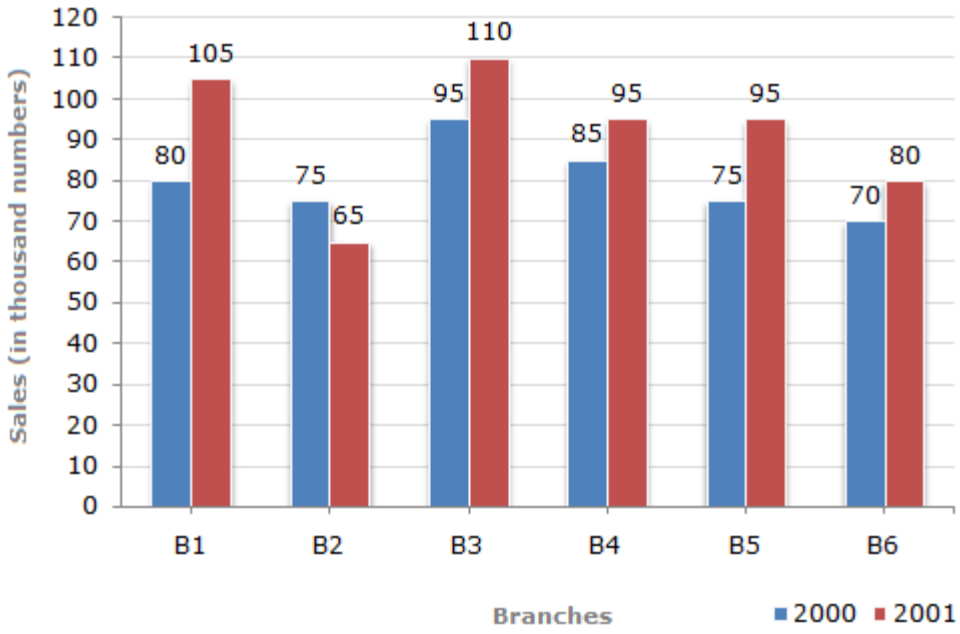
= Rs. 85.71 crores.

From the analysis of graph the exports of Company Z are more than the average annual exports of Company Z (i.e., Rs. 85.71 crores) during the years 1994, 1995, 1996 and 1999, i.e., during 4 of the given years.

BARCHARTS:

The bar graph given below shows the sales of books (in thousand number) from six branches of a publishing company during two consecutive years 2000 and 2001.

Sales of Books (in thousand numbers) from Six Branches - B1, B2, B3, B4, B5 and B6 of a publishing Company in 2000 and 2001.



1. What is the ratio of the total sales of branch B2 for both years to the total sales of branch B4 for both years?

A. 2:3

B. 3:5

C. 4:5

D. 7:9

Answer: Option **D**

Explanation:

Required ratio = $\frac{(75 + 65)}{(85 + 95)} = \frac{140}{180} = \frac{7}{9}$.

2.

Total sales of branch B6 for both the years is what percent of the total sales of branches B3 for both the years?

A. 68.54%

B. 71.11%

C. 73.17%

D. 75.55%

Answer: Option **C**
Explanation:

$$\text{Required percentage} = \left[\frac{(70 + 80)}{(95 + 110)} \times 100\right]\%$$

$$= \left[\frac{150}{205} \times 100\right]\%$$

$$= 73.17\%.$$

3.

What percent of the average sales of branches B1, B2 and B3 in 2001 is the average sales of branches B1, B3 and B6 in 2000?

A. 75%

B. 77.5%

C. 82.5%

D. 87.5%

Answer: Option **D**
Explanation:

Average sales (in thousand number) of branches B1, B3 and B6 in 2000

$$= \frac{1}{3} \times (80 + 95 + 70) = \left(\frac{245}{3}\right).$$

Average sales (in thousand number) of branches B1, B2 and B3 in 2001

$$= \frac{1}{3} \times (105 + 65 + 110) = \left(\frac{280}{3}\right).$$

$\therefore$ Required percentage = $\left[\frac{245/3}{280/3} \times 100\right]\% = \left(\frac{245}{280} \times 100\right)\% = 87.5\%$

4. What is the average sales of all the branches (in thousand numbers) for the year 2000?

A. 73

B. 80

C. 83

D. 88

Answer: Option **B**

Explanation:

Average sales of all the six branches (in thousand numbers) for the year 2000

$= \frac{1}{6} \times [80 + 75 + 95 + 85 + 75 + 70]$

$= 80.$

Total sales of branches B1, B3 and B5 together for both the years (in thousand numbers) is?

A. 250

B. 310

C. 435

D. 560

Answer: Option **D**

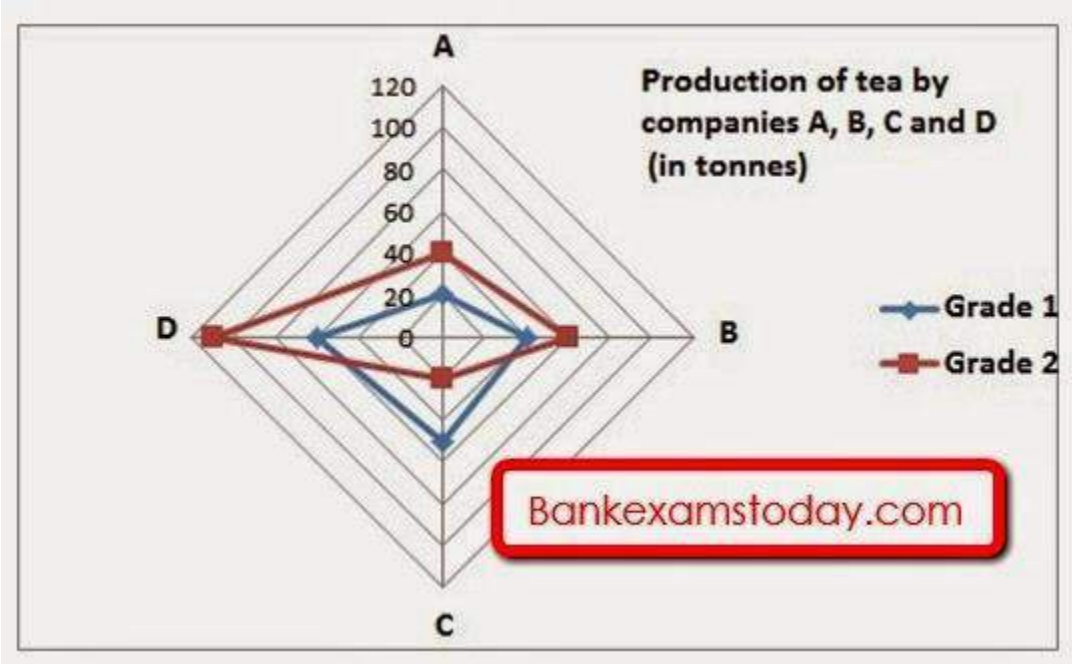
Explanation:

Total sales of branches B1, B3 and B5 for both the years (in thousand numbers)

$= (80 + 105) + (95 + 110) + (75 + 95)$

$= 560.$

Data Interpretation Set - Radar Graph



Use the given data to answer the following questions.

Grade	Rate/Tonne
1	Rs.75,000
2	Rs.60,000

1. What is the difference between the average sales of grade 1 and 2 in all 4 companies?
a. 5 tonnes
b. 10 tonnes
c. 15 tonnes
d. 20 tonnes
e. 25 tonnes

2. What is the difference between the total income of companies C and A?
a. Rs. 1.05 million
b. Rs. 10.05 million
c. Rs.1005 million
d. Rs. 1.05 crores
e. Rs. 10.05 crores

3. In how many companies is the production of grade 2 tea at least 50% more than that of grade 1?
a. 0
b. 1
c. 2
d. 3
e. 4

4. What percentage of the net income of company A is constituted by grade 1 tea?
a. 50%
b. 33.33%
c. 25%
d. 40%
e. 38.46%

5. Total production by company D is what percentage of that of company B?
a. 140%
b. 150%
c. 160%
d. 170%
e. 180%

Solution: 1.c 2.a 3.d 4.e 5.d

1. Average sales of grade 1= (20+40+50+60)/4= 42.5 tonnes
Average sales of grade 2= (40+60+20+110)/4= 57.5 tonnes
Difference= 57.5-42.5= 15 tonnes.

2. Total income of companies A= (75000*20) + (60000*40) = Rs.3900000
Total income of companies C= (75000*50) + (60000*20) = Rs.4950000
Difference= Rs.1050000= Rs. 1.05 million.

3. companies= A, B and D. See the table below.

Company	Grade 1 (tonnes)	Grade 2 (tonnes)
A	20	40
B	40	60
C	50	20
D	60	110

4. Net income of company A= (75000*20)+(40*60000)= Rs.3900000
Grade 1 constitutes 38.46% ((150000/3900000)*100).
5. Total production by company D= 60+110= 170 tonnes
Total production by company B= 40+60= 100 tonnes
Total production by company D is 170 % that of company B. (170/100)*100

DIRECTION SENSE

1. A man walks 5 km toward south and then turns to the right. After walking 3 km he turns to the left and walks 5 km. Now in which direction is he from the starting place?

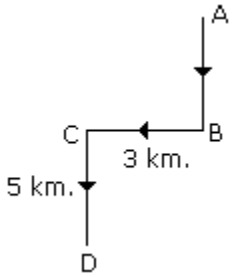
A. West

B. South

C. North-East

D. South-West

Answer: Option **D**
Explanation:



2. Rahul put his timepiece on the table in such a way that at 6 P.M. hour hand points to North. In which direction the minute hand will point at 9.15 P.M. ?

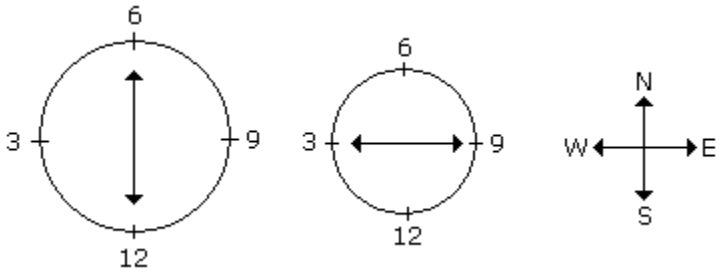
A. South-East

B. South

C. North

D. West

Answer: Option **D**
Explanation:



At 9.15 P.M., the minute hand will point towards west.

3. Rasik walked 20 m towards north. Then he turned right and walks 30 m. Then he turns right and walks 35 m. Then he turns left and walks 15 m. Finally he turns left and walks 15 m. In which direction and how many metres is he from the starting position?

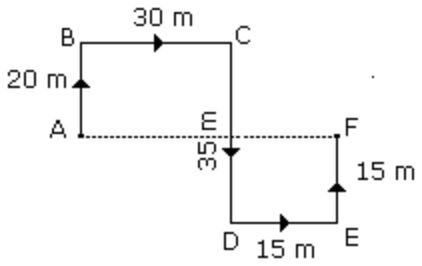
A. 15 m West

B. 30 m East

C. 30 m West

D. 45 m East

Answer: Option **D**
Explanation:



Required distance = AF

= 30 + 15

= 45 m.

From the above diagram, F is in East direction from A.

Hence the required answer is '45 m East'.

4. Two cars start from the opposite places of a main road, 150 km apart. First car runs for 25 km and takes a right turn and then runs 15 km. It then turns left and then runs for another 25 km and then takes the direction back to reach the main road. In the mean time, due to minor break down the other car has run only 35 km along the main road. What would be the distance between two cars at this point?

A. 65 km

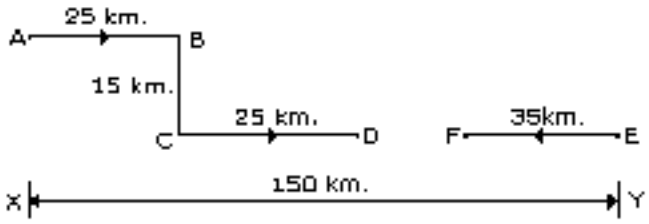
B. 75 km

C. 80 km

D. 85 km

Answer: Option **A**

Explanation:



Required distance = DF

= 150 - (25 + 25 + 35)

= 150 - 65

= 65 km.

5. Starting from the point X, Jayant walked 15 m towards west. He turned left and walked 20 m. He then turned left and walked 15 m. After this he turned to his right and walked 12 m. How far and in which directions is now Jayant from X?

A. 32 m, South

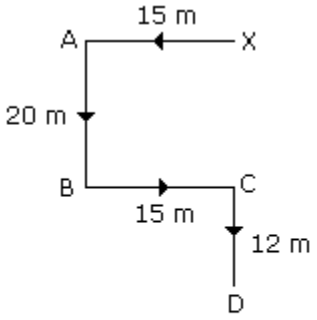
B. 47 m, East

C. 42 m, North

D. 27 m, South

Answer: Option **A**

Explanation:



Required distance = 20 + 12

= 32 m in south direction

6. K is 40 m South-West of L. If M is 40 m South-East of L, then M is in which direction of K?

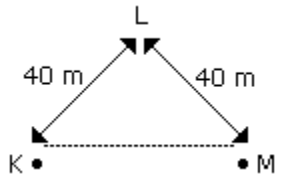
A. East

B. West

C. North-East

D. South

Answer: Option **A**
Explanation:



Hence M is in the East of K.

7. A man walks 2 km towards North. Then he turns to East and walks 10 km. After this he turns to North and walks 3 km. Again he turns towards East and walks 2 km. How far is he from the starting point?

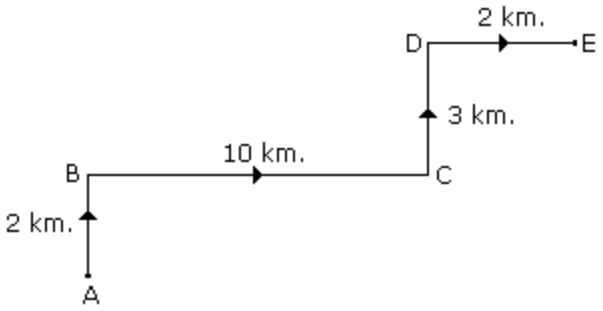
A. 10 km

B. 13 km

C. 15 km

D. None of these

Answer: Option **B**
Explanation:



Required distance = AE

$$= \sqrt{5^2 + 12^2}$$

$$= 13 \text{ km.}$$

8. The length and breadth of a room are 8 m and 6 m respectively. A cat runs along all the four walls and finally along a diagonal order to catch a rat. How much total distance is covered by the cat?

A. 10

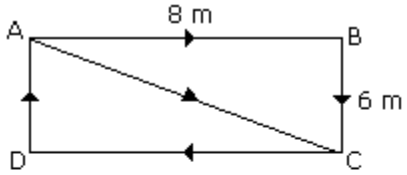
B. 14

C. 38

D. 48

Answer: Option **C**

Explanation:



Required distance = $8 + 6 + 8 + 6 + \sqrt{8^2 + 6^2}$

$$= 28 + \sqrt{100}$$

$$= 28 + 10$$

$$= 38 \text{ m}$$

9. One morning sujata started to walk towards the Sun. After covering some distance she turned to right then again to the right and after covering some distance she again turns to the right. Now in which direction is she facing?

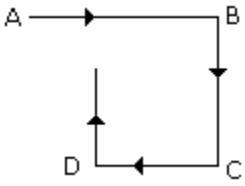
A. North

B. South

C. North-East

D. South-West

Answer: Option **A**
Explanation:



Hence finally Sujata will face towards North.

10. Some boys are sitting in three rows all facing North such that A is in the middle row. P is just to the right of A but in the same row. Q is just behind of P while R is in the North of A. In which direction of R is Q?

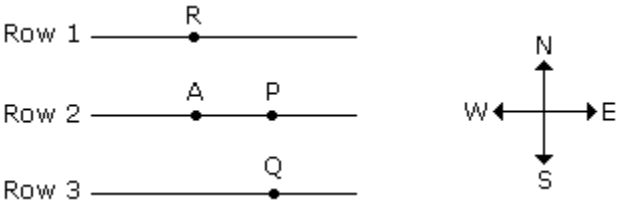
A. South

B. South-West

C. North-East

D. South-East

Answer: Option **D**
Explanation:



Q is in South-East of R.

11. One morning after sunrise, Vimal started to walk. During this walking he met Stephen who was coming from opposite direction. Vimal watch that the shadow of Stephen to the right of him (Vimal). To Which direction Vimal was facing?

A. East

B. West

C. South

D. Data inadequate

Answer: Option **C**
Explanation:

Sun rises in the east. So the shadow of a man will always falls towards the west. Since the shadow of Stephen is to the right of Vimal. Hence Vimal is facing towards South.

12. Golu started from his house towards North. After covering a distance of 8 km. he turned towards left and covered a distance of 6 km. What is the shortest distance now from his house?

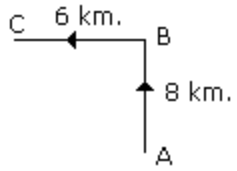
A. 10 km.

B. 16 km.

C. 14 km

D. 2 km.

Answer: Option **A**
Explanation:



Required distance = AC

$= \sqrt{8^2 + 6^2}$

$= \sqrt{64 + 36}$

$= \sqrt{100}$

$= 10$ km.

13. P started from his house towards west. After walking a distance of 25 m. He turned to the right and walked 10 m. He then again turned to the right and walked 15 m. After this he is to turn right at 135° and to cover 30 m. In which direction should he go?

A. West

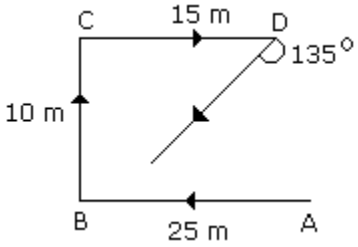
B. South

C. South-West

D. South-East

Answer: Option **C**

Explanation:



Hence he should go in the South-West direction.

14. Ravi left home and cycled 10 km towards South, then turned right and cycled 5 km and then again turned right and cycled 10 km. After this he turned left and cycled 10 km. How many kilometers will he have to cycle to reach his home straight?

A. 10 km

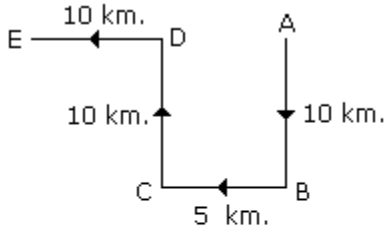
B. 15 km

C. 20 km

D. 25 km

Answer: Option **B**

Explanation:



Required distance = AE

= 5 + 10

= 15 km.

15. A child went 90 m in the East to look for his father, then he turned right and went 20 m. After this he turned right and after going 30 m he reached to his uncle's house. His father was not there. From there he went 100 m to his north and met his father. How far did he meet his father from the starting point?

A. 80 m

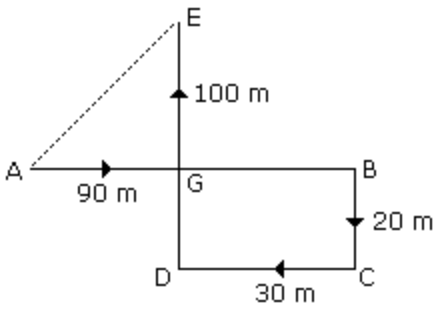
B. 100 m

C. 140 m

D. 260 m

Answer: Option **B**

Explanation:



Required distance = AE

$$= \sqrt{AG^2 + EG^2}$$

$$= \sqrt{(90 - 30)^2 + (100 - 20)^2}$$

$$= \sqrt{(60)^2 + (80)^2}$$

$$= \sqrt{3600 + 6400}$$

$$= \sqrt{10000}$$

$$= 100 \text{ m}$$

HCF & LCM

Formulas and Quick Tricks for LCM and HCF

1. LCM stands for Least Common Multiple. The least number which is exactly divisible by each one of the given numbers is called their LCM
2. HCF stands for Highest Common Factor. The other names for HCF are Greatest Common Divisor (GCD) and Greatest Common Measure (GCM)
3. The HCF of two or more numbers is the greatest number that divides each one of them exactly.
4. Two numbers are said to be co-prime if their HCF is 1
5. HCF of fractions = HCF of numerators/LCM of denominators
6. LCM of fractions = GCD of numerators/HCF of denominators

Questions and Solved Examples on LCM and HCF Problems

1. The HCF of two numbers is 8. Which of the following can never be their LCM?
   A. 24
   B. 48

C. 56
D. 60

Answer: D. 60
Explanation: HCF of two numbers divides their LCM exactly. Clearly, 8 is not a factor of 60

2. If the LCM of two numbers is 750 and their product is 18750, find the HCF of the numbers.
A. 25
B. 30
C. 50
D. 125

Answer: A. 25
Explanation: HCF = (Product of the numbers) / (Their LCM) = 18750/750 = 25

3. The least square number which divides 8, 12 and 18 is?
A. 64
B. 100
C. 144
D. 196

Answer: C. 144
Explanation: LCM = 72
72 * 2 = 144

4. The least number which when divided by 8, 12 and 16, leave in each remainder 3, is?
A. 51
B. 61
C. 69
D. 71

Answer: A. 51
Explanation: LCM = 48 + 3 = 51

5. The least number which when diminished by 7 is divisible by 21, 28, 36 and 45 is?
A. 1261
B. 1265
C. 1267
D. 1269

Answer: C. 1267
Explanation: LCM = 1260
1260 + 7 = 1267

6. A man was employed on the promise that he will be paid the highest wages per day. The contract money to be paid was Rs. 1189. Finally he was paid only Rs. 1073. For how many days did he actually work?
A. 35
B. 37
C. 39
D. 40

Answer: B. 37
Explanation: HCF of 1189, 1073 = 29
1073/29 = 37

7. An officer was appointed on maximum daily wages on contract money of Rs. 4956. But on being absent for some days, he was paid only Rs. 3894. For how many days was he absent?
A. 2
B. 3
C. 4
D. 5

Answer: B. 3
Explanation: HCF of 4956, 3894 = 354
(4956 - 3894)/354 = 3

8. A merchant has three different types of milk: 435 liters, 493 liters and 551 liters. Find the least number of casks of equal size required to store all the milk without mixing.

A. 45
B. 47
C. 51
D. 61

Answer: C. 51
Explanation: HCF of 435, 493, 551 = 29
(453/29) + (493/29) + (551/29) = 51

INEQUALITY

Directions (Q1 - Q5): In each of the given questions, one statement has been given followed by two conclusions. Find which of the given conclusions is true

Q 1.
Statement: A > F ≤ C = D < E
Conclusion I: A > E **Conclusion II:** F < E

1. Only conclusion I is true
2. Only conclusion II is true
3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true

Answer: (2) Only conclusion II is true

Q 2.
Statement: P > Q, X ≤ R < S, S > P Conclusion I: P ≤ R
Conclusion II: X > S

1. Only conclusion I is true
2. Only conclusion II is true

3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true

Answer: (4) Neither conclusion I nor II is true Solution:

$X \leq R < S > P > Q$

Q 3.

Statement: V ≤ X > Y ≤ U = Z > O Conclusion I: Y < Z

Conclusion II: Y = Z

1. Only conclusion I is true
2. Only conclusion II is true
3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true

Answer: (5) Either conclusion I or II is true

Q 4.

Statement: C = B ≥ A ≤ D = E

Conclusion I: C = X **Conclusion II:** C < D

1. Only conclusion I is true
2. Only conclusion II is true
3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true

Answer: (4) Neither conclusion I nor II is true

Q 5.

Statement: L > M, M ≤ O = N, L = Q < K Conclusion I: K > M

Conclusion II: O ≤ K

1. Only conclusion I is true
2. Only conclusion II is true
3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true

Answer: (1) Only conclusion I is true

Directions (Q6 - Q10): In the following questions, the symbols #, *, %, @ and © are used with the following meaning:
A # B, means A is greater than B A * B, means A is smaller than B A % B, means A is equal to B
A @ B, means A is greater than equal to B A © B, means A is smaller than equal to B

Q 6.
Statement: S © P @ Q # R
Conclusion I: S @ R
Conclusion II: R * P

1. Only conclusion I is true
2. Only conclusion II is true
3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true

Answer: (2) Only conclusion II is true Solution:

A # B, means A > B

A * B, means A < B

A % B, means A = B

A @ B, means A ≥ B

A © B, means A ≤ B

Statement: S ≤ P ≥ Q > R

Conclusion I: S ≥ R Conclusion II: R < P

Q 7. Statement: X # B * N @ I © H Conclusion I: X # N
Conclusion II: I % X

1. Only conclusion I is true
2. Only conclusion II is true
3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true

Answer: (4) Neither conclusion I nor II is true Solution:
Statement: X >
B < N ≥ I ≤ H
Conclusion I: X >
N Conclusion II:
I = X

Q 8.
Statement: A % R © U @ D % G
Conclusion I: A % U
Conclusion II: A * U

1. Only conclusion I is true
2. Only conclusion II is true
3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true **Answer: (5) Either conclusion I or II is true Solution:**

Statement: A = R
≤ U ≥ D = G
Conclusion I: A =
U Conclusion II: A
< U

Q 9.

Statement: H % J * D * K # I % F Conclusion I: J * K

Conclusion II: D % F

1. Only conclusion I is true
2. Only conclusion II is true
3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true

Answer: (1) Only conclusion I is true Solution:

Statement: H = J < D < K > I = F Conclusion I: J < K

Conclusion II: D = F

Q 10.

Statement: L # H % J % B @ D # F

Conclusion I: H % F

Conclusion II: L # D

1. Only conclusion I is true
2. Only conclusion II is true
3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true

Answer: (2) Only conclusion II is true Solution:

Statement: L > H = J = B ≥ D > F

Conclusion I: H = F

Conclusion II: L > D

Other Logical Reasoning Related Links:

Reasoning Puzzles	Seating Arrangement
Data Sufficiency	Blood Relations
Directions	Calendar

Q 11.

Statement: K < H > G, G ≤ N, N = U Conclusion I: K = U

Conclusion II: H > N

1. Only conclusion I is true
2. Only conclusion II is true
3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true

Answer: (4) Neither conclusion I nor II is true

Q 12.

Statement: G ≤ S, S > R < K, K ≥ C, L = G Conclusion I: G ≤ R

Conclusion II: L ≥ K

1. Only conclusion I is true
2. Only conclusion II is true
3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true

Answer: (4) Neither conclusion I nor II is true

Direction (Q13 - Q15): Based on the information given below, answer the following questions: A @ B, means B is greater than A

A & B, means B is
smaller than A A $
B, means B is equal
to A
A # B, means B is greater than equal to A
A % B, means B is smaller than or equal to A

Q 13.

Statement: P @ Q $ R
% S # T % U
Conclusion I: P % U
Conclusion II: R @ T

1. Only conclusion I is true
2. Only conclusion II is true
3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true

Answer: (4) Neither conclusion I nor II is true Solution:
A @ B,
means A
< B A &
B, means
A > B A $
B, means
A = B A #
B, means
A ≤ B A %
B, means
A ≥ B
Statement: P < Q = R ≥ @ S ≤
T ≥ U Conclusion I: P ≥ U
Conclusion II: R < T

Q 14.

Statement: A @ B $ C
& D @ E # F
Conclusion I: F @ C
Conclusion II: A # D

1. Only conclusion I is true
2. Only conclusion II is true
3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true

Answer: (4) Neither conclusion I nor II is true Solution:
Statement: A < B = C
> D < E ≤ F
Conclusion I: F < C
Conclusion II: A ≤ D

Q 15.
Statement: S % U @ T
& V $ W # R
Conclusion I: U & R
Conclusion II: T & W

1. Only conclusion I is true
2. Only conclusion II is true
3. Both conclusion I and II are true
4. Neither conclusion I nor II is true
5. Either conclusion I or II is true

Answer: (2) Only conclusion II is true Solution:
Statement: S ≥ U < T > V = W
≤ R Conclusion I: U > R
Conclusion II: T > W

1. Find the nature of the roots of the given equation: $x^2 + 2x + 3 = 0$.
A. Rational and equal
B. Equal
C. Imaginary
D. Irrational
The correct answer is C.
2. If the roots of the equation are -3 and -8, then which of the following is that equation?
A. $x^2 + 11x + 24 = 0$
B. $x^2 – 11x – 24 = 0$
C. $x^2 – 11x + 24 = 0$
D. $x^2 + 11x – 24 = 0$
The correct answer is A.
3. What will be the sum of the roots of the equation $35x^2 – 2x + 1= 0$
A. 1/35
B. 69/35
C. 2/35
D. -1/35
The correct answer is C.
4. Solve the equation $x^2 – 7x + 10 = 0$ and find its roots.
A. (3 +- √23)/2
B. (3 +- √-5)/2
C. (-8,2)
D. (8,-2)
The correct answer is B.

5. If alpha and beta are the roots of the equation $x^2 – 9x + 14 = 0$ then find the value of $A^2 + B^2$.
A. 25
B. 28
C. 53
D. 81
The correct answer is C.
6. 1. Solve: 2(x – 3) – (5 – 3x) = 3 (x + 1) – 4(2 + x)
A) 4
B) 1
C) 3
D) 2

E) None of these
Answer is B
Explanation:
2(x – 3) – (5 – 3x) = 3 (x + 1) – 4(2 + x)
=>2x – 6 – 5 + 3x = 3x + 3 – 8 – 4x
=>5x – 11 = -x – 5
=>6x = 6 => x = 1

7. The length of a rectangle is 8cm more than its breadth. If the perimeter of the rectangle is 68 cm, find its length and breadth.
A) 21cm
B) 14cm
C) 18cm
D) 20cm
E) None of these
Answer is A
Explanation:
Let the breadth of the rectangle be x.
Then, its length = (x + 8) cm
∴ Perimeter of rectangle = 2 [x + (x + 8)] = 2[2x + 8] = 4x + 16
∴ 4x + 16 = 68
=>4x = 68 – 16 = 52
=>x = 13

=>Breadth of rectangle = 13cm and length = 13 + 8 = 21cm
8. A man when asked how many hens and buffaloes he has told that his animals have 120 eyes and 180 legs. How many hens have he?
A) 20
B) 40
C) 30
D) 10
E) None of these
Answer is C
Explanation:
Let number of buffaloes = x
The number of hens = y
∴ Total eyes = 2x + 2y = 120
∴ Total legs = 4x + 2y = 180
Subtracting,

2x + 2y = 120
4x + 2y = 180
– – –
———————-
-2x = – 60
=> x = 30
Put (i) 60 + 2y = 120 => 2y = 60
y = 30
Hence, number of hens = 30

9. If 25x – 19 – [3 – (4x – 5)] = 3x – (6x – 5), x is equal to
A) x =1
B) x = -1
C) x = ½
D) x = 2
E) None of these
Answer is A
Explanation:
=>25x – 19 – [3 – (4x – 5)] = 3x – (6x – 5)
=>25x – 19 – [3 – 4x + 5] = 3x – 6x + 5
=>25x – 19 + 4x – 8 = -3x + 5
=>29x + 3x = 5 + 27
=>32x = 32
=>x = 1

10. If (x2-3x+2)/(x2-5x+4) = (x2-6x+8)/(x2-9x+14), then the value of x is
A) 2(1/2)
B) 1/2
C) 2
D) -2
E) None of these
Answer is D
Explanation:
(x-2)(x-1)/(x-4)(x-1) = (x-2)(x-4)/(x-2)(x-7)
=>x-2/x-4= x-4/x-7
=>x2 – 9x + 14 = x2 – 8x + 16
=>x = -2

MIXTURE OR ALLIGATION

Formulas and Quick Tricks for Mixtures and Alligations

1. **Alligation:** Alligation is the rule which enables us to find the ratio in which two or more ingredients at the given price must be mixed to produce a mixture of a specified price.
2. **Mean Price:** Mean price is the cost price of a unit quantity of the mixture.
3. **Rule of Alligation:** If two ingredients are mixed, then: (Quantity of cheaper / Quantity of dearer) = (CP of dearer - Mean Price / Mean price - CP of cheaper)
4. If the number of quantities in two groups be n_1 and n_2 and their average is x and y respectively, the combined average is $(n_1x+n_2y) / (n_1+ n_2)$
5. The average of n quantities is equal to x. When a quantity is removed, the average becomes y. The value of the removed quantity is n(x-y) + y
6. The average of n quantities is equal to x. When a quantity is added, the average becomes y. The value of the new quantity is n(y-x) + y

Questions and Solved Examples on Mixtures and Alligations

1. A Jar contains 30 litres mixture of Milk and Water in the ratio of x:y respectively. When 10 litre of the mixture is taken out and replaced it water, then the ratio becomes 2:3. Then what is the initial quantity of Milk in the Jar?
   A. 12 Litres
   B. 15 Litres
   C. 18 Litres
   D. 20 Litres

   Answer: C. 18 Litres
   Explanation:
   x+y =30
   (x-10*x/x+y)/ (y-10*y/(x+y) + 10) = 2/3
   2x-4/3y = 20
   x = 18

2. A Container contains ‘X’ litres of Milk. A thief stole 50 litres of Milk and replaced it with the same quantity of water. He repeated the same process further two times. And thus Milk in the container is only ‘X-122’ litres. Then what is the quantity of water in the final mixture?
A. 122 Litres
B. 124 Litres

C. 128 Litres
D. 250 Litres

Answer: A. 122 Litres
Explanation:
$X-122 = X(1-50/X)^3$
X = 250 Litres
Milk = 250-122 = 128
Water = 122

3. A Jar contains 100 litres of Milk a thief stole 10 litre of Milk and replaced it with water. Next, he stole 20 litre of Milk and replaced it with water. Again he stole 25 litre of Milk and replaced with water. Then what is the quantity of water in the final mixture?
A. 46 Litres
B. 50 Litres
C. 54 Litres
D. 55 Litres

Answer: A. 46 Litres
Explanation:
Milk = 100*90/100*80/100*75/100 = 54
Water = 100-54 = 46

4. In a 250 litre of a mixture of Milk and Water, Water is X%. The milkman sold 50 litres of the mixture and replaced same quantity with water. If the percent of Milk in final mixture is 64%, then what is the percentage of Milk in the initial mixture?
A. 20%
B. 40%
C. 60%
D. 80%

Answer: D. 80%
Explanation:
Milk = 250*(100-x/100)
50 litres replaced then,

250*(100-x/100) – 50*(100-x/100) = 64% of 250
X = 20%
Milk = 80%

5. A jar contains ‘x’ litres of Milk, a seller withdraws 25 litre of it and sells it at Rs.20 per litre. He then replaces it water. He repeated the process total three times. Every time while selling he reduces selling price by Rs.2. After this process Milk left in the mixture is only 108 litres so he decided to sell the entire Mixture at Rs. 15 per litre. Then how much profit did he earned if bought Milk at Rs.20 per litre?
A. Rs. 50
B. Rs. 70
C. Rs. 90
D. Rs. 100

Answer: B. Rs.70
Explanation:
Seller sells Milk at Rs.20,18 and 16 respectively for three times
= 25*(20+18+16) = 1350
108 = x(1-25/100) 3
x =256 litre
He sold entire 256 litres at Rs.15 =256*15 = 3840
Cost price = 256*20 = 5120
Profit = 5190-5120 = 70

6. Shailesh covered 180 kms distance in 10 hours. The first part of his journey he covered by Car, then he hired a Rickshaw. The speed of the car and rickshaw is 25 kmph and 15 kmph respectively. The ratio of the distances covered by the car and the rickshaw is:
A. 7:9
B. 7:5
C. 7:3
D. 7:2

Answer: B. 7:5
Explanation:
Average Speed = 180/10 = 18 kmph
15……25
……18……

7.....3

The ratio of time taken by rickshaw to car = 7:3

The ratio of distances covered by rickshaw to car = 7 * 15 : 3 * 25 = 7:5

7. A mixture of wheat is sold at Rs.3 per Kg. This mixture is formed by mixing the Wheat of Rs.2.10 per kg and Rs.2.52 per kg. What is the ratio of price of cheaper to the costlier quality in the mixture if the profit of 25% is being earned?

A. 2:1
B. 2:3
C. 2:5
D. 2:7

Answer: C. 2:5

Explanation:

Selling Price = x + 25*x/100 = 3; x = 2.4

210.....252

.....240.....

12.....30

Hence, Ratio = 2:5

8. From a container of milk, which contains 200 litres of milk, the seller replaces each time with water when he sells 40 litres of milk(or mixture). Every time he sells out only 40 litres of milk(or mixture). After replacing the milk with water 4th time, the total amount of water in the mixture is

A. 75.82L
B. 81.92L
C. 85.28L
D. 87.45L

Answer: B. 81.92L

Explanation:

The amount of Milk left after 4 operations = 200(1-40/100)4

= 200 *(4/5)4= 200 * 256/625 = 81.92L;

Amount of water = 200 – 81.92 = 118.08L

9. The diluted Milk contains only 8 litres of Milk and the rest is water. A new mixture whose concentration is 30%, is to be formed by replacing Milk. How many litres of the mixture shall be replaced with pure Milk if there was initially 32 litres of water in the mixture?

A. 3 litres
B. 4 litres
C. 5 litres
D. 8 litres

Answer: C. 5 litres
Explanation:
Milk : Water
8 : 32 => 1:4
Original Ratio = 20%:80%
Required Ratio = 30%:70%
Original Ratio(water) = 80%
Required Ratio(water) = 70%
7/8 = (1-x/40)
x = 5 litres

10. In a school, the average weight of boys in a class is 30 kg and the average weight of girls in the same class is 20 kg. If the average weight of the whole class is 23.25 kg, what could be the possible strength of boys and girls respectively in the same class?
A. 18 and 19
B. 16 and 15
C. 15 and 13
D. 13 and 27

Answer: D. 13 and 27
Explanation:
20……30
……23.25……
6.75……3.25
Total number of boys and total number of girls = 13 and 27

SURDS & INDICES

1. $(17)^{3.5} \times (17)^{?} = 17^{8}$

A. 2.29

B. 2.75

C. 4.25

D. 4.5

Answer: Option **D**

Explanation:

Let $(17)^{3.5} \times (17)^{x} = 17^{8}$.

Then, $(17)^{3.5 + x} = 17^{8}$.

$\therefore$ $3.5 + x = 8$

$\Rightarrow x = (8 - 3.5)$

$\Rightarrow x = 4.5$

2. If $\left(\frac{a}{b}\right)^{x - 1} = \left(\frac{b}{a}\right)^{x - 3}$, then the value of x is:

A. $\frac{1}{2}$

B. 1

C. 2

D. $\frac{7}{2}$

Answer: Option C

Explanation:

Given $\left(\frac{a}{b}\right)^{x - 1} = \left(\frac{b}{a}\right)^{x - 3}$

$\Rightarrow \left(\frac{a}{b}\right)^{x - 1} = \left(\frac{a}{b}\right)^{-(x - 3)} = \left(\frac{a}{b}\right)^{(3 - x)}$

$\Rightarrow x - 1 = 3 - x$

$\Rightarrow 2x = 4$

$\Rightarrow x = 2.$

3. Given that 100.48 = x, 100.70 = y and xz = y2, then the value of z is close to:

A. 1.45

B. 1.88

C. 2.9

D. 3.7

Answer: Option C
Explanation:
xz = y2 $\Leftrightarrow$ 10(0.48z) = 10(2 x 0.70) = 101.40
$\Rightarrow$ 0.48z = 1.40

$\Rightarrow z = \frac{140}{48} = \frac{35}{12} = 2.9$ (approx.)

4. If $5^a = 3125$, then the value of $5^{(a-3)}$ is:

A. 25

B. 125

C. 625

D. 1625

Answer: Option **A**
Explanation:
$5^a = 3125 \Leftrightarrow 5^a = 5^5$
$\Rightarrow a = 5.$
$\therefore 5^{(a-3)} = 5^{(5-3)} = 5^2 = 25.$

5. If $3^{(x-y)} = 27$ and $3^{(x+y)} = 243$, then *x* is equal to:

A. 0

B. 2

C. 4

D. 6

Answer: Option **C**
Explanation:
$3^{x-y} = 27 = 3^3 \Leftrightarrow x - y = 3$ ....(i)
$3^{x+y} = 243 = 3^5 \Leftrightarrow x + y = 5$ ....(ii)
On solving (i) and (ii), we get $x = 4$.

6. $(256)^{0.16} \times (256)^{0.09} = ?$

A. 4

B. 16

C. 64

D. 256.25

Answer: Option **A**
Explanation:
$(256)^{0.16} \times (256)^{0.09} = (256)^{(0.16 + 0.09)}$
$= (256)^{0.25}$
$= (256)^{(25/100)}$
$= (256)^{(1/4)}$
$= (4^4)^{(1/4)}$
$= 4^{4(1/4)}$
$= 4^1$
$= 4$

7. The value of $[(10)^{150} \div (10)^{146}]$

A. 1000

B. 10000

C. 100000

D. 10^6

Answer: Option **B**
Explanation:

$(10)^{150} \div (10)^{146} = \frac{10^{150}}{10^{146}}$

$= 10^{150 - 146}$

$= 10^4$

$= 10000.$

8. (25)7.5 x (5)2.5 ÷ (125)1.5 = 5?

A. 8.5

B. 13

C. 16

D. 17.5

E. None of these

Answer: Option B
Explanation:
Let (25)7.5 x (5)2.5 ÷ (125)1.5 = 5x.

Then, $\frac{(5^2)^{7.5} \text{ x } (5)^{2.5}}{(5^3)^{1.5}} = 5^x$

$\Rightarrow \frac{5^{(2 \text{ x } 7.5)} \text{ x } 5^{2.5}}{5^{(3 \text{ x } 1.5)}} = 5x$

$\Rightarrow \frac{5^{15} \text{ x } 5^{2.5}}{5^{4.5}} = 5^x$

$\Rightarrow 5x = 5(15 + 2.5 - 4.5)$
$\Rightarrow 5x = 513$
$\therefore$ x = 13.

9. $(0.04)^{-1.5}$ = ?

A. 25

B. 125

C. 250

D. 625

Answer: Option **B**
Explanation:

$(0.04)^{-1.5} = \left(\frac{4}{100}\right)^{-1.5}$

$= \left(\frac{1}{25}\right)^{-(3/2)}$

$= (25)^{(3/2)}$

$= (5^2)^{(3/2)}$

$= (5)^{2 \times (3/2)}$

$= 5^3$

$= 125.$

10. If $x = 3 + 22$, then the value of $\left(x - \frac{1}{x}\right)$ is:

A. 1

B. 2

C. 22

D. 33

Answer: Option **B**
Explanation:

$\left(x - \frac{1}{x}\right)^2 = x + \frac{1}{x} - 2$

$= (3 + 22) + \frac{1}{(3 + 22)} - 2$

$$= (3 + 22) + \frac{1}{(3 + 22)} \times \frac{(3 - 22)}{(3 - 22)} - 2$$

$$= (3 + 22) + (3 - 22) - 2$$

$$= 4.$$

$$\therefore \left(x - \frac{1}{x} \right) = 2.$$

TIME, SPEED & DISTANCE

Formulas and Quick Tricks for Speed, Time and Distance

1. 1 Kmph = (5/18) m/s
2. 1 m/s = (18/5) Kmph
3. Speed(S) = Distance(d)/Time(t)
4. Average Speed = Total distance/Total Time = $(d_1+d_2)/(t_1+t_2)$
5. When $d_1 = d_2$, Average Speed = $2S_1S_2/(S_1+S_2)$, where S_1 and S_2 are the speeds for covering d_1 and d_2 respectively.
6. When $t_1 = t_2$, Average Speed = $(S_1+S_2)/2$, where S_1 and S_2 are the speeds during t_1 and t_2 respectively.
7. Relative speed when moving in opposite direction is S_1+S_2
8. Relative speed when moving in same direction is S_1-S_2
9. A person goes certain distance (A to B) at a speed of S_1 kmph and returns back (B to A) at a speed of S_2 kmph. If he takes T hours in all, the distance between A and B is $T(S_1S_2/(S_1+S_2)$
10. When two trains of lengths l_1 and l_2 respectively travelling at the speeds of S_1 & S_2 respectively cross each other in time t, then the equation is given as $S_1+S_2 = (l_1+l_2)/t$
11. When a train of length l_1 travelling at a speed of S_1 overtakes another train of length l_2 travelling at speed S_2 in time t, then the equation is given as $S_1-S_2 = (l_1+l_2)/t$
12. When a train of length l_1 travelling at a speed of S_1 crosses a platform/bridge/tunnel of length l_2 in time t, then the equation is given as $S_1 = (l_1+l_2)/t$
13. When a train of lengths l travelling at a speed s crosses a pole/pillar/flag post in time t, then the equation is given as s = l/t

14. If two persons A and B start at the same time from two points P and Q towards each other and after crossing they take T_1 and T_2 hours in reaching Q and P respectively, then (A's speed) / (B's speed) = $\sqrt{T_2}$ / $\sqrt{T_1}$

Questions and Solved Examples on Speed, Time and Distance

1. A man goes from A to B at a speed of 20 kmph and comes back to A at a speed of 30 kmph. Find his average speed for the entire journey?

   A. 20 kmph B. 24 kmph C. 28 kmph D. 32 kmph

   Answer: B. 24 kmph
   Explanation: Distance from A and B be 'd'
   Average Speed = total distance / total time
   Average Speed = (2d) / [(d/20) + (d/30)]
   = (2d) / [5d/60) => 24 kmph

2. Convert the 13/36 m/s into kilometers per hour?

   A. 1.2 kmph B. 1.3 kmph C. 1.4 kmph D. 1.5 kmph

   Answer: B. 1.3
   Explanation: 13/36 m/s = 13/36 * 18/5
   = 13/10 = 1.3 kmph

3. If a man can cover 12 metres in one second, how many kilometres can he cover in 3 hours 45 minutes?

   A. 150 kms B. 156 kms C. 162 kms D. 168 kms

   Answer: C. 162 kms
   Explanation: 12 m/s = 12 * 18/5 kmph
   3 hours 45 minutes = 3 3/4 hours = 15/4 hours
   Distance = speed * time = 12 * 18/5 * 15/4 km = 162 kms

4. Nikita takes as much time in running 18 meters as a car takes in covering 48 meters. What will be the distance covered by Nikita during the time the car covers 1.6 km?
   A. 480 m B. 520 m C. 600 m D. 800 m

Answer: C. 600 m
Explanation: Distance covered by Amar = 18/4.8 (1.6km)
= 3/8(1600) = 600 m

5. By travelling at 40 kmph, a person reaches his destination on time. He covered two-third the total distance in one-third of the total time. What speed should he maintain for the remaining distance to reach his destination on time?
A. 15 kmph B. 20 kmph C. 25 kmph D. 30 kmph

Answer: B. 20 kmph
Explanation: Let the time taken to reach the destination be 3x hours. Total distance = 40 * 3x = 120x km
He covered 2/3 * 120x = 80x km in 1/3 * 3x = x hours
So, the remaining 40x km, he has to cover in 2x hours would be required speed = 40x / 2x = 20 kmph

6. What distance will be covered by a bus moving at 72 kmph in 30 seconds?
A. 450 m B. 500 m C. 600 m D. 750 m

Answer: C. 600 m
Explanation: 72 kmph = 72 * 5/18 = 20 mps
D = Speed * time = 20 * 30 = 600 m

7. Walking with 4/5 of my usual speed, I miss the bus by 5 minutes. What is my usual time?
A. 15 mins B. 20 mins C. 25 mins D. 30 mins

Answer: B. 20 mins
Explanation: Speed Ratio = 1:4 / 5 = 5:4
Time Ratio = 4:51 -------- 5 4 --------- ? => 20

8. Rohit walked 25 meters towards South. Then he turned to his left and walked 20 meters. He then turned to his left and walked 25 meters. He again turned to his right and walked 15 meters. At what distance is he from the starting point and in which direction?
A. 35m East B. 35m North C. 40m East D. 60m East

Answer: A. 35m East
Explanation: Rohit's distance from the starting point A would be:
AE = AD+DE = 20 + 15 = 35m East

9. Sagar was riding bike towards north, turned left road 1 km turns towards left & road 2 kms found himself 1 km west of starting. How far did he road north?
   A. 1.5 kms B. 2 kms C. 3 kms D. 3.5 kms

Answer: B. 2 kms
Explanation: He travelled total distance of 3 kms.
From which he travelled 1 km in west.
Hence in all he travelled total 2 kms in north.

10. Walking 7/6 of his usual rate, a boy reaches his school 4 minutes early. Find his usual time to reach the school?
    A. 24 mins B. 26 mins C. 28 mins D. 30 mins

Answer: C. 28 mins
Explanation: Speed Ratio = 1:7/6 = 6:7
Time Ratio = 7:6
1 -------- 7
4 -------- ? => 28 mins

Number Analogy

Q. no. 1: If x = 3 and y = 27, then x : y :: y : _____
A. 19 B. 196 C. 1968 **D. 19683**

Q no. 2) What number will follow the given series of numbers: 3, 6, 11, __ _?
A. 13 B. 16 **C. 18** D. 22

First term = $[1]^2 + 2 = 3$;

Q. no. 3) 11 : 121 :: 13 : ____
A. 156 B. 169 C. 179 D. 216

Q. no. 4) Complete the analogy: 144 : 23 :: 169: _____

A. 32 B. 24 C. 25 D. 26

144 – 23 = 121

5) 583 : 488 : : 293 : ?

a) 581 b) 291 c) 378 d) 487

Answer: (c)
As, Sum of digits of 583 = 5 + 8 + 3 = 16
and Sum of digits of 488 = 4 + 8 + 8
Similarly, Sum of digits of 293 = 2 + 9 + 3 = 14
and Sum of digits of "378" = 3 + 7 + 8 = 18
Here, difference of both sum of digits are (20 - 16) = (18 - 14) = 4.

6) 12 : 144

a) 15 : 135 b) 22 : 164 c) 40 : 1600 d) 10 : 140

The relationship is $x : x^2$.
As, 12:122=12:144.
Similarly,40:402=40:1600

7) 5 : 35

a) 7 : 77 b) 9: 45 c) 11 : 55 d) 3 : 24

The first number is multiplied by the next prime number to obtain the second number.
Prime Numbers are 1, 3, 5, 7, 11, 13 .....
5 : 5 x 7 = 5 : 35
llly, 7 : 7 x 11 = 7 : 77.

8) 7 : 24

a) 30 : 100 b) 23 : 72 c) 19 : 58 d) 11 : 43

Answer: (b)
The relationship is x : (3x + 3)
As, 7:(3 x 7 + 3)=7:24.
Similarly,23:(3 x 23 + 3)=23:72

9) 27 : 9
a) 64 : 8 b) 125 : 5 c) 135 : 15 d) 729 : 81

10) 27 : 9
a) 64 : 8 b) 125 : 5 c) 135 : 15 d) 729 : 81

Means and Averages

1) If the arithmetic mean of 14 observations 26, 16, 14, 15, x, 17, 9, 11, 18, 16, 24, 20, 22, 8 is 17. Find the missing observation.

a. 20 b. 22 c. 16 d. 24

Solution:
Given 14 observations are: 26, 16, 14, 15, x, 17, 9, 11, 18, 16, 24, 20, 22, 8
Arithmetic mean = 17
We know that,
Arithmetic mean = Sum of observations/Total number of observations
17 = (216 + x)/14
17 x 14 = 216 + x
216 + x = 238
x = 238 – 216
x = 22
Answer: B

2.) The arithmetic mean is 50 and all the sum of observations is 700 then the number of observation are.

a. 25 b. 70 c. 14 d. 75

Solution:
Arithmetic mean = sum of observation / number of observation
50 = 700/n
Number of observation = 14
Answer: C

3.) The arithmetic mean is 12 and the number of observations are 20 then the sum of all the values is

a. 8 b. 32 c. 240 d. 1.667

Solution:
Arithmetic mean = sum of all the value/ no.of.observation
12=sum of all the values/20
Sum of all the values = 20 x 12 = 240
Answer: C

4.) What is the Geometric Mean of 1, 2, 4, 8, and 16?

Solution:
First we have to multiply the given numbers: $1 \times 2 \times 4 \times 8 \times 16 = 1024$
Now, (since there are 5 numbers) take the 5th root: $\sqrt[5]{1024} = 4$

5.) **If a, G, b are in Geometric Progression then 'G' is said to be**

A. arithmetic mean
B. geometric mean
C. standard deviation
D. none of above

Answer: B

6.) **Geometric mean is calculated by**

A. $\pm \sqrt{ab}$ B. $\pm ab$ C. $(a + b)^2$ D. $a - b/2$

Answer: A

7.) **The three Geometric means between 2 and 32 are**

A. 6, 10, 14 B. 10, 12, 14 C. 6, 8, 10 D. 4, 8, 16

Answer: D

8.) Find the geometric mean of 1,3,5,7,9
Solution :
The GM is given as $(x_1 \times x_2 \times x_3 ... \times x_n)^{1/n}$
$= (1 \times 3 \times 5 \times 7 \times 9)^{1/5}$
$= (945)^{1/5}$
$= 3.936$
Answer: Therefore, GM = 3.936

Averages

1. A library has an average of 510 visitors on Sundays and 240 on other days. The average number of visitors per day in month of 30 days beginning with a Sunday is:

a. 250 b. 276 c. 280 d.285

Solution:

Sundays : 1, 8, 15, 22, 29 = 510 x 5 = 2550

= 240 x 25 = 6000

= 8550

∴ the month of 30 days

⇒ 8550 / 30 = 285

Average visitors per day = 285

2. The average of 50 numbers is 30. If two numbers, 35 and 40 are discarded, then the average of the remaining numbers is nearly:

a. 28.32 b. 29.68 c. 28.78 d. 29.27

Solution:

Total sum of 48 numbers = (50x30 – (35 +40)

= 1500 – 75

= 1425

∴ Average = 1425 / 48 = **29.68**

3. The average score of a cricketer for ten matches is 38.9 runs. If the average for the first six matches is 42, then find the average for the last four matches.

a. 33.25 b. 33.5 c. 34.25 d. 35

Solution:

Total sum of last 4 matches = (10 x 38.9) – (6 x 42)

= 389 – 252 = 137

∴ **Average = 137 / 4 = 34.25**

4. The average price of 10 books is Rs.12 while the average price of 8 of these books is Rs.11.75. Of the remaining two books, if the price of one book is 60% more than the price of the other, what is the price of each of these two books?

a. Rs.5, Rs.7.50 b. Rs.8, Rs.12 c. Rs.10, Rs.16 d. Rs.12, Rs.14

Solution:

Total cost of 10 books = 120

Total cost of 8 books = 94 (-)

∴ **The cost of 2 books = 26**

⇒ x + y = 26 -------(1)

Given that the price of 1 book is 60% more than the other price

$\therefore \frac{160}{100}$ y + y = 26

Y ($\frac{160}{100}$ +1) = 26

∴ **y =** $\frac{26x100}{260}$

Y = 10

Substituting Y = 10 in (1) we get,

X + 10 = 26

X = 16

5. Of the three numbers, the first is twice the second and the second is twice the third. The average of the reciprocal of the numbers is $\frac{7}{72}$. The numbers are:

a. 16, 8, 4 b. 20, 10, 5 **c. 24, 12, 6** d. 36, 18, 9

Solution:

Let three numbers be x, y,z

Given x = 2y ⇒ x = 4z ; y = 2z ; z = z

The average of reciprocal numbers is 7/72

$\therefore \frac{\frac{1}{x}+\frac{1}{y}+\frac{1}{z}}{3}$ = 7/72

$\frac{yz+xz+xy}{3xyz}$ = 7/72 ⇒ $\frac{2z^2+4z^2+8z^2}{3x4zx2zxz}$ = 7/72

$\frac{14z^2}{24z^3}$ = 7/72 ⇒ $\frac{7}{12z}$ = 7/72

504 = 84z

Z = 504/84 = 6

∴ x = 4 x6 = 24

Y = 2 x 6 = 12

Answer = x = 24, y = 12 ; z= 6

6. Average of ten positive numbers is $\bar{x}$. If each number by 10%, then $\bar{x}$:
a. remains unchanged b. may decrease c. may increase
d. is increased by 10%

Solution:

Ten +ve numbers in $\bar{x}$ is

$$\frac{10+10+10+10+10+10...10}{10} = \bar{x}$$

$\bar{x}$ = 10

It is increased by 10%.

7. The average age of 36 students in a group is 14 years. When teacher's age is included to it, the average increases by one. What is the teacher's age in years?
a. 31 b. 36 c. 51 d. None of these

Solution:

The average age 36 students = 14
37 members = 14 +1 = 15

∴ The teacher's age = (37 x 15 – (36x14)
= 555 – 504 = 51

8. The average salary of all the workers in a workshop is Rs.8000. The average salary of 7 technicians is Rs.12000 and the average salary of the rest is Rs.6000. The total number of workers in the workshop is:
a. 20 b. 21 c. 22 d. 23

Solution:

Let the total number of workers in the workshop = x
Given Average of all workers = 8000 ⇒ 8000x
Average of 7 members = 12000 ⇒ 7 x 12000 = 84000
Average of remaining workers = 6000 ⇒ 6000 X (x – 7) ⇒ 6000x – 42000
Find out the total number of workers

8000x = 84000 + 6000x – 42000

2000x = 42000

X = 21

There fore the total number of workers in the workshop is = 21.

9. The average age of students of a class is 15.8 years. The average age of boys in the class is 16.4 years and that of the girls is 15.4 years. The ratio of the number of boys to the number of girls in the class is:

a. 1 : 2 **b. 2 : 3** c. 3 : 4 d. 3 : 5

Solution:

Let the ratio be K : 1

Kx16.4 + 1x 15.4 = (K+1) x 15.8

(16.4 – 15.8)k = (15.8 – 15.4)

0.6k = 0.4

K = 0.4/0.6 = 2/3

The required ratio = 2/3 :1

= 2:3

10. The average height of 30 boys out of a class of 50, is 160cm, if the average height of the remaining boys is 165cm, the average height of the whole class (in cm) is :

Answer:162

Solution:

Given the average of 30 boys is 160 cm.

Total 50

∴ The remaining (50-30 = 20)

∴ The average of 20 boys is 165 cm

∴ The required average = $\frac{(30x160)+(20x165)}{50}$

= $\frac{4800+3300}{50}$ ⇒8100/50 = **162 cm**

NUMBER SYSTEM

1. If one-third of one-fourth of a number is 15, then three-tenth of that number is:

a. 35 b. 36 c. 45 d. 54

Solution:

Given one third of one fourth of a number (x) is 15.

$(\frac{1}{3}(\frac{1}{4} \times x)) = 15$

$\Rightarrow x = 15 \times 12$

$\Rightarrow x = 180$

$\therefore$ Three benth of $x = \frac{3}{10} \times x$

$= \frac{3}{10} \times 180 = 54$

2. **The value of** $\sqrt{10+\sqrt{25+\sqrt{108+\sqrt{154+\sqrt{225}}}}}$ **is:**

a. 4 b. 5 c. 8 d. 10

Solution:

$\sqrt{10+\sqrt{25+\sqrt{108+\sqrt{154+\sqrt{225}}}}}$

$= \sqrt{10+\sqrt{25+\sqrt{108+\sqrt{154+15}}}}$ Therefore $\sqrt{225} = 15$

$= \sqrt{10+\sqrt{25+\sqrt{108+\sqrt{169}}}}$ Therefore $\sqrt{169} = 13$

$= \sqrt{10+\sqrt{25+\sqrt{121}}}$ Therefore $\sqrt{121} = 11$

$= \sqrt{10+\sqrt{25+11}}$ Therefore $\sqrt{36} = 6$

$= \sqrt{10+6}$

$= \sqrt{16}$

$= 4$

3. The average of five consecutive odd numbers is 61. What is the difference between of these highest and lowest numbers?

a. 2 b. 5 c. 8 d. None of these

Solution:

Let the Consecutive odd numbers be

$x,\ x+2,\ x+4,\ x+6,\ x+8$

Given $\frac{x+x+2+x+4+x+6+x+8}{5}$ = 61

$\frac{5x+20}{5}$ = 61

$x+4 = 61$

$x = 57$

∴ The numbers are 57, 59, 61, 63, 65

Difference between the highest and lowest number is 65 – 57 = 8.

4. What is the difference between the biggest and the smallest fraction among $\frac{2}{3}, \frac{3}{4}, \frac{4}{5} and \frac{5}{6}$?

a. $\frac{1}{6}$ b. $\frac{1}{12}$ c. $\frac{1}{20}$ d. $\frac{1}{30}$

Solution:

The biggest among $\frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}$ is = $\frac{5}{6}$

The Smallest among $\frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}$ is = $\frac{2}{3}$

The difference between the biggest and the smallest fraction = $\frac{5}{6} - \frac{2}{3}$

$= \frac{15-12}{18}$

$= \frac{3}{18}$

$= \frac{1}{6}$

5. $\frac{4+4\times18-6-8}{123\times6-146\times5}=?$

a. 1 b. 2 c. 6.65 d. 7.75

Solution:

$\frac{4+(4x18)-6-8}{123x6-146x5} = \frac{4+72-6-8}{(123x6)-(146x5)}$

$= \frac{4+72-6-8}{738-730}$

$= \frac{62}{8}$

= 7.75

6. $\frac{3}{8}$ of 168 × 15 ÷ 5 + ? = 549 ÷ 9 + 235

a. 107 b. 174 c. 189 d. 296

Solution:

R.H.S. = $\frac{549}{9}$ + 235

= 61 + 235

R.H.S. = 296

L.H.S. = ($\frac{3}{8}$ x168) *x* $\frac{15}{5}$ + *x* Where *x* has to be found

L.H.S. = 189 = *x*

L.H.S. = R.H.S. $\Rightarrow$ 189 + *x* = 296

x = 296 – 189

x = 107

7. If the sum of one-half and one-fifth of a number exceeds one-third of that number by $7\frac{1}{3}$, the number is:

a. 15 b. 18 c. 20 d. 30

Solution:

Let the unknown number be *x*

$\frac{1}{2}x + \frac{1}{5}x - (7\ \frac{1}{3}) = \frac{1}{3}x$

$\frac{x}{2} + \frac{x}{5} - \frac{22}{3} = \frac{x}{3}$

$\frac{x}{2} + \frac{x}{5} - \frac{x}{3} = \frac{22}{3}$

$\frac{15x + 6x - 10x}{30} = \frac{22}{3}$

$\frac{11x}{30} = \frac{22}{3}$

$\frac{x}{10} = 2$

$x = 20$

8. $\frac{\frac{1}{2\frac{1}{3}}}{1\frac{3}{4}}$ is equal to:

a. $\frac{7}{14}$ b. $\frac{12}{49}$ c. $1\frac{1}{12}$ d. None of these

Solution:

$\frac{\frac{1}{2\frac{1}{3}}}{1\frac{3}{4}}$

$= \frac{\frac{1}{7/3}}{7/4}$

$= \frac{3}{7} + \frac{4}{7}$

$= \frac{7}{7}$

$= 1$

∴ The Answer is None of these.

9. $\sqrt{\frac{25}{81}-\frac{1}{9}}=?$

a. $\frac{2}{3}$ **b.** $\frac{4}{9}$ c. $\frac{16}{81}$ d. $\frac{25}{81}$

Solution:

$\sqrt{\frac{25}{81}-\frac{1}{9}} = \sqrt{\frac{25-9}{81}}$

$= \sqrt{\frac{16}{81}} =$ **4/9**

10. The sum of a number and its reciprocal is one-eight of 34. What is the product of the number and its square root?

a. 8 b. 27 c. 32 d. None of these

Solution:

Let the unknown number be *x*

The sum of a number *x* & its reciprocal is $\frac{1}{8}(34)$

Given $\Rightarrow x + \frac{1}{x} = \frac{1}{8}(34)$

$\frac{x^2+1}{x} = \frac{17}{4}$

$4x^2 - 17x + 4 = 0$

Taking $x = 4$

The product of *x* & it's square root = $x \times \sqrt{x}$

$= 4 \times \sqrt{4}$

$= 4 \times 2$

$= 8$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

a = 4, b= -17, c=4

$\therefore x = \frac{17 \pm \sqrt{289-64}}{8}$

$= \frac{17 \pm \sqrt{225}}{8}$

$= \frac{17 \pm 15}{8}$

$= \frac{17+15}{8}, \frac{17-15}{8}$

$= x = 4, \frac{1}{4}$

PERCENTAGES

1. If 75% of a number is added to 75, the result is the number itself. Then the number is

Ans.300

Solution:

X% = x / 100
a/ b as percent : (a/b x 100) %

Answer with explanation

Take the number as x

75% of x + 75 = x

75/100 + 75 = x

75 = x – 75/100 x

75 = x – ¾ x

75 = x/4
 x = 300

2. Subtracting 40% of a number from the number, we get the result as 30, the number is

Ans: 50

Solution:

Consider the number as x

x – 40/100 x	=	30
x - 2/5 x	=	30
3/5 x	=	30

3x = 150
x = 150/3
x = 50

3. If x is 90% of Y, what percent of x is y?

ans : 111.1

Solution:

X = 90 % of y
X = 90/ 100 y
X = 9/10 y
 y = 10/9 x
 y / x = 10/9

required percentage = y / x x 100

= 10/9 x 100
= 1.111 x 100
= 111.1%

4. (X% of Y + Y % of X) = ?

Ans: 2% of xy

X % of y + y % of X
= xy / 100 + yx / 100
= 2 x y / 100
= 2% xy

5. A number increased 37 ½ % gives 33. The number is
Ans: 24

(100 + 37 ½) % of x = 33
(100+ 75/2) % of x = 33
(200+75/2) % of x = 33

= 275 / 2 x 1 / 100 x = 33

x = (33 x 100 x 2) / 275

= 3 x 4 x 2

x = 24

6. The number which when decreased by 27 ½ % given 87 is
Ans: 120

Answer

(100 – 27 ½) % of x = 87

200 - 55 / 2 x 1/100x = 87

145 / 2 x 100 = 87

x = 87 x 2 x 20 / 145

= 3 x 2 x20

= 120

7. It is known that 20% of the mangoes are rotten. If the number of rotten mangoes is 35, then the total number of mangoes is

Ans: 175

Solution:

20% x = 35

20 / 100 = 35

1/5 = 35

x = 175

8. If 70% of students in a school are boys and the number of girls is 504, the number of boys is
Ans: 1176

Solution:

70% of students in a school are boys:

(100-70)% = 30% girls percentage

30% of x = 504
30/100x = 504
3/10 x = 504
x = 504 x 10 / 3
= 1680
No of boys = 70% of 1680
= 70/100 x 1680
= 1176

9. A house owner was having his house painted. He was advised that he would require 25kg of paint. Allowing for 15% wastage and assuming that the paint is available in 2kg cans, what would be the cost of pain purchased, if one can cost Rs.16?

Ans: 240Rs.

Solution:

Required no of kgs 25kg

10% 2.5

5% / 15% 1.25 / 28.75kg

1 can contains 2kg paint
= 28.75
14 can 1 can
= 15 cans
= 15 x 16 = 240

1 can = 16 Rs.

10. A man spends 35% of his income on house rent 75% of the remaining on other items. What percentage of income does he save?

Ans : 16.25

Answers:

Consider the total income as Rs.100

Total In	Rs.100
House rent 35%	Rs. 35

Remaining	Rs. 65

Other expenses 75% of Rs.65 = Rs.48.75

Rs. 16.25

He save Rs.16.25

RATIOS

1. At present, the ratio between the ages of Arun and Deepak is 4 : 3. After 6 years, Arun's age will be 26 years. What is the age of Deepak at present?

a. 12 years **b. 15 years** c. 19 years d. 49 years

Basic Formula:

Answer with Explanation:

Step (i) : Let the present ages of Arun and Deepak be 4x and 3x respectively.

After 6 years , Arun's age is 4x +6 years

Step (ii) : It is given that after 6 years, Arun's age will be 26 years.

$\therefore$ 4x + 6 = 26

$$X = \frac{26-6}{4} = 5$$

$\therefore$ **Deepak's Present age = 3 x 5 = 15 years.**

2. In what ratio must wheat at Rs.3.20 per kg be mixed with wheat at Rs.2.90 per kg so that the mixture be worth Rs.3.08 per kg

Ans:3:2

Basic Formula:

If 2 ingredients are mixed, then the required ratio is given by, **the rule of allegation**

C.P of a unit quantity of cheaper (c) C.P. of a unit quantity of dearer (d)

Mean Price (m)

d-m m-c

∴ Required ratio is **cheaper quantity : dearer quantity = (d-m) : (m-c)**

Answer with Explanation:

Given

i. C.P of a unit quantity of I kind (p) = 3.20
ii. C.P of a unit quantity of II kind (p) = 2.90
iii. Mean price (p) = 3.08
iv. d – m = 3.08 – 2.90 = 0.18
v. m – c = 3.20 – 3.08 = 0.12

∴ **Required ratio = 0.18 : 0.12 = 3 : 2**

3. How many kilograms of sugar costing Rs/.9 per kg must be mixed with 27kg of sugar costing Rs.7 per kg so that there may ba gain of 10% by selling the mixture at Rs.9.24 per kg ?

Ans:63kg

Basic Formula:

i. **If S.P and gain are given, C.P =** $\left[\frac{100}{100+gain\%} xS.P\right]$ **Rs.**
ii. **The rule of allegation**

∴ Required ratio is **cheaper quantity : dearer quantity = (d-m) : (m-c)**

Answer with Explanation:

Step I : S.P of 1 kg of mixture = Rs. 9.24

Gain = 10%

∴ C.P of 1 kg of mixture = $\left[\frac{100}{100+10} x9.24\right]$ = Rs. 8.40

∴ Mean price = Rs. 8.40/-

Step (ii) By the rule of allegation

C.P of 1 kg of sugar of I kind (p) = 900

C.P of 1 kg of sugar of II kind (p) = 700

Mean price (p) = 840

d – m = 900 - 840 = 60

m – c = 840 – 700 = 140

∴ Required ratio = 140 : 60 = 7 : 3

Step (iii) Let x kg of sugar of I kind be mixed with 27 kg of II kind

∴ 7 : 3 = x : 27 ⇒ 7/3 = x/27 ⇒ x = 7/3 x 27 = 63 kg.

4. In what ratio must water be mixed with milk to gain 16 2/3% on selling the mixture at cost price ?

Ans: 1:6

Basic Formula:

If S.P and gain are given, C.P = $\left[\frac{100}{100+gain\%}xS.P\right]$ **Rs.**

The rule of allegation

∴ Required ratio is **cheaper quantity : dearer quantity = (d-m) : (m-c)**

Answer with Explanation:

Step i) Let C.P of 1 litre of mild be Rs.1

And S.P of1 litre of mild be Rs.1

Gain = 50/3 per cent

∴ C.P of 1 litre of mixture = $\left[\frac{100}{100+\frac{50}{3}}x1\right]$

= Re. 100 x 3/350 x 1 = 6/7 (Mean price)

Step (ii) By the rule of allegation

C.P of 1 liter of water = 0

C.P of 1 liter of milk = 1

Mean price (p) = 6/7

d – m = 1 – 6/7 = 1/7

m – c = 6/7 - 0 = 6/7

∴ **ratio of water and milk = 1/7 : 6/7 = 1 : 6**

5. Two vessels A and B contain milk and water mixed in the ratio 8:5 and 5:2 res. The ratio in which these two mixtures be mixed to get a new mixture containing milk and a water in the ratio 9:4?

Ans:2:7

Basic Formula:

Rule of allegation

Answer with Explanation:

Step (i) : Let C.P. of milk be Re.1

Given ratio of mixture in A = 8:5

∴ Milk in 1 lit mixture in A = 8/13 lit

∴ C.P of 1 lit mixture in A = Rs. 8/13

Ratio of Mixture in B = 5:2

∴ milk in 1 litre mixture in B – 5/7 lit

∴ C.P of 1 lit mixture in B = Rs. 5/7

Ratio of new mixture = 9:4

∴ milk in 1 lit mixture = 9/13

C.P of 1 lit mixture = Rs/ 9/13 (Mean price)

Step (ii) : By the rule of allegation,

C.P of 1 liter of mixture in A =8/13

C.P of 1 liter of mixture in B = 5/7

Mean price (p) = 9/13

d – m = 9/13 – 5-7 = 2/91

m – c = 9/13 – 8/13 = 1/13

∴ **Required ratio = 2/91 : 1/13 = 2:7**

6. In what ratio water be mixed with milk costing Rs.12 per liter to obtain a mixture worth of Rs.8 per litre?

Ans 1:2

Basic Formula:

Rule of Alligation

Answer with Explanation:

By the rule of allegation,

C.P of 1 liter of water = 0

C.P of 1 liter of milk = 12

Mean price (p) = 8

d – m = 12-8 = 4

m – c = 8-0 = 8

∴ **Ratio of water and milk = 4 : 8 = 1 : 2**

7. A sum of Rs.4000 is lent out in two parts, one at 8% simple interest and the other at 10% simple interest. In the annual interest is Rs.352, the sum lent at 8% is
Ans:Rs.2400

Basic Formula:
S.I = PNR/100

Answer with Explanation:
Step (i) Given the total sum = Rs. 4000
Let the sum lent at 8% be Rs.x
Ie) P = x , n=1, R = 8%

$$\frac{xX1X8}{100} = \frac{8x}{100}$$

Let the sum lent at 10% be Rs. 4000 – x
P = 4000-x , n=1, R = 10%

$$\frac{4000 - xX1X10}{100} = \frac{40000 - 10x}{100}$$

Given annual interest = Rs. 352

$$\frac{8x}{100} + \frac{40000 - 10x}{100} = 352$$

8x – 10x = 35200 – 40000
-2x = -4800

$$X = \frac{4800}{2}$$ **= Rs.2400/-**

8. A merchant has 1000kg of sugar, part of which he sells at 8% profit and the rest at 18% profit. He gains 14% on the whole. The quantity sold at 18% profit is **Ans:600kg**

Basic Formula:
Rule of Allegation

Answer with Explanation:
Profit on I kind (%) (c) 8 Profit of II kind (d) 18
Mean Price (m) 14

d-m (18-14) = 4 m-c (14-8) = 6

Ratio of Profits on I and II kind = 4:6 = 2:3

Step (ii) Quantity sold at 18% profit = (3/5 x 1000) kg
= 600 kg.

9. Two vessels A and B contain milk and water mixed in the ratio 4:3 and 2:3 in what ratio must these mixtures be mixed to form new mixture containing half milk and half water**?**

Ans: 7:5

Basic Formula:

Rule of Alligation

Answer with Explanation:

Step (i): Let C.P. of 1 liter milk be Re.1

Ratio of mixture in A = 4:3

∴ Milk in 1 litre mixture in A = 4/7 lit, ∴ C.P of 1 litre mix of A = Rs. 4/7

Ratio of mix in B = 2:3

∴ Milk in 1 litre mixture in B = 2/5 lit, ∴ C.P of 1 litre mix of B = Rs. 2/5

Ratio of new mixture = 1:1

∴ Milk in 1 litre mixture = 1/2 lit, ∴ C.P of 1 litre mix = Rs. ½

(Mean price = re. ½)

Step (ii) By the rule of alligation

C.P. of 1 lit mix. In A (d) 4/7 C.P. of 1 lit mix. In B (c) 2/5

Mean Price (m) 1/2

m-c (1/2 – 2/5) = 1/10 d-m (4/7 – 1/2) = 1/14

∴ **Required Ratio = 1/14 : 1/10 = 7 : 5**

10. A sum of Rs.312 was divided among 100 boys and girls in such a way that the boy gets Rs.3.60 and each girl Rs.2.40 the number of girls is

Ans:40

Basic Formula:

Solving simultaneous equations

Answer with Explanation:

Step (i) Let x be the number of boys and y be the number of girls.

Given total number of boys and girls = 100

∴ x + y = 100 ---------- (i)

Step (ii) A boy gets Rs. 3.60 and a girl gets Rs. 2.40

The amount given to 100 boys and girls = Rs. 312

$\therefore$ 3.60x +2.40y = 312 ----------(ii)

Step (iii)

Solving (i) and (ii)

i. x 3.60 $\Rightarrow$ 3.60 x + 3.60y = 360 (-)

ii. $\Rightarrow$ 3.60 x + 2.40y = 312

1.20y = 48

Y = 48 / 1.20 = 40

$\therefore$ **Number of girls = 40**

TIME & WORK

1. A can do piece of work in 30 days while B alone can do it in 40 days. In how many days can A and B working together do it?

Ans 17 1/7

Solultion:

A can finish his work in 30 days

B can finish his work in 40 days

There fore A's one day's work = 1/30

B's one days work = 1/40

(A+B)'s one day's work is = 1/30 + 1/40

$$= \frac{4+3}{120} \text{ - 7/120}$$

A and B together finish the work $= \frac{1}{\frac{7}{120}}$

= 120/7

= 17 1/7 days

2. A and B together can complete a piece of work in 35 days while A alone can complete the same work in 60 days. B alone will be able to complete the same working in

Ans 84 days

Solution:

Subtraction of fraction

$$\frac{a}{b} - \frac{c}{d} = \frac{ad - cb}{bd}$$

Answer with Explanation:

A and B finish one work with company = 35 days

$\Rightarrow$ (A + B)'s one days work = 1/35

A alone finish the same work = 60 days

$\Rightarrow$ A's one day's work = 1/60

$\therefore$ B's one day's work = (A + B)'s one days work - A's one day's work

$$= \frac{1}{35} - \frac{1}{60} \quad \text{(take LCM)}$$

$$= \frac{12-7}{420} = \frac{5}{420} = 1/84$$

$\therefore$ B alone can complete the work = **84 days**

3. A takes 3 days and B 2 days. Both finished the work and got Rs.150. What is the share of A?

Answer: 60

Solution:

Given A's one day's work = 1/3

B's one day's work = ½

$\therefore$ (A + B)'s one day's work = 1/3 + ½ = 5/6

$\therefore$ A's share is $\frac{A's one day's work}{(A+B)'s one day's work}$ x Amount

$$\Rightarrow \frac{\frac{1}{3}}{\frac{5}{6}} \times 150$$

$\Rightarrow$ 1/3 x 6/5 x 150

$\Rightarrow$ 60

$\therefore$ **The share of A is Rs. 60.**

4. A can do 1/3 of the work in 5 days and B can do 2/5 of the work in 10 days in how many days both A and B together can do the work
A**ns 9 3/8**

Solution:

A can do 1/3 of work in = 5 days
$\therefore$ Whole work done by A = 5 x 1/3 = 15 days
B do 2/5 of work in = 10 days
$\therefore$ Whole work done by B = 10 x 5/2 = 50/2 = 25 days
$\therefore$ A's one day work = 1/15
B's one day work = 1/25

$\therefore$ (A+B)'s 1day's work = $\frac{1}{15} + \frac{1}{25}$ (take LCM)

$= \frac{5+3}{75} = \frac{8}{75}$

$\therefore$ (A+B) can finish their work in 75/8 **= 9 3/8 days.**

5. Ramesh, Suresh and Harirsh can do a piece of work in 15 days, 10 days and 6 days respectively. How long will they take to do it, if all the three work it together? A**ns 3 days**

Solution:
Given Ramesh's one day's work = 1/15
Suresh's one day's work = 1/10
Harish's one day's work = 1/6

∴ (Ramesh + Suresh + Harish)'s one day's work = $\frac{1}{15} + \frac{1}{10} + \frac{1}{6}$ (take LCM)

$\frac{4+6+10}{60} = \frac{20}{60}$ = 1/3

∴ **if all the three finish the work in 3 days.**

6. A can do a piece of work in 80 days. He works at it for 10 days and then B alone finished the remaining work in 42 days. The two together could complete the work in :

A**ns 30 days**

Solution:

A's 10 days work = 1/80 x 10 = 1/8
Remaining work = 1 – 1/8 = 7/8
∴ 7/8 part of awork done by B in 42 days
∴ whole work will be done by B in 42 x 7/8 = 48 days

Now A's one days work = 1/80
B's one day's work = 1/ 48

∴ (A+B)'s 1day's work = $\frac{1}{80} + \frac{1}{48}$ (take LCM)

= $\frac{3+5}{240} = \frac{8}{240}$ = 1/30

∴ A and B finish the work in 30 days.

7. A and B can together finish a work in 30 days. They worked at it for 20 days and then B left. The remaining work was done by A alone in 20 more days A alone can finish the work in

A**ns : 60 days**

Solution:

A and B's one day's work = 1/30

∴ A and B's 20 day's work = 1/30 x 20 = 2/3

Remaining work = 1-2/3 = 1/3

Now 1/3 part of work done by a in 20 days

∴ **Whole work will be done by a in 20 x 3/1 = 60 days.**

8. A is twice as good a work man as B and together they finish a piece of work in 14 days The number of days taken by A alone to finish the work.
Ans: 21 days

Solution:
Ratio comparison

A:b:: c:d
Ad = bc

Answer with Explanation:
Given A is twice as like as B
∴ take x for B and 2x for A
∴ we get (A's one day's work) : (B's one day's work) = 2:1
But given (A+B)'s one day's work = 1/14
Divide 1/14 in the ratio 2:1
∴ A's one day's work = 1/14 x 2/3 = 1/21
∴ **A alone can do the work in 21 days.**

9. A and B can do a piece of work in 45 days and 40 days respectively. They began to go the work together but A leaves after some days and than B completed the reaminnig work in 23 days. The number o days after which A left the work was

Ans: 9

Solution:

A's one day's work = 1/45
B's one day's work = 1/40

∴ (A+B)'s 1day's work = $\frac{1}{45} + \frac{1}{40}$ (take LCM)

= $\frac{8+9}{360} = \frac{17}{360}$

Work done by B in k23 days = 1/40 x 23 = 23/40

Remaining work = 1 – 23/40 = $\frac{40-23}{40}$ = 17/40

(A+B)'s 1day's work **=** $\frac{17}{360}$

17/40 work done by (A + B) in 1 x 360/17 x 17/40 = 9 days.

10. A can do a certain job in 12 days. B is 60% more efficient than A . The number of days, it takes B to do the same piece of work is

Ans 7 ½

Solution:

Ratio multiplication
A:b:: c:d
Ad = bc

Answer with Explanation:

Given B is 60% more than A

Assume A is 100 because percentage

∴ B is 60 + 100 = 160

∴ Ratio of times taken by A and B = 160 : 100 = 8:5

Now assume B take days x

Given A do the job = 12 days

∴ The ratio is 12 : x

Comparing 8 : 5 :: 12 : x (apply above basic formula ad = bc)

8x = 60

X = 60 / 8 = 7 ½ days

∴ **B takes 7 ½ days to do the same piece of work.**

SET THEORY AND VENN DIAGRAM

What is a Venn Diagram?

Venn diagram, also known as Euler-Venn diagram is a simple representation of sets by diagrams. The usual depiction makes use of a rectangle as the universal set and circles for the sets under consideration.

In CAT and other MBA entrance exams, questions asked from this topic involve 2 or 3 variable only. Therefore, in this article we are going to discuss problems related to 2 and 3 variables.

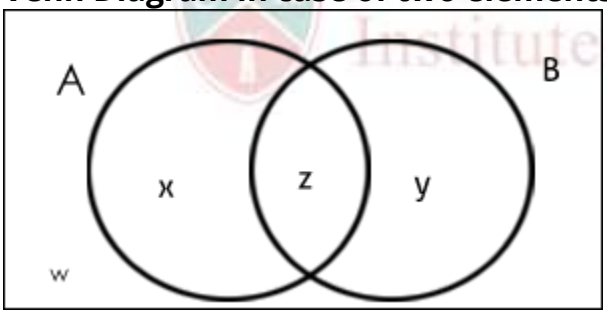
Let's take a look at some basic formulas for Venn diagrams of two and three elements.

$n (A \cup B) = n(A) + n (B) - n (A \cap B)$

$n (A \cup B \cup C) = n(A) + n (B) + n (C) - n (A \cap B) - n (B \cap C) - n (C \cap A) + n (A \cap B \cap C)$

And so on, where n(A) = number of elements in set A.

Venn Diagram in case of two elements



Where;

X = number of elements that belong to set A only

Y = number of elements that belong to set B only

Z = number of elements that belong to set A and B both (A∩B)

W = number of elements that belong to none of the sets A or B

From the above figure, it is clear that

$n(A) = x + z$;

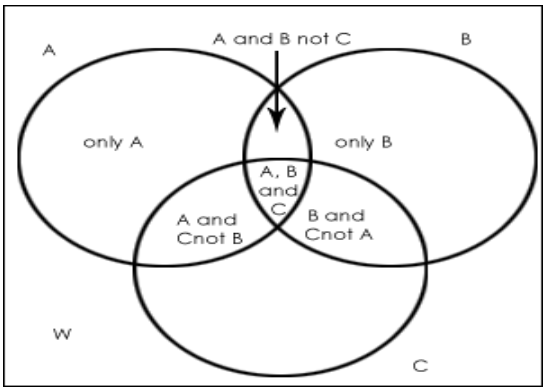
$n (B) = y + z$;

$n(A \cap B) = z$;

$n (A \cup B) = x + y + z$.

Total number of elements = x + y + z + w

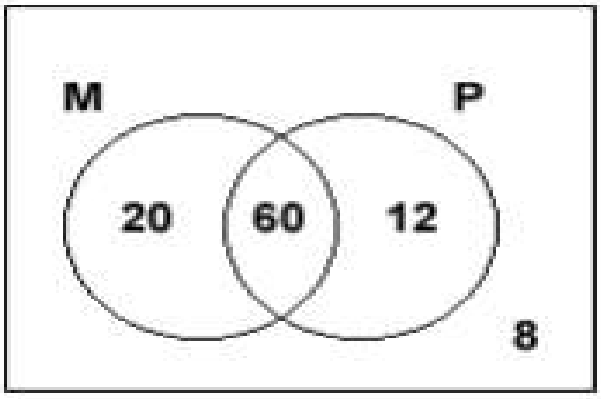
Venn Diagram in case of three elements



Where,
W = number of elements that belong to none of the sets A, B or C
Tip: Always start filling values in the Venn diagram from the innermost value.

1: In a group of 100 customers at Big Red's Pizza Emporium, 80 of them ordered mushrooms on their pizza and 72 of them ordered pepperoni. 60 customers ordered both mushrooms and pepperoni on their pizza. a. How many customers ordered mushrooms but no pepperoni? b. How many customers ordered pepperoni but no mushrooms? c. How many customers ordered neither of these two toppings?

Solution :

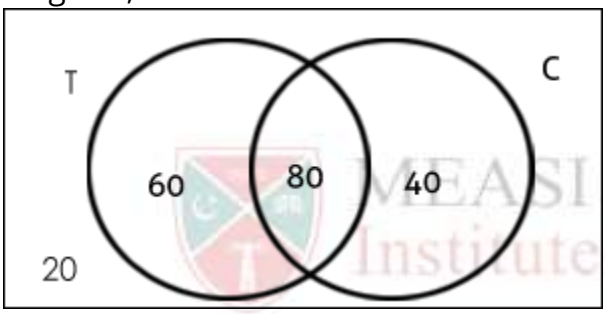


Now, we can answer the questions.
a. 20 ordered mushrooms but not pepperoni.
b. 12 ordered pepperoni but not mushrooms.
c. 8 ordered neither of these two toppings.

2: In a college, 200 students are randomly selected. 140 like tea, 120 like coffee and 80 like both tea and coffee.

- How many students like only tea?
- How many students like only coffee?
- How many students like neither tea nor coffee?
- How many students like only one of tea or coffee?
- How many students like at least one of the beverages?

Solution: The given information may be represented by the following Venn diagram, where T = tea and C = coffee.



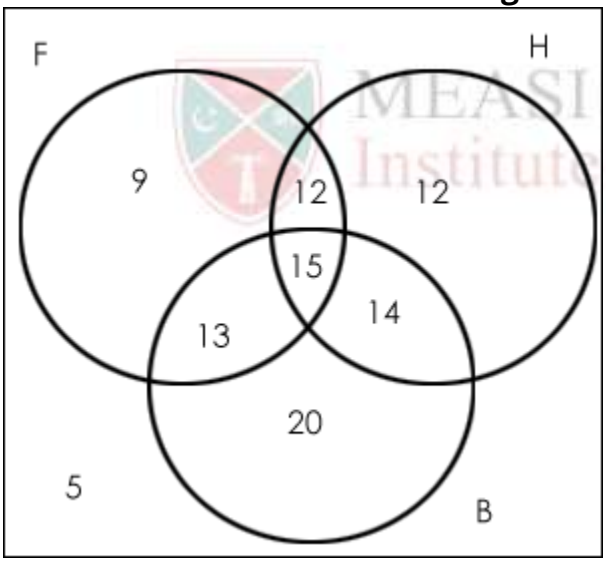
- Number of students who like only tea = 60
- Number of students who like only coffee = 40
- Number of students who like neither tea nor coffee = 20
- Number of students who like only one of tea or coffee = 60 + 40 = 100
- Number of students who like at least one of tea or coffee = n (only Tea) + n (only coffee) + n (both Tea & coffee) = 60 + 40 + 80 = 180

Example 2: In a survey of 500 students of a college, it was found that 49% liked watching football, 53% liked watching hockey and 62% liked watching basketball. Also, 27% liked watching football and hockey both, 29% liked watching basketball and hockey both and 28% liked watching football and basket ball both. 5% liked watching none of these games.

- How many students like watching all the three games?
- Find the ratio of number of students who like watching only football to those who like watching only hockey.
- Find the number of students who like watching only one of the three given games.

- Find the number of students who like watching at least two of the given games.

Solution:
n(F) = percentage of students who like watching football = 49%
n(H) = percentage of students who like watching hockey = 53%
n(B)= percentage of students who like watching basketball = 62%
n (F ∩ H) = 27% ; n (B ∩ H) = 29% ; n(F ∩ B) = 28%
Since 5% like watching none of the given games so, n (F ∪ H ∪ B) = 95%.
Now applying the basic formula,
95% = 49% + 53% + 62% -27% - 29% - 28% + n (F ∩ H ∩ B)
Solving, you get n (F ∩ H ∩ B) = 15%.
Now, make the Venn diagram as per the information given.
Note: All values in the Venn diagram are in percentage.



- Number of students who like watching all the three games = 15 % of 500 = 75.
- Ratio of the number of students who like only football to those who like only hockey = (9% of 500)/(12% of 500) = 9/12 = 3:4.
- The number of students who like watching only one of the three given games = (9% + 12% + 20%) of 500 = 205

- The number of students who like watching at least two of the given games=(number of students who like watching only two of the games) +(number of students who like watching all the three games)= (12 + 13 + 14 + 15)% i.e. 54% of 500 = 270.

In a survey of university students, 64 had taken mathematics course, 94 had taken chemistry course, 58 had taken physics course, 28 had taken mathematics and physics, 26 had taken mathematics and chemistry, 22 had taken chemistry and physics course, and 14 had taken all the three courses. Find how many had taken one course only.

Solution :

Step 1 :

Let M, C, P represent sets of students who had taken mathematics, chemistry and physics respectively.

Step 2 :

From the given information, we have

$$n(M) = 64, n(C) = 94, n(P) = 58,$$

$$n(MnP) = 28, n(MnC) = 26, n(CnP) = 22$$

$$n(MnCnP) = 14$$

Step 3 :

From the basic stuff, we have

Number of students who had taken only Math

$$= n(M) - [n(MnP) + n(MnC) - n(MnCnP)]$$

$$= 64 - [28 + 26 - 14]$$

$$= 64 - 40$$

$$= 24$$

Step 4 :

Number of students who had taken only Chemistry :

$$= n(C) - [n(MnC) + n(CnP) - n(MnCnP)]$$

$$= 94 - [26+22-14]$$

$$= 94 - 34$$

$$= 60$$

Step 5 :

Number of students who had taken only Physics :

$$= n(P) - [n(MnP) + n(CnP) - n(MnCnP)]$$

$$= 58 - [28 + 22 - 14]$$

$$= 58 - 36$$

$$= 22$$

Step 6 :

Total number of students who had taken only one course :

$$= 24 + 60 + 22$$

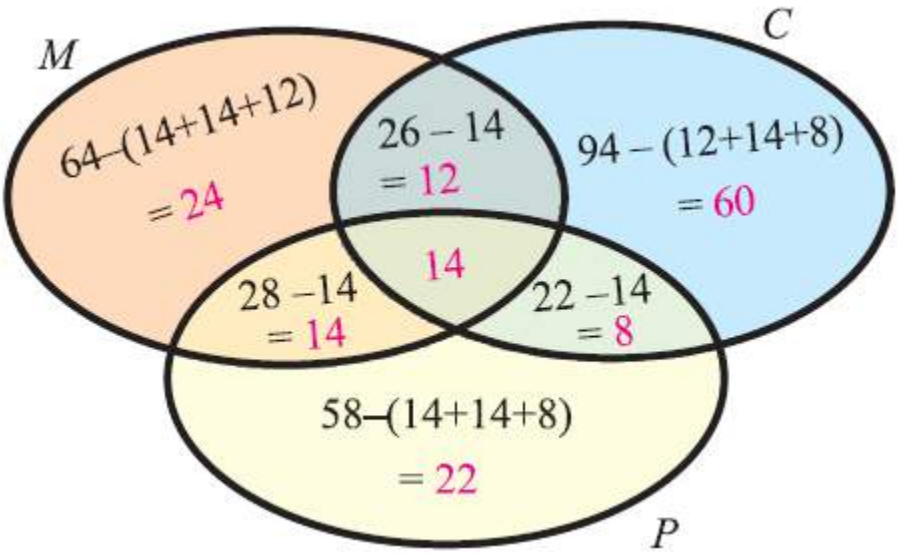
$$= 106$$

Hence, the total number of students who had taken only one course is 106.

Alternative Method (Using venn diagram) :

Step 1 :

Venn diagram related to the information given in the question:



Step 2 :

From the venn diagram above, we have

Number of students who had taken only math = 24

Number of students who had taken only chemistry = 60

Number of students who had taken only physics = 22

Step 3 :

Total Number of students who had taken only one course :

$$= 24 + 60 + 22$$

$$= 106$$

Hence, the total number of students who had taken only one course is 106.

Problem 2 :

In a group of students, 65 play foot ball, 45 play hockey, 42 play cricket, 20 play foot ball and hockey, 25 play foot ball and cricket, 15 play hockey and cricket and 8 play all the three games. Find the total number of students in the group (Assume that each student in the group plays at least one game).

Solution :

Step 1 :

Let F, H and C represent the set of students who play foot ball, hockey and cricket respectively.

Step 2 :

From the given information, we have

$$n(F) = 65,\ n(H) = 45,\ n(C) = 42,$$

$$n(FnH) = 20,\ n(FnC) = 25,\ n(HnC) = 15$$

$$n(FnHnC) = 8$$

Step 3 :

From the basic stuff, we have

Total number of students in the group is n(FuHuC).

n(FuHuC) is equal to

$$= n(F) + n(H) + n(C) - n(FnH) - n(FnC) - n(HnC) + n(FnHnC)$$

$$n(FuHuC) = 65 + 45 + 42 - 20 - 25 - 15 + 8$$

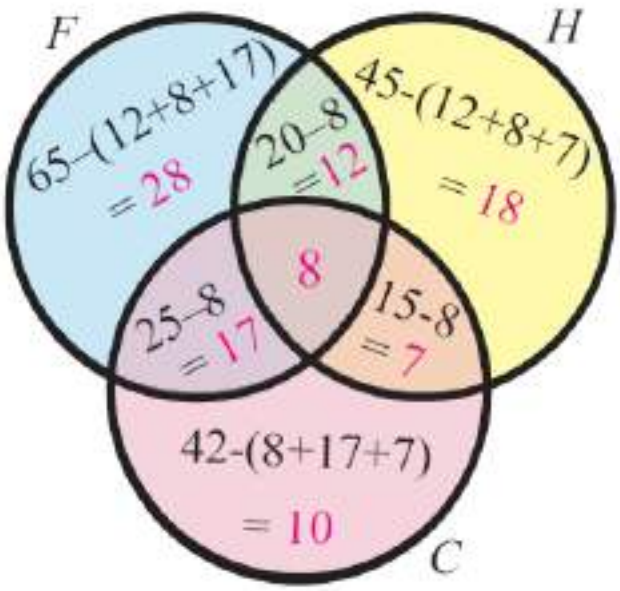
$$n(FuHuC) = 100$$

Hence, the total number of students in the group is 100.

Alternative Method (Using Venn diagram) :

Step 1 :

Venn diagram related to the information given in the question :



Step 2 :

Total number of students in the group :

$$= 28 + 12 + 18 + 7 + 10 + 17 + 8$$

$$= 100$$

So, the total number of students in the group is 100.

Problem 3 :

In a college, 60 students enrolled in chemistry,40 in physics, 30 in biology, 15 in chemistry and physics,10 in physics and biology, 5 in biology and chemistry. No one enrolled in all the three. Find how many are enrolled in at least one of the subjects.

Solution :

Let C, P and B represents the subjects Chemistry, Physics and Biology respectively.

Number of students enrolled in Chemistry :

$$n(C) = 60$$

Number of students enrolled in Physics :

$$n(P) = 40$$

Number of students enrolled in Biology :

$$n(B) = 30$$

Number of students enrolled in Chemistry and Physics :

$$n(CnP) = 15$$

Number of students enrolled in Physics and Biology :

$$n(PnB) = 10$$

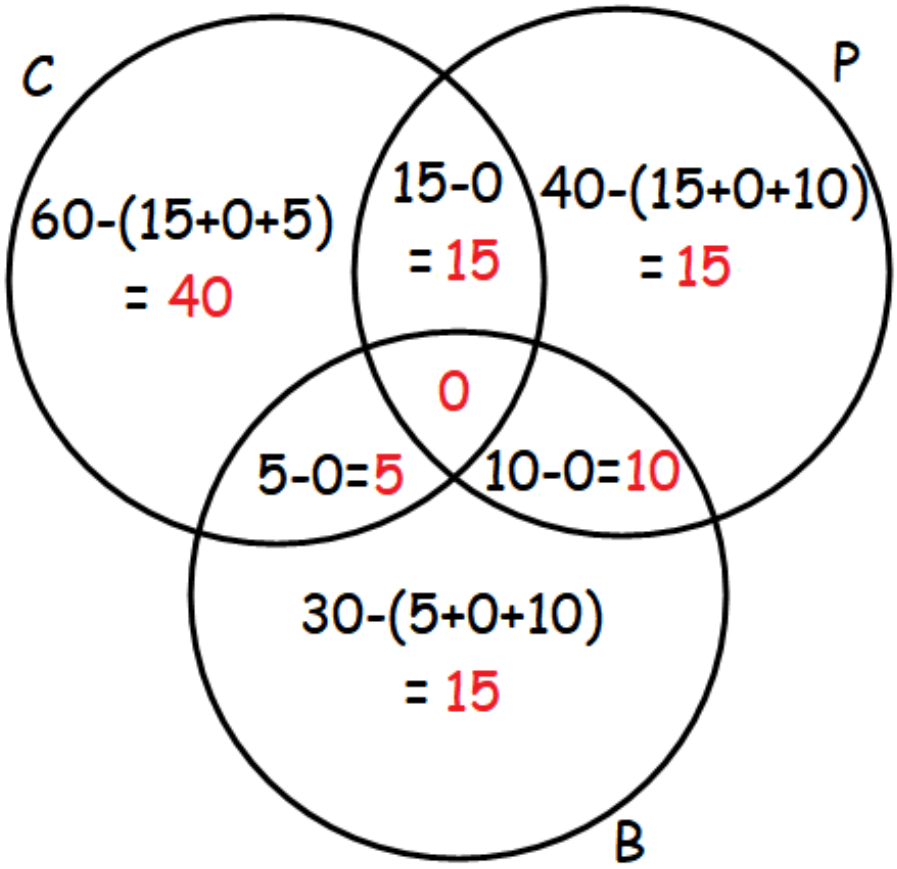
Number of students enrolled in Biology and Chemistry :

$$n(BnC) = 5$$

No one enrolled in all the three. So, we have

$$n(CnPnB) = 0$$

The above information can be put in a Venn diagram as shown below.



From, the above Venn diagram, number of students enrolled in at least one of the subjects :

$$= 40 + 15 + 15 + 15 + 5 + 10 + 0$$

$$= 100$$

So, the number of students enrolled in at least one of the subjects is 100.

Problem 4 :

In a town 85% of the people speak Tamil, 40% speak English and 20% speak Hindi. Also 32% speak Tamil and English, 13% speak Tamil and Hindi and 10% speak English and Hindi, find the percentage of people who can speak all the three languages.

Solution :

Let T, E and H represent the people who speak Tamil, English and Hindi respectively.

Percentage of people who speak Tamil :

$$n(T) = 85$$

Percentage of people who speak English :

$$n(E) = 40$$

Percentage of people who speak Hindi :

$$n(H) = 20$$

Percentage of people who speak English and Tamil :

$$n(TnE) = 32$$

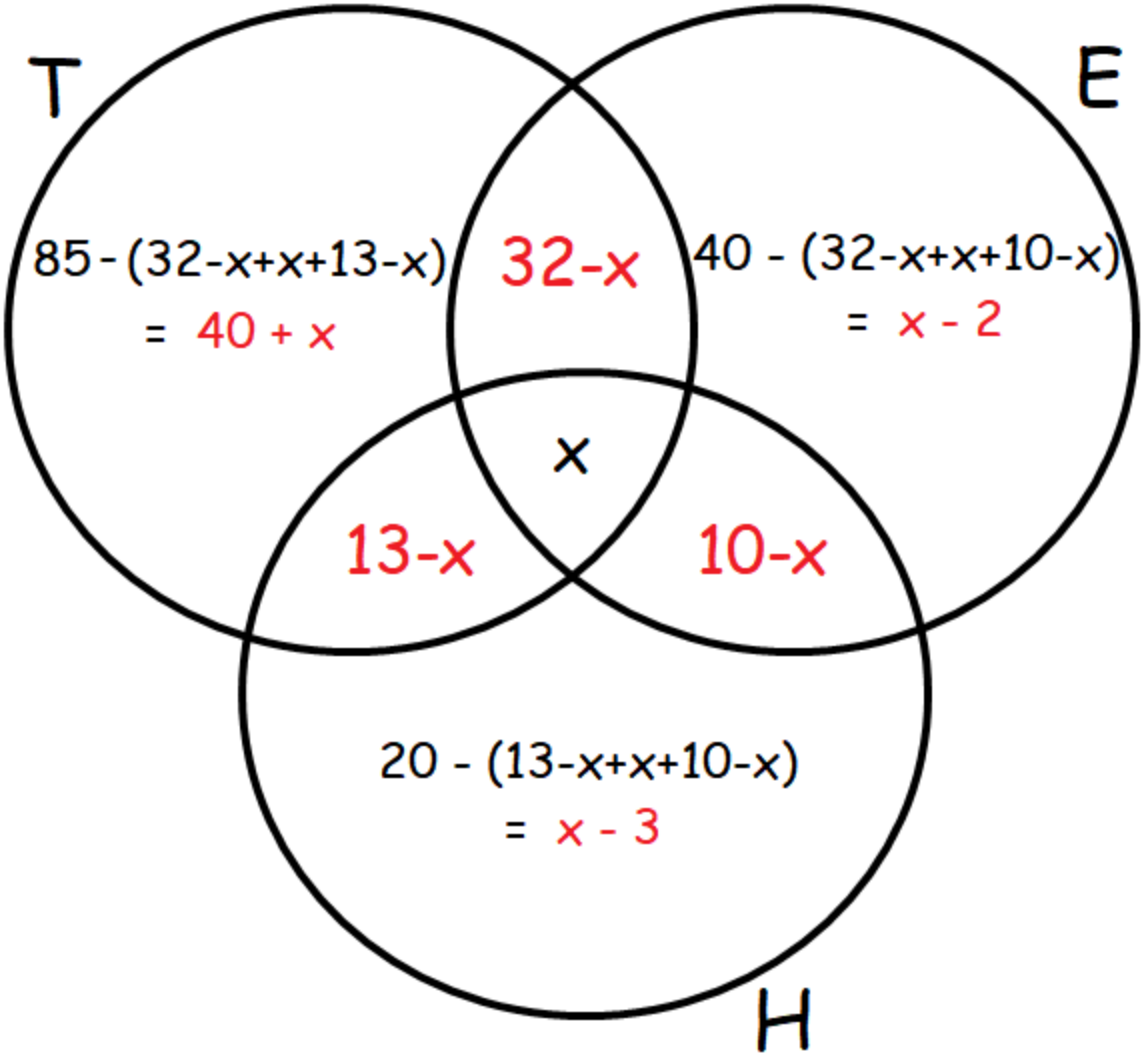
Percentage of people who speak Tamil and Hindi :

$$n(TnH) = 13$$

Percentage of people who speak English and Hindi :

$$n(EnH) = 10$$

Let x be the percentage of people who speak all the three language.



From the above Venn diagram, we can have

$$100 = 40 + x + 32 - x + x + 13 - x + 10 - x - 2 + x - 3 + x$$

$$100 = 40 + 32 + 13 + 10 - 2 - 3 + x$$

$$100 = 95 - 5 + x$$

$$100 = 90 + x$$

$$x = 100 - 90$$

$$x = 10\%$$

So, the percentage of people who speak all the three languages is 10%.

Problem 5 :

An advertising agency finds that, of its 170 clients, 115 use Television, 110 use Radio and 130 use Magazines. Also 85 use Television and Magazines, 75 use Television and Radio, 95 use Radio and Magazines, 70 use all the three. Draw Venn diagram to represent these data. Find

(i) how many use only Radio?

(ii) how many use only Television?

(iii) how many use Television and Magazine but not radio?

Solution :

Let T, R and M represent the people who use Television, Radio and Magazines respectively.

Number of people who use Television :

$$n(T) = 115$$

Number of people who use Radio :

$$n(R) = 110$$

Number of people who use Magazine :

$$n(M) = 130$$

Number of people who use Television and Magazines

$$n\ (TnM) = 85$$

Number of people who use Television and Radio :

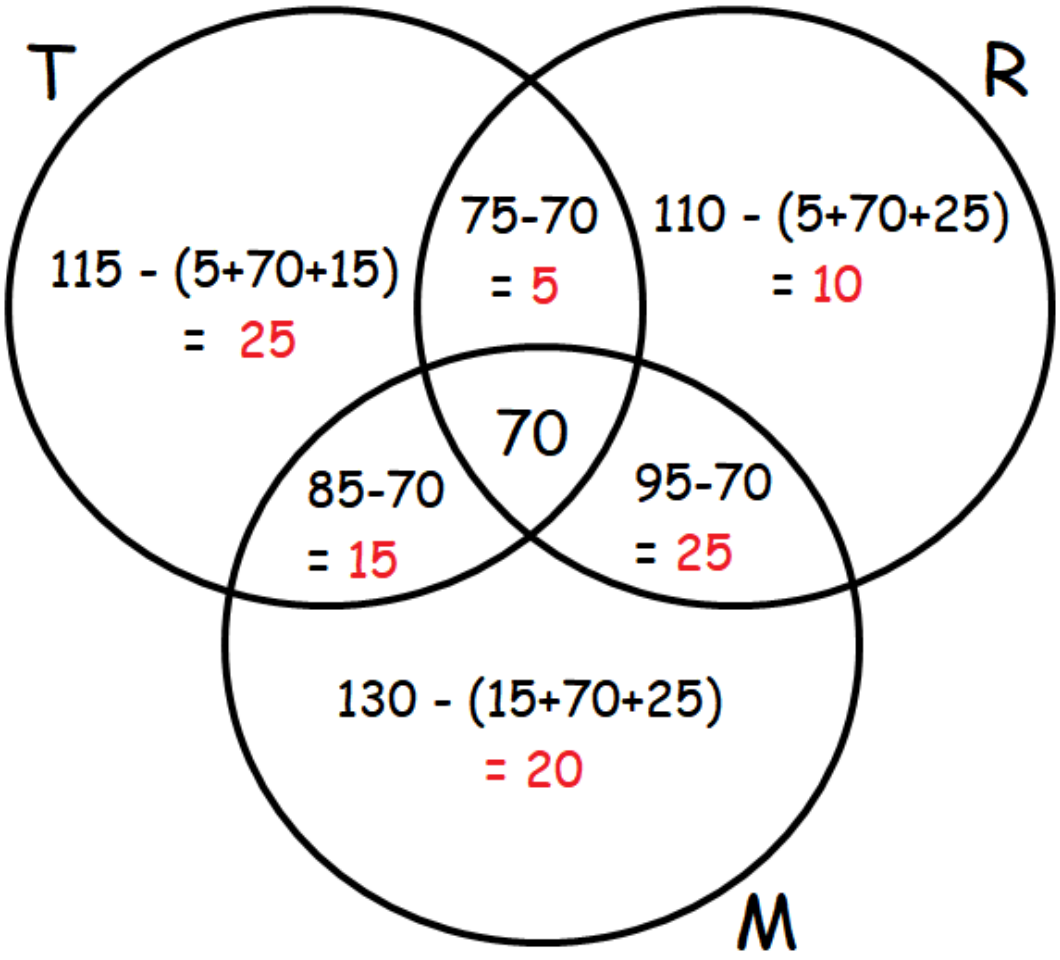
n(TnR) = 75

Number of people who use Radio and Magazine :

n(RnM) = 95

Number of people who use all the three :

n(TnRnM) = 70



From the above Venn diagram, we have

(i) Number of people who use only Radio is 10.

(ii) Number of people who use only Television is 25.

(iii) Number of people who use Television and Magazine but not radio is 15.

Problem 6 :

In a class of 60 students, 40 students like math, 36 like science, 24 like both the subjects. Find the number of students who like

(i) Math only, (ii) Science only (iii) Either Math or Science (iv) Neither Math nor science.

Solution :

Step 1 :

Let M and S represent the set of students who like math and science respectively.

Step 2 :

From the information given in the question, we have

$$n(M) = 40, n(S) = 36, n(MnS) = 24$$

Step 3 :

Answer (i) :

Number of students who like math only :

$$= n(M) - n(MnS)$$

$$= 40 - 24$$

$$= 16$$

Step 4 :

Answer (ii) :

Number of students who like science only :

$$= n(S) - n(MnS)$$

$$= 36 - 24$$

$$= 12$$

Step 5 :

Answer (iii) :

Number of students who like either math or science :

$$= n(M \text{ or } S)$$

$$= n(MuS)$$

$$= n(M) + n(S) - n(MnS)$$

$$= 40 + 36 - 24$$

$$= 52$$

Step 6 :

Answer (iv) :

Total number students who like Math or Science subjects :

$$n(MuS) = 52$$

Number of students who like neither math nor science

$$= 60 - 52$$

$$= 8$$

Problem 7 :

At a certain conference of 100 people there are 29 Indian women and 23 Indian men. Out of these Indian people 4 are doctors and 24 are either men or doctors. There are no foreign doctors. Find the number of women doctors attending the conference.

Solution :

Step 1 :

Let M and D represent the set of Indian men and Doctors respectively.

Step 2 :

From the information given in the question, we have

$$n(M) = 23,\ n(D) = 4,\ n(MuD) = 24$$

Step 3 :

From the basic stuff, we have

$$n(MuD) = n(M) + n(D) - n(MnD)$$

$$24 = 23 + 4 - n(MnD)$$

$$n(MnD) = 3$$

$$n(\text{Indian Men and Doctors}) = 3$$

Step 4 :

So, out of the 4 Indian doctors, there are 3 men.

And the remaining 1 is Indian women doctor.

So, the number women doctors attending the conference is 1.