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100 APTITUDE Questions YOU MUST KNOW

Exclusively prepared by SSC Focus Team

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AVERAGE

1. The average price of 80 computers in an electronic shop is Rs30,000. If the highest and lowest price computers are sold out then the average price of the remaining 78 computers is Rs.29,500. The cost of the highest price computer is Rs.80,000. The cost of lowest price computer is

(a)Rs.19,000 (b) Rs.20,000

(c)Rs.29,000 (d) Can't be determined

2. The average salary of all the 60 employees in an office is Rs.12,000 per month. If the number of executive is twice the number of non executive employees, then the average salary of all the non executive employees

(a) Rs.9000 (b) Rs.8000

(c) Rs.6000 (d) Can't be determined

3. Mr. Sharma travels by car and covers 25% of his journey with a speed of 10 km/h, 45% of his journey with a speed of 5 km/h and remaining 30% of his journey with a speed of 15 km/h. what will be the average speed of Mr. Sharma for the whole journey?

(a) 7.40km/h (b) 7.45 km/h

(c) 8.0km/h (d) 6.5 km/h

4. Gopal went to the Hospital at the speed of 60 km/hr while returning for his home he covered the half of the distance at the speed of 10 km/hr, but suddenly he realized that he was getting late so he increased the speed and reached the home by covering rest half of the distance at the speed of 30km/hr. The average speed of the Gopal in the whole length of journey is:

(a) 5.67 km/hr (b) 24 km/hr

(c) 22.88 km/hr (d) 5.45 km/hr

5. In a class, there are 75 students and their average mark in the annual examination is 35. If the average marks of passed student's is55 and average marks of failed students is 30, then find out the number students who failed

(a) 60 (b) 65

(c) 70 (d) 75

6. The average runs scored by a cricketer in 42 innings, is 30. The difference between his maximum and minimum scores in an innings is 100. If these two innings are not taken into consideration, then the average score of remaining 40 innings is 28. Calculate the maximum runs scored by him in an innings?

(a) 125 (b) 120

(c) 110 (d) 100

7. On an average 300 people watch the movie in Sahu Cinema hall on Monday, Tuesday and Wednesday and the average number of visitors on Thursday and Friday is 250. If the average number of visitors per day in the week be 400, then the average number of people who watch the movie in weekends (i.e., on Saturday and Sunday) is:

(a) 500 (b) 600
(c) 700 (d) 800

8. The average weight of 5 men is decreased by 3 kg when one of them weighing 150 kg is replaced by another person. This new person is again replaced by another person whose weight is 30 kg lower than the person he replaced. What is the overall change in the average due to this dual change?
(a) 6 kg (b) 9 kg
(c) 12 kg (d) 15kg

9. There were 35 students in a hostel. Due to the admission of 7 new students the expenses of the mess were increased by Rs.42 per day while the average expenditure per head diminished by Re 1. What was the original expenditure of the mess?
(a) 420 (b) 400
(c) 480 (d) 460

10. 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.8 (b) Rs. 8, Rs. 12.8
(c) Rs. 10, Rs. 16 (d) Rs. 12, Rs. 19.2

Partnership

1. A and B started a partnership business investing some amount in the ratio of 3: 5. C joined them after six months with an amount equal to that of B. In what proportion should the profit at the end of one year be distributed amount A, B and C.
(a) 3:7:5 (b) 6:10:5
(c) 6:10:7 (d) 6:7:5

2. A starts business with Rs. 3500 and after 5 months, B joins with A as his partner. After a year, the profit is divided in the ratio 2:3. What is B's contribution in the capital
(a) Rs 9000 (b) Rs 7000
(c) Rs 5000 (d) Rs 4000

3. Nirmal and Kapil started a business investing Rs. 9000 and Rs. 12000 respectively. After 6 months, Kapil withdrew half of his investment. If after a year, the total profit was Rs. 4600, what was Kapil's share initially?
(a) Rs 2300 (b) Rs 2400
(c) Rs 2500 (d) None of above

4. In business, A and C invested amounts in the ratio 2:1, whereas the ratio between amounts invested by A and B was 3:2, If Rs 157300 was their profit, how much amount did B receive.
(a) Rs 48000 (b) Rs 47000
(c) Rs 47400 (d) Rs 48400

5. Rahul and Bharti are partners in a business. Rahul contributes 1/4th capital for 15 months and Bharti received 2/3 of profit. For how long Bharti money was used.

(a) 8 months (b) 10 months

(c) 11 months (d) 17 months

6. Check which among following are required to answer this questions:

Three friends started a businesses, let their names are A, B and C. What profit B will get, if,

1. C invested Rs. 8000 for nine months; his profit was 3/2 times that of B's and his investment was four times that of A.

2. A and B invested for one year in the proportion 1: 2 respectively.

3. The three together got Rs. 1000 as profit at the year end.

(a) Only 1 and 3 (b) Only 1 and 2

(c) All 1, 2 and 3 (d) None of above

7. If 4 (P's Capital) = 6 (Q's Capital) = 10 (R's Capital), then out of the total profit of Rs 4650, R will receive

(a) 700 (b) 900

(c) 600 (d) 750

8. A and B started a partnership business. A invested 15000 and B invested 30000. After 6 months A invested some more so that they divide the profit equally in the year end. How much did A invest additionally?

(a) 45000 (b) 30000

(c) 15000 (d) 60000

9. P, Q, R enter into a partnership & their shares are in the ratio 1/2: 1/3: 1/4, after two months, P withdraws half of the capitals & then after 10 months, a profit of Rs 378 is divided among them. What is Q's share?

(a) 144 (b) 154

(c) 164 (d) none of the above

10. A, B, C rent a pasture. A puts 'X' oxen for 7 months, B puts 4 oxen for 5 months and C puts 5 oxen for 3 months for grazing. If the rent of the pasture is Rs. 168, Find X if C pays Rs 45 as rent.

(a) 3 (b) 2

(c) 4 (d) 5

Percentage

1. If the price of petrol increases by 25% and raj intends to spend only an additional 10% on petrol, by how much % will he reduced the quantity of petrol purchased?

(a) 10% (b) 12%

(c) 8% (d) 6.67%

2. Rahul went to a shop and bought things worth Rs.25, out of which 30 paise went to sales tax on taxable purchases .If the tax rate was 6%, then what was the cost of the tax free items?

(a) Rs.20.00 (b) Rs. 17.90

(c) Rs.19.70 (d) Rs.18.70

3. Rama's expenditures and savings are in the ratio 5:3. If her income increases by 12% and expenditure by 15%, they by how much percent do her savings increase?

(a) 12 (b) 7

(c) 8 (d) 13

4. The price of sugar is increased by 20%.As a result a family has decreased its consumption by 20%.The expenditure of the family on sugar is decreased by

(a) 0% (b) 2.5%

(c) 4% (d) 5%

5. A vessel has 60L of solution of acid and water having 80% acid. How much water is to be added to make it solution in which acid forms 60%?

(a) 48 L (b) 24 L

(c) 20 L (d) 28 L

6. A candidate who scores 30% fails by 5 marks, while another candidate who scores 40% marks gets 10 more than minimum pass marks. The minimum marks required to pass are

(a) 45 (b) 60

(c) 90 (d) 50

7. A solution of salt and water contains 15% salt by weight. Of it, 30 kg water evaporates and the solution now contains 20% of salt. Find the original quantity of salt.

(a) 120 kg (b) 160 kg

(c) 100 kg (d) 124 kg

8. The price of sugar having gone down by 10%,a consumer can buy 5 kg more sugar for Rs.270.The difference between the original and reduced price per kg is,

(a) 64 paise (b) 60 paise

(c) 40 paise (d) 54 paise

9. The price of ghee is increased by 32%.Therefore, a family reduces its consumption, so that the increment in price of ghee is only 10%.If consumption of ghee is 10kg before the increment, then what is the consumption now?

(a) $8\frac{1}{3}$ kg (b) $8\frac{3}{4}$ kg

(c) $8\frac{1}{2}$ kg (d) $9\frac{1}{7}$ kg

10. In a recent survey 30% houses contained 2 or more people. Of those houses containing only one person 15% were having only a male. What is the percentage of all houses contain exactly one female and no males?

(a) 60% (b) 60.5%

(c) 59% (d) 59.5%

Profit and Loss

1. A metal trader buys two kinds of copper foils, the ratio of their prices being 1:4. He sells the mixture at Rs.90 per kg so that he can make a profit of 20%. If the ratio of their quantities present in a mixture is 6:1

respectively, find the purchase price of the foil present in lesser quantity.

(a) Rs. 52.5 (b) Rs. 55

(c) Rs. 47.5 (d) Rs. 45

2. Akram has two types of grapes. One is the fresh grapes containing 80% water and dry grapes containing 25% water. He sells 20 kg dry grapes, by adding water to the dry grapes, at cost price. What is the total profit percentage when water is added in proportion to that of fresh grapes to the 20 kg of dry grapes?

(a) 275% (b) 200%

(c) 80% (d) 125%

3. A dishonest retailer cheats his wholesaler and customer both. He purchases 19% more quantity from the wholesaler and sells 15% less quantity while selling to his customer. What is profit percentage by selling the goods at cost price?

(a) 36.78% (b) 34%

(c) 40% (d) 36.85%

4. An egg seller sells his eggs only in the packs of 3 eggs, 6 eggs, 9 eggs, 12 eggs etc, but the rate is not necessarily uniform. One day Raju (who is not the same egg seller) purchased at the rate of 3 eggs for a rupee and the next hour he purchased equal number of eggs at the rate of 6 eggs for a rupee. Next day he sold all the eggs at the rate of 9 eggs for Rs.2. What is his percentage profit or loss?

(a) 10% loss (b) 11.11%loss

(c) 3% loss (d) 2.5% profit

5. A merchant earns 25% profit in general. Once his 25% consignment was abducted forever by some goondas. Trying to compensate his loss he sold the rest amount by increasing his selling price by 20%. What is the new percentage profit or loss?

(a) 10% loss (b) 12.5% loss

(c) 12.5% profit (d) 11.11% loss

6. A milkman purchases 10 liters of milk at Rs.7 per liter and forms a mixture by adding freely available water which constitutes 16.66% of the mixture. Later on he replaced the mixture by some freely available water and thus the ratio of milk is to water is 2:1. He then sold the new mixture at cost price of milk and replaced amount of mixture at twice the cost of milk then what is the profit percentage?

(a) 68% (b) 34%

(c) 40% (d) none of these

7. Profit on selling 10 candles equals selling price of 3 bulbs. While loss on selling 10 bulbs equals selling price of 4 candles. Also profit percentage equals to the loss percentage and cost of a candle is half of the cost of a bulb. What is the ratio of selling price of candle to the selling price of a bulb?

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

8. Cost price of two motorcycles is same. One sold at a profit of 15% and the other for Rs.4800 more than the first. If the net profit is 20%. Find the cost price of each motorcycle:
(a) Rs.48000 (b) Rs.52000
(c) Rs.36000 (d) Rs.42500

9. One trader calculates the percentage of profit on the buying price and another calculates on the selling price. When their selling prices are the same, then the difference of their actual profits is Rs.85 and both claim to have made 20 % profit. What is the selling price of each?
(a) Rs. 1700 (b) Rs.2100
(c) Rs. 2550 (d) Rs.2750

10. Kamal bought a house in Sushant city, whose sale price was Rs.8 lakh. He availed 20% discount as an early bird offer and then 10% discount due to cash payment. After that he spent 10% of the cost price in interior decoration and lawn of the house. At what price should he sell the house to earn a profit of 25%?
(a) Rs. 9 lakh (b) Rs.7.99 lakh
(c) Rs. 7.92 lakh (d) none of these

11. In an office the number of employees reduces in the ratio of 3:2 and the wages increases in the ratio of 20:27. What is the profit percentage of employees over the previous wages?
(a) 10% (b) 9.09%
(c) 11.11% (d) none of these

12. A man sells an article at a profit of 40%. If he had bought it at 40% less and sold for Rs. 5 less, he would have gained 50%. Find the cost price of the article.
(a) Rs.10 (b) Rs.15
(c) Rs.20 (d) Rs.30

Ratio Proportion and Ages

1. Brass is an alloy of copper and zinc. Bronze is an alloy containing 80% of copper, 4% of zinc and 16% of tin. A fused mass of brass and bronze is found to contain 74% of copper, 16% of zinc, and 10% of tin. The ratio of copper to zinc in Brass is:
(a) 64% and 36% (b) 33% and 67%
(c) 50% and 75% (d) 68% and 32%

2. If Rs. 58 is divided among 150 children such that each girl and each boy gets 25p and 50p respectively. Then how many girls are there?
(a) 52 (b) 54
(c) 68 (d) 62

3. A person gave 2/5 part of his income to his elder son and 30% part to his younger son. He saved his remaining money in three

trusts A, B and C in the ratio of 3:5:2. If difference between the amounts got by his both sons is Rs. 2000, how much amount he saved in trust C?

(a) Rs. 1140 (b) Rs. 1200rs

(c) Rs. 1256 (d) Rs. 1300

4. The ratio of female population of two neighboring states A and B is 2:3. The sex ratios for A and B respectively are 926 and 914 females per 1000 males. If the female population of B is 33 million, what is the total population of A?

(a) 46.28 million (b) 45.76 million

(c) 44.98 million (d) 44.54 million

5. In an election each voter may vote for two candidates. Half of the voters vote for A, but divide their votes between B, C and D in the ratio 3:2:1. Of the remainder, half vote for B and divide their votes between C and D in the ratio 2: 1. Of the remainder, half vote for C and D and the remaining 840 do not vote for anyone. How many votes were received by A, B, C and D respectively?

(a) 3360, 3360, 3080 and 1960

(b) 3360, 3360, 1960 and 3080

(c) 3450, 3210, 4120 and 1210

(d) 5000, 5000, 2500 and 1250

6. Tanya's grandfather was 8 times older to her 16 years ago. He would be 3 times of her age 8 years from now. What was ratio of ages of Tanya and her grandfather 8 years ago?

(a) 11 : 50 (b) 11: 51

(c) 11: 53 (d) 11: 54

7. Ayesha's father was 38 years of age when she was born while her mother was 36 years old when her brother four years younger to her was born. What is the difference between the ages of her parents?

(a) 2 years (b) 4 years

(c) 6 years (d) 8 years

8. Last time I visited a friend's farm near Bangalore, he gave me a bag containing 1000 peanuts, from which I took out 230 peanuts for myself and gave away the bag with the remainder of peanuts to three little brothers who live in my neighborhood and told them to distribute the nuts among themselves in proportion of their ages which together amounted to 17 ½ years. Anil, Sunil and kapil, the three brothers, divided the nuts in the following manner: As often as Anil took four, Sunil took three and as often as Anil took six, Kapil took seven. When were the respective ages (in years) of the boys?

(a) 8, 4 ½, 6 (b) 6, 4 ½, 7

(c) 4 ½, 6, 7 (d) 4 ½, 7, 6

9. A factory employs skilled workers, unskilled workers, and clerks in the proportion 8: 5: 1 and the wages of skilled

worker, unskilled worker and clerk are in the ratio 5: 2: 3. When 20 unskilled workers are employed, the total daily wages of all amount to Rs.318. Find the daily wages paid to each category of employees?

(a) Rs.240, Rs.60, Rs.18

(b) Rs.250, Rs.70, Rs. 24

(c) Rs.200, Rs.100, Rs. 20

(d) Rs.245, Rs.85, Rs.15

10. If 6 years are subtracted from the present age of Ajay and the remainder is divided by 18, then the present age of Rahul is obtained. If Rahul is 2 years younger to Denis whose age is 5 years, then what is Ajay's present age?

(a) 50 years (b) 60 years

(c) 52 years (d) 55 years

Simple Interest/Compound Interest

1. Purnima borrowed a sum of money and returned it in three equal quarterly installments of Rs.17576 each. Find the sum borrowed, if the rate of interest charged was 16% per annum compounded quarterly.

(a) 46900 (b) 48775

(c) 68320 (d) None of these.

2. A bicycle can be purchased on cash payment of Rs.1500. The same bicycle can also be purchased at the down payment (initial payment, at the time of purchasing) of Rs.350 and rest can be paid in 3 equal installments of Rs.400 for next 3 months. The rate of SI per annum charged by the dealer is:

(a) $23\frac{9}{17}$ (b) $17\frac{9}{23}$

(c) $13\frac{9}{17}$ (d) None of these

3. Sanjay purchased a hotel worth Rs.10 lakh and Ranjith purchased a car worth Rs.16 lakh. The value of hotel every year increases by 20% of the previous value and the value of car every year depreciates by 25%.What is the difference between the price of hotel and car after 3 years?

(a) Rs. 925000 (b) Rs. 10,53,000

(c) Remains constant (d) Can't be determined

4. A sum was put at SI at a certain rate for 2 years. Had it been put at 3% higher rate, it would have fetched Rs.300 more. Find the sum.

(a) 3500 (b) 5000

(c) 4500 (d) 3000

5. The simple interest on a sum of money will be Rs.300 after 4 years. In the next 6 years principal becomes 4 times, what will be the total interest at the end of the 10^{th}year?

(a) 2300 (b) 2700

(c) 3100 (d) 2100

6. A person lent a certain sum of money at 4% simple interest, and in 8 years the interest amounted to Rs.340 less than the sum lent. Find the sum lent.

(a) 750 (b) 550

(c) 500 (d) 700

7. The compound interest on a certain sum of money for 2 years at 10% per annum is Rs.420.The simple interest on the same sum at the same rate and same time will be:

(a) 350 (b) 375

(c) 380 (d) 400

8. A sum of money at compound interest amounts to thrice itself in three years. In how many years will it be 9 times itself?

(a) 4 (b) 6

(c) 7 (d) 3

9. The Compound interest on a certain sum for 2 years is Rs.40.80 and simple interest is Rs.40.Find the rate of interest per annum and the sum.

(a) 4% & 500 (b) 5% & 480

(c) 8% & 520 (d) 6% & 500

10. Find the compound interest on Rs.3200 in 2 years, the rate of interest being $7\frac{1}{2}\%$ for the first year and $12\frac{1}{2}\%$ for the second year.

(a) Rs.620 (b) Rs.670

(c) Rs.770 (d) Rs.760

11. The difference between the simple and the compound interest every six months at the rate of 10 per cent per annum at the end of two years is Rs.124.05.

(a) Rs.10000 (b) Rs.6000

(c) Rs.12000 (d) Rs.8000

12. Find the least number of complete years in which a sum of money put out at 20 per cent compound interest will be more than doubled.

(a) 2 years (b) 3 years

(c) 4 years (d) Data inadequate

Time and Work

1. P is thrice good a workman as Q and therefore become able to finish a job in 48 days less than Q. Working together, they do it in

(a) 18 days (b) 24 days

(c) 20 days (d) 12 days

2. Kamal can do a work in 15 days. Bimal is 50 percent more efficient than kamal doing the work. In how many days will Bimal do that the work?

(a) 14 days (b) 12 days

(c) 10 days (d) $10\frac{1}{2}$ days

3. Pipe A can fill a tank in 15 minutes and Pipe B can drain 40 liter per minute. If both the pipes are opened together, the cistern is full in 45 minutes, find the capacity of the cistern.

(a) 600 liters (b) 750 liters

(c) 900 liters (d) 1800 liters

4. 12 men take 36 days to do a work while 12 women complete 3/4th of the same work in 36 days. In how many days 10 men and 8 women together will complete the same work?

(a) 6 days (b) 27 days

(c) 12 days (d) Data inadequate

5. A and B can do a work in 45 and 40 days respectively. They began the work together, but A left after some time and B finished the remaining work in 23 days. After how many days did A leave?

(a) 6 days (b) 9 days

(c) 12 days (d) 10 days

6. The number of days required by A, B, and C to work individually is 6, 12 and 8 respectively. They started the work doing it alternatively. If A has started then followed by B and so on, how many days are needed to complete the whole work?

(a) 8 (b) 7.5

(c) 8.5 (d) 9.5

7. If 14 men and 12 boys can finish work in 4 days, while 8 men and 16 boys can finish the same work in 5 days. Compare the 1 day work of 1 man and 1 boy

(a) 2 (b) $1\frac{1}{2}$

(c) $\frac{1}{2}$ (d) 3

8. When A alone does a piece of work, he takes 16 days more than the time taken by (A + B) to complete the work, while B alone takes 9 days more than the time taken by (A + B) to finish the work. What time, A and B together will take to finish the work?

(a) 9 days (b) 6 days

(c) 12 days (d) 10 days

9. A wall of 100 m can be built by 7 men or 10 women in 10 days. How many days will 14 men and 20 women take to build a wall of 600 m?

(a) 15 (b) 20 (c) 2 (d) 30

10. 10 men and 15 women can complete the work in 6 days.1 man can do the same job in 100 days. In how many days 1 woman can do the job?

(a) 80 days (b) 125 days

(c) 180 days (d) 225 days

11. A certain number of men can do a piece of work in 80 days. If there were 10 men less, it could be finished in 20 days more. How many men are there in the starting?

(a) 45 (b) 50 (c) 40 (d) 60

Time and Distance

1. The metro services has a train going from Mumbai to Pune and Pune to Mumbai every hour, the first one at 6 a.m. The trip from one city to other takes $4\frac{1}{2}$ hours and all trains at the same speed. How many trains

will you pass while going from Mumbai to Pune if you start at 12 noon?

(a) 10 (b) 11

(c) 9 (d) 12

2. A column of men, extending 500 m in length takes a hour to march through a 60% of the the street at the rate of 50 paces a minute, each pace being 25cm. Find the length of the street.

(a) 1.5 km (b) 1 km

(c) 1.75 km (d) 1.25 km

3. One bad day, at 7 am. I started on my bike at the speed of 36 kmph to meet one of my relatives. After I had travelled some distance, my bike went out of order and I had to stop. After resting for 35 minutes, I returned home on foot at a speed of 14 kmph and reached home at 1 pm. Find the distance from my house at which my bike broke down (approx.)

(a) 55 km (b) 63 km

(c) 45 km (d) 72 km

4. Two points A and B are located 48 km apart on the riverfront. A motorboat must go from A to B and return to A as soon as possible. The river flows at 6km/h. What must be the least speed of the motorboat in still water for the trip from A to B and back again to be completed in not more than six hours(assume that the motorboat does not stop at B)

(a) 18 kmph (b) 20 kmph

(c) 25 kmph (d) 16 kmph

5. If a train overtakes two persons who are walking in the same direction in which the persons are going at the rate of 2km/h and 4km/h and passes them completely in 9 and 10 seconds. Find the length of train and its speed (in kmph)

(a) 50m, 22kmph (b) 52m, 25kmph

(c) 100m, 44kmph (d) 120m, 20kmph

6. A train leaves the station 1 hour before the scheduled time. The driver decreases its speed by 4km/hr. At the next station 120km away, the train reached on time. Find the original speed of the train.

(a) 20 km/hr (b) 28 km/hr

(c) 24 km/hr (d) 18 km/hr

7. Two trains each 200 m long move towards each other on parallel lines with velocities 20 kmph and 30 kmph respectively. What is the time that elapses when they first meet until they have pass each other?

(a) 20 seconds (b) 28.8 seconds

(c) 14.4 seconds (d) 16 seconds

8. A farmer completed a distance of 61km in 9 hours. He covered some of the distance at 4km/hr by walking and the remaining distance on cycle at the speed of 9km/hr. How much distance did he travel walking?

(a) 14 km (b) 15 km

(c) 16 km (d) 17 km

9. A and B run on a circular track of circumference 800 m in the opposite direction. Speed of A and B are 50 m/s and 30 m/s respectively. Initially A and B are diametrically opposite to each other. When will they meet for the first time?

(a) 5 seconds (b) 15 seconds
(c) 10 seconds (d) 12 seconds

10. A man who can swim 48m/min in still water swims 200 m against the current and 200 m with the current. If the difference between the two times is 10 minutes, find the speed of the current.

(a) 30m/min (b) 29m/min
(c) 31m/min (d) 32m/min

11. A passenger sitting in a train of length 100m, which is running with speed of 60 km/h passing through two bridges, notices that he crosses the first bridge and the second bridge in time intervals in the ratio 7:4 respectively. If the length of first bridge be 280 m, then the length of second bridge is

(a) 210m (b) 160m
(c) 459m (d) 630m

12. Two persons start from the opposite ends of a 90km straight track run to and fro between the two ends. The speed of first person is 30m/s and the other is $\frac{125}{6}$ m/s. They continue their motion for 10 hours. How many times they pass each other?

(a) 10 (b) 11
(c) 9 (d) 12

13. A boat takes 7 hours to go from P to R, through a midpoint Q, but it takes 8 hours to go from P to Q, and then return from Q to P. How long it would take to go from R to P?

(a) 8h (b) 7.5h
(c) 8.5h (d) 9h

14. A surveillance plane is moving between two fixed places Pukhwara and Kargil at 120 km/hr. The distance between two places is 600 km. After 18 hour what will be the distance between the Kargil and its position if it starts moving from Pukhwara?

(a) 360 km (b) 300 km
(c) 240 km (d) 400 km

15. A train leaves station X at 5 am and reaches station Y at 9 am. Another train leaves station Y at 7 am. and reaches station X at 10.30 am. At what time do the trains cross each other?

(a) 7.36 am (b) 8.56 am
(c) 8.36 am (d) 7.56 am

Probability

1. 12 persons are seated around a round table. What is the probability that two particular persons sit together?

(a) 2/11 (b) 1/6
(c) 3/11 (d) 3/15

2. Eleven books, consisting of five Engineering books, four Mathematics books and two physics books, are arranged in a shelf at random. What is the probability that the books of each kind are all together?

(a) $\frac{5}{1155}$ (b) $\frac{2}{1155}$
(c) $\frac{3}{1155}$ (d) $\frac{1}{1155}$

3. From a group of 7 men and 4 women a committee of 6 persons is formed. What is the probability that the committee will consist of exactly 2 women?

(a) $\frac{5}{11}$ (b) $\frac{3}{11}$
(c) $\frac{4}{11}$ (d) $\frac{2}{11}$

4. One digit is selected from first 20 positive integers. What is the probability that it is divisible by 3 or 4.

(a) 1/2 (b) 1/3
(c) 2/3 (d) 4/5

5. A letter is taken from the word ASSISTANT and another from the word STATISTICS. What is the probability that both the letters are the same?

(a) $\frac{1}{45}$ (b) $\frac{17}{90}$ (c) $\frac{19}{90}$ (d) $\frac{13}{90}$

Permutation

1. There are 16 executives including two brothers, Aravind and Aakash. In how many ways can they be arranged around the circular table if the two brothers cannot be seated together?

(a) (14!).13 (b) $14p_3$
(c) $\frac{14!}{3!}$ (d) None of these

2. Seven delegates are to address a meeting. If a particular speaker is to speak before another particular speaker, find the number of ways in which this can be arranged.

(a) 1220 (b) 2520 (c) 3250 (d) 7826

3. Nargis has 8 children and she takes 3 at a time to children's park as often as she can without taking the same 3 children together more than once. The number of times she will go to the park is:

(a) 56 (b) 14 (c) 28 (d) 76

4. There are four different coloured balls and 4 boxes of the same colours as that of the balls. Find the number of ways in which exactly one ball can be put in different colour box that of the ball.

(a) 16 (b) 10
(c) $4C_2$ (d) None of these

5. The number of permutations of the letters of the word LUMINARY such that neither the pattern LURY nor MINA occurs is :

(a) 46800 (b) 24600
(c) 40086 (d) None of these

EXPLANATION

AVERAGE

1. The price of the costliest and cheapest computer

$= (80 \times 30000) - (78 \times 29500) = 99000$

Therefore the price of cheapest computer

$= 99000 - 80000 = 19{,}000$

2. $\frac{no\ of\ executives}{no\ of\ non\ executives} = \frac{2}{1}$

Therefore number of executives = 40

Number of non executive employees = 20

$total\ salary = 40 \times salary\ of\ executive + 20 \times salary\ of\ non\ executive$

$60 \times 12000 = 40 \times k + 20 \times L$

$\therefore K, L\ are\ unknown$

So we can't determine the required average salary.

3. $P = 25\% = \frac{1}{4}$ $\quad X = \frac{10km}{h}$

$Q = 45\% = \frac{45}{100} = \frac{9}{20}$ $\quad Y = 5\frac{km}{h}$

$R = 30\% = \frac{30}{100} = \frac{3}{10}$ $\quad Z = 15\ km/h$

$required\ average\ speed = \frac{1}{\frac{P}{X} + \frac{Q}{Y} + \frac{R}{Z}}$

$= \frac{1}{\left(\frac{1}{4\times10} + \frac{9}{20\times5} + \frac{3}{10\times15}\right)} = 7.40\ km/hr$

4. Let distance between home & hospital = d km

Total distance travelled = d+d = 2d km

Total time taken $= \frac{d}{60} + \frac{\frac{d}{2}}{10} + \frac{\frac{d}{2}}{30}$

$= \frac{d}{60} + \frac{d}{20} + \frac{d}{60}$

$= \frac{5d}{50} = \frac{d}{12}$

Average speed in the whole journey

$= \frac{2d}{\frac{d}{12}} = 2d \times \frac{12}{d} = 24\frac{km}{hr}$

Other method:-

Let the distance =x

$average\ speed = \frac{total\ distance}{total\ time}$

$= \frac{x + x}{\frac{x}{60} + \frac{\frac{x}{2}}{10} + \frac{\frac{x}{2}}{30}}$

$= \frac{2x}{\frac{x+3x+x}{60}}$

$= 24\ km/hr$

5. Let the number of failed students = x

then, number of passed students = 75-x

$75 \times 35 = 30x + 55\ (75 - x)$

$15 \times 35 = 6x + 11\ (75 - x)$

$5x = 300$

$x = 60$

Other method:-

$n = 75\,, \quad a = 35$

$x = 55\,, \quad y = 30$

Number of students who passed

$= \frac{n(a-y)}{x-y} = \frac{75(35-30)}{55-30}$

$= \frac{75 \times 5}{25} = 15$

Number of students failed = 60

6. Let the minimum score =x

Maximum score = x+100

$x + (x + 100) = 30 \times 42 - 40 \times 28$

$2x + 100 = 1260 - 1120 = 140$

$2x = 40$

$x = 20$

Hence, the maximum score= x+100

$= 20 + 100 = 120$

7. Monday + Tuesday + Wednesday=

$300 \times 3 = 900$

Thursday + Friday $= 250 \times 2 = 500$

Monday to Sunday $= 400 \times 7 = 2800$

Required average $= \frac{1}{2}[2800 - (900 + 500)]$

$= 700$

8. The weight of 2nd person is $(150 - 3 \times 5) = 135kg$

The weight of the 3rd person is $= 135 - 30 = 105\ kg$

Thus the change of the 5 person

$$= 150 - 105 = 45\ kg$$

Hence overall change $= \frac{45}{5} kg = 9\ kg$

9. Let Average expenditure per head be = x

So, $(35 + 7)(x - 1) - 35x = 42$

$42\ (x - 1) - 35x = 42$

$x = 12$

Original expenditure of mess $= 12 \times 35 = 420$

10. Total cost of 10 books = Rs. 120 ---→(1)

Total cost of 8 books = Rs. 94 -----→ (2)

Subtracting (1) & (2),

We get,

The cost of 2 books = Rs. 26

Let the price of each book be x and y,

$x + y = 26$ ------→ (3)

1 book is 60% more than other price

$\frac{160y}{100} + y = 26$

$y = 10$

Substitute in (3)

$$x + 10 = 26$$

$$x = 16$$

∴ The price of each of these two books = Rs.10 & Rs.16

PARTNERSHIP

1. $Ratio\ of\ capital = 3:5:5$

$Ratio\ of\ time = 12:12:6 = 2:2:1$

$A:B:C = (3x \times 2):(5x \times 2):(5x \times 1)$

$= 6:10:5$

2. Let B contribution is x

$= \frac{3500 \times 12}{7x} = \frac{2}{3}$

$14x = 126000$

$x = 9000$

3. Nir:Kap=9000×12 : (12000×6+6000×6)

=1:1

$Kapils\ share = \frac{4600}{2} = 2300$

4. $A:B = 3:2 = 6:4$

$A:C = 2:1 = 6:3$

A	B	C
3	2	3
6	6	3
18:	12:	9

A: B: C = 6:4:3

B's share = $\frac{4}{13} \times 157300 = 48400$

5. Let profit =x

Barati profit $= x \times \frac{2}{3}$

$Rahul\ profit = \frac{1}{3}x$

Ratio of profit = 2:1 = B: R

Similarly

Let capital is Y

Ratio of capital = 3:1 = B: R

$\frac{3x \times t}{x \times 15} = \frac{2}{1}$

$t = 10$

6. We will require all the statements to answer this question

1 and 2 will give

$C's\ ratio = Rs\ (8000 \times 9) = 72000$

$A's\ ratio = \frac{1}{4} \times 8000 \times 12 = 24000$

$B's\ ratio = 48000$

$C: A: B = 72000: 24000: 48000 = 3: 1: 2$

From 3, we will get total profit = 1000

Now from the ratio and total profit we can get share of C:

$= 1000 \times \frac{2}{6} = 333\frac{1}{3}$

7. Let P's capital = P

Q's capital =q

Then$4p = 6q = 10r$

$q = \frac{2p}{3}$

$r = \frac{2p}{5}$

$P: Q: R = P: \frac{2p}{3}: \frac{2p}{5} = 15: 10: 6$

$R's\ \ share = \frac{4650 \times 6}{31} = 900$

8. First 6 months $= 15000 \times 6 : 30000 \times 6$

$+ \qquad +$

Second 6 months $= x \times 6 \ : 30000 \times 6$

Since profit is equally shared $= 1: 1$

$= \frac{6(15000 + x)}{6(60000)}: \frac{1}{1}$

$x = 45000$

9. The ratio of their initial investment $= \frac{1}{2}: \frac{1}{3}: \frac{1}{4}$

$= 6: 4: 3$

Let's take the initial investment of P, Q, R as 6x, 4x and 3x respectively

$A: B: C = (6x \times 2 + 3x \times 10): (4x \times 12 : 3x \times 12)$

$14: 16: 12 = 7: 8: 6$

B's share $= \frac{378 \times 8}{21} = 18 \times 8 = 144$

10. $7\ X : 5 \times 4 : 3 \times 5$

$7X : 20: 15$

C's share is 45

$15x = 45$

$x = 3$

$21X + 60 + 45 = 168$

$X = \frac{63}{21} = 3$

$X = 3$

PERCENTAGE

1. Let the price of 1 litre of petrol be Rs. x and let Raj initially buys 'y' litres of petrol. Therefore, he would have spent Rs. xy on petrol.

When the price of petrol increases by 25%, the new price per litre of petrol is 1.25x.

Raj intends to increase the amount he spends on petrol by 10%.

i.e., he is willing to spend xy +10% of xy = xy + 0.10xy =1.10 xy

Let the new quantity of petrol that can get be 'q'

Then, $1.25\,x \times q = 1.10xy$

$$q = \frac{1.10xy}{1.25x} = 0.88y$$

As the new quantity that he can buy is 0.88y, he gets 0.12 y lesser than what he used to get earlier (Or) a reduction 12%.

Other method:-

$$\%\ decrease\ in\ petrol\ consumption = \frac{apparent\ \%\ increase\ in\ petrol\ price}{100 + \%\ increase\ in\ petrol\ price} \times 100$$

$$= \frac{\%\ increase\ in\ petrol\ pirce - extra\ allowed\ exemption\ \%}{100 + \%\ increase\ in\ petrol\ price} \times 100$$

$$= \frac{25-10}{100+25} \times 100$$

$$= \frac{15}{125} \times 100$$

$$= 12\%$$

Other method:-

Suppose petrol uses 100 ltr

Petrol price = 100

Total cost $= 100 \times 100 = 10000$

Now price increase 25% $= Rs.125$

Now petrol uses $\frac{10000}{125} = 80\ ltr$

That finally petrol increase only 10%

So $80 \times \frac{110}{100} = 88\%$

$100\,\% - 88\,\% = 12\%$.

2. Let the amount taxable purchase be Rs. x

Then, 6% of x= 30 paise

$$6\%\ of\ x = Rs.\frac{30}{100}$$

$$x = Rs.\left(\frac{30}{100} \times \frac{100}{6}\right)$$

$$= Rs.5$$

$\therefore\ cost\ of\ tax\ free\ items = Rs.[\,25 - (5 + 0.30)] = Rs.19.70$

3. Let Rama's expenditure = 5x

Rama's savings = 3x

Rama's income $= 5x + 3x = 8x$

Rama's income, (increase 12%)

$= \frac{112}{100} \times 8x = Rs.8.96\,x$

Rama's expenditure, (increase 15%)

$\frac{5x \times 115}{100} = Rs.5.75x$

Rama's savings

$= Rs.(8.96x - 5.75x)$

$= Rs.3.21x$

Rama's savings increase percent

$= \frac{3.21x - 3x}{3x} \times 100$

$= \frac{0.21x}{3} \times 100 = 7\%$

Other method:-

Take expenditure =100

$expenditure\ , 5x = 100$

$savings\ , 3x = 60$

Total income= savings + expenditure

$Total\ income = 100 + 60$

$= 160$

$income\ increases\ (12\%) = 160 \times \frac{112}{100} = 179.2$

Income	Expenditure		Savings
160	100		= 60
(12% increase) ↓ 179.2	115	↓ (15% increase)	= 64.20

$savings\ increase = \frac{4.20}{60} \times 100 = 7\%$

4. $expenditure = CP \times consumption$

Let take CP =100

and consumption =100 units

Initial expenditure= $100 \times 100 = 10000$

CP increases 20% $= 100 \times \frac{120}{100}$

=120

Consumption decreases 20% $= 100 \times \frac{80}{100} = 80$

$expenditure = 120 \times 80 = 9600$

$expenditure\ decrease\ percent = \frac{400}{10000} \times 1 = 4\%$

Other method:-

In 2 percentage is same one percentage (x) is increase and other percentage(x) is decrease, $= -\frac{x^2}{100}$

$$= \frac{-20 \times 20}{100} = -\frac{400}{100} = -4$$

(-) means decreases. So decreased by 4 %.

5. Given percentage of acid = 80%

Then, percentage of water = 20%

In 60 L of solution, water $= 60 \times \frac{20}{100} = 12\ L$

Let X L of water is to be added,

$$= \frac{12 + x}{60 + x} \times 100 = 40$$

$$1200x + 100x = 2400 + 40x = 60x = 1200$$

Other method:-

The quantity of water to be added = original quantity of solution $\times \frac{\%\ diff\ .of\ salt}{final\ \%\ of\ salt}$

$$= 60 \times \left(\frac{20}{60}\right) = 20\ L$$

$x = 20L$

6. Let maximum marks be x

$$\frac{30x}{100} + 5 = \frac{40x}{100} - 10$$

$$= \frac{4x}{10} - \frac{3x}{10} = 10 + 5$$

$$\frac{x}{10} = 15$$

$x = 150$

$\therefore minimum\ \ passing\ marks$

$= 150 \times \frac{30}{100} + 5 = 45 + 5 = 50$

Other method:-

$Maximum\ mark = \frac{100(a+b)}{y-x}$

$$= \frac{100(sum\ of\ scores)}{diff\ in\ percent\ marks} = \frac{100 \times 15}{10} = 150$$

$Minimum\ passing\ marks = 150 \times \frac{30}{100} + 5 = 50$

7. Suppose there was X kg of solution initially

The quantity of salt =15% of X= $\frac{15x}{100} = \frac{3x}{20} kg$

Now, after evaporation, only (x-30) kg of mixture contain $\frac{3x}{20} kg$ of salt.

$20\%\ of\ (x-30) = \frac{3x}{20}$

$\frac{x-30}{5}=\frac{3x}{20}$

$15x=20x-600$

$x=120\ kg$

Other method:-

Original quantity of solution

$=\ quantity\ of\ evaporated\ water\ \left(\frac{Final\ \%\ of\ salt}{\%\ diff\ \ of\ salt}\right)$

$$=30\left(\frac{20}{5}\right)=30\times4=120\ kg$$

8. Let the original price of sugar be x

Then reduced price of sugar

$=x-\frac{10x}{100}=\frac{90x}{100}=Rs.\frac{9x}{10}$

$\frac{270}{\frac{9x}{10}}-\frac{270}{x}=5$

$\frac{270\times10}{9x}-\frac{270}{x}=5$

$\frac{300-270}{x}=5$

$5x=30$

$x=6$

$\therefore original\ price\ of\ sugar=Rs.6$

$\therefore reduced\ price\ of\ sugar=\frac{9\times x}{10}=\frac{9\times6}{10}$

$$=Rs.5.40$$

$\therefore Required\ diff=(6-5.40)$

$$=Rs.0.60=60\ paise$$

Other method:-

$Reduced\ price=\left(\frac{amount}{\frac{extra}{less}kg}\times\frac{reduced\ \%}{100}\right)$

$$=\frac{270}{5}\times\frac{10}{100}=Rs.5.40$$

Original Price $=\left(\frac{amount}{\frac{extra}{less}kg}\times\frac{reduced\ \%}{100-reduced\ \%}\right)$

$=\frac{270}{5}\times\frac{10}{90}=$ Rs.6.00

$required\ diff=Rs.600-Rs.540$

$$=Rs.0.60=60\ paise$$

9. Let the price of ghee before increase = x

Consumption = 10 kg

Expenditure = Price X

Consumption

Then, expenditure of ghee = 10x

After increase expense (10% increase) = 110% of 10x = 11x

Price of ghee (increase 32%) = 132% of x

$=\frac{33x}{25}\ per\ kg$

New consumption = Increase expense/Increase price of Ghee

$$\therefore new\ consumption\ =\frac{11x\times25}{33x}=8\frac{1}{3}kg$$

Other method:-

$\%\ decrease\ in\ consumption$

$=\frac{\%\ increase\ in\ ghee\ price-extra\ allowed\ exemption\%}{100+\%\ increase\ in\ ghee\ price}$

$\times100$

$$=\frac{32-10}{182}\times100=\frac{22}{132}\times100$$

$=\frac{50}{3}\%\ decrease=10kg\ \times\frac{50}{3}\times\frac{1}{100}=\frac{5}{3}$

$$=10-\frac{5}{3}=\frac{25}{3}=8\frac{1}{3}kg$$

10. Houses containing only one person

$=100\%-30\%=70\ \%$

Houses containing only a male

$=70\times\frac{15}{100}=10.5\%$

$Houses\ containing\ only\ one\ female = 70\% - 10.5\% = 59.5\%$

Other method:-

$$= \frac{(100-x)(100-y)}{100}$$

$$= \frac{(100-30)(100-15)}{100}$$

$$= \frac{70 \times 85}{100} = 59.5\%$$

PROFIT AND LOSS

1. In 1kg of mixture,

Foil of 1st kind $= \frac{6}{7} kg$

2nd kind $= \frac{1}{7} kg$

Let price of 1st kind $= Rs \frac{x}{kg}$

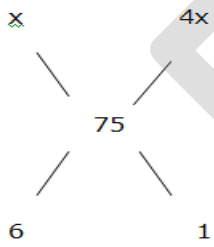
Price of 2nd kind $= Rs. \frac{4x}{kg}$

Cost price of mixture $= \frac{90 \times 100}{120} = 75$

$\frac{6x}{7} + \frac{4x}{7} = \frac{10x}{7} = 75$

$x = 52.5$

Other method:



$\frac{4x-75}{75-x} = \frac{6}{1}$

$x = 52.5$

2.

Fresh grapes

Water	:	pulp
80%		20%
4	:	1

Dry grapes

Water	:	Pulp
25%		75%
1	:	3

	5kg	15kg	out of 20 kg dry grapes
+	80%	20%	20% of pulp → 15kg...so 80% of water → 60kg
55	4	1	required proportion of water & pulp
	60kg	15kg	

Thus to make dry grapes similar to fresh grapes, Akram requires 55 kg water with 20 kg of dry grapes.

So, the profit % $= \frac{55}{20} \times 100 = 275\%$

Other method:

Water	:	pulp
4	:	1
1	:	3

$4 \rightarrow 20\ kg$

$3 \rightarrow 15\ kg$

$1 \rightarrow 5\ kg$

So, $\frac{5+x}{15} = \frac{4}{1}$

$x = 55\ kg$

$20\ kg \rightarrow 100\%$

$55 kg \rightarrow ?$

Trichy: opp BSNL office, Juman Center, 43 Promenade Road, Cantonment. Mob: 9360703030
Salem: #209, Muthu Plaza, Junction Main Rd, State Bank Colony, Salem. Mob: 7305958080
Coimbatore: #545, First Floor, Diwan Bahadur Road, RS Puram. Mob: 7667673030 / 7667678080

$= 275\%$

3. From the statement it is clear that he purchases 119 g instead of 100g & he sells 85g instead of whole transaction

He saves $19 + 15 = 34\ g$

Thus the profit

$= \left(\frac{goods\ left}{goods\ sold}\right) \times 100 = \frac{34}{85} \times 100 = 40\%$

Other method:

Originally purchased =119

Cost price = Rs. 85

$85 \rightarrow 100$

$so\ 34 \rightarrow ?$

$= 40\%$

4. CP of one egg (in 1st case) $= \frac{1}{3} = 33.33\ paise$

CP of one egg (in 2nd case) $= \frac{1}{6} = 16.66\ paise$

Average CP of one egg $= \frac{33.33+16.66}{2} = 25\ paise$

SP of one egg = 200/9

$\text{CP} - \text{SP} = \frac{25 - \frac{200}{9}}{25} \times 100 = 11.11\%\ loss$

5. Let the CP of one article = Rs.1

Then SP = Rs. 1.25

Again the new SP $= 1.25 \times 1.2 = 1.5$

Now, if he sells initially 100 articles, then

$CP = 100 \times 1 = Rs.100$

$SP = 100 \times 1.25 = Rs.125$

New $SP = 75 \times 1.5 = 112.5$

$new\ profit\ \% = 12.5\%$

Other method:

$CP = 100$

$SP = 125$

Given:

c.p	s.p
$(100 \rightarrow 125)$	100% S.P is 125
$120 \rightarrow ?$	120% S.P is 150
150	

$100 \rightarrow 75$

$150 \rightarrow ?$

$x = \frac{75 \times 150}{100} = 112.5$

$P\% = 12.5\%$

6. $16.66\% = \frac{1}{6} = water$

$milk = 1 - \frac{1}{6} = \frac{5}{6}$

$\left(\frac{10}{12}\right)\left[1 - \frac{x}{12}\right] = \frac{2}{3}$ $x = 2.4$

Selling price $= 12 \times 1 + 2.4 \times 2 = 16.8$

Cost price $= 10 \times 1 = 10$

$\frac{16.8 - 10}{10} \times 100 = \frac{6.8}{10} \times 100 = 68\%$

7.	Candle	bulb
CP	a	c
SP	b	d

and c= 2a

$profit = 10\ (b - a) = 3d$

$loss = 10(c - d) = 4b$

$profit\ \% = \frac{3d}{10a} \times 100$

$loss\ \% = \frac{4b}{10c} \times 100$

$again\ \frac{3d}{10a} \times 100 = \frac{4b}{10c} \times 100$

$\frac{3d}{a} = \frac{4b}{c} = \frac{3d}{a} = \frac{4b}{2a}$

$\frac{b}{d} = \frac{3}{2}$

8. Net profit = 20

So

$\frac{15 + x}{2} = 20$

$x = 25\%$

$25 - 15 = 10$

$10 = 4800$

100= 48000

Other method:

Let the CP of each motor cycle be Rs. x , then

$2(1.15x) + 4800 = 2(1.2x)$

$2.30x + 4800 = 2.4x$

$0.10x = 4800$

$x = 48000$

9. $SP1 = SP2$

$SP \times \frac{20}{100} - CP \times \frac{20}{100} = 85$

$CP \times \frac{120}{100} = SP$

$SP \times \frac{20}{100} - SP \times \frac{100}{120} \times \frac{20}{100} = 85$

$SP \times \frac{20}{100}\left(1 - \frac{100}{120}\right) = 85$

$SP = 85 \times 30$

$SP = 2550$

10.

MP		CP		TOTAL CP		
100	$\longrightarrow$	80	$\longrightarrow$	72	$\longrightarrow$	79.2
	-20%		-10%		+10%	

$SP = 125\%\ of\ CP$

$= 1.25 \times 79.2$

$SP = 99$

Initially MP= $100 = 800000$

Final sale price $= 99 = 792000$

Other method:

$-20 - 10 + \frac{200}{100} = 28$

$\therefore CP = 72 \rightarrow 100$

$110 \rightarrow ?$

79.2

$100 \rightarrow 79.2$

$125 \rightarrow ? \rightarrow 99$

$100 \rightarrow 8\ lakh$

$99 \rightarrow ? \rightarrow 7.92\ L$

11. $Total\ wages = No\ of\ employees \times wage\ per\ employee$

$60xy = 3x \times 20y$

$54xy = 24 \times 27y$

$profit\ \% = \frac{60 - 54}{60} \times 100$

$= 10\%$

Other method:

Previous = 3 members

Wages = $3 \times 20 = 60$

After reduction, 2 members

$wages = 27$

$2 \times 27 = 54$

$\frac{60-54}{60} \times 100 = \frac{6}{60} \times 100 = 60\%$

12. Let $CP = x$

$SP = \frac{140x}{100}$

$= Rs.\frac{7x}{5}$

$new\ CP = 60\%\ of\ x = \frac{60x}{100} = \frac{3x}{5}$

$Gain = 50\%$

$new\ SP = 150\%\ of \frac{3x}{5}$

$= \frac{150}{100} \times \frac{3x}{55} = \frac{9x}{10}$

According to question

$\frac{7x}{5} - \frac{9x}{10} = 5 \rightarrow \frac{14x - 9x}{10} = 5$

$\frac{5x}{10} = 5 \rightarrow \frac{1}{2}x = 5$

$x = Rs.10$

Other method:

Let $CP = Rs.100\ then\ SP = 140$

$New\ CP = Rs.60\ \&\ new\ SP = \left(60 \times \frac{150}{100}\right) = Rs.90$

$Rs\ (140 - 90) = Rs.50\ is\ equivalent\ to\ Rs.5$

$100Rs\ is\ equivalent\ to\ Rs.10$

$CP = 10\ Rs$

RATIO PROPORTION AND AGES

1. Initial composition

C: Z: T = 80: 4: 16

Final C: Z: T = 74: 16: 10

Tin to be reduced from 16% to 10%

Copper % in brass=

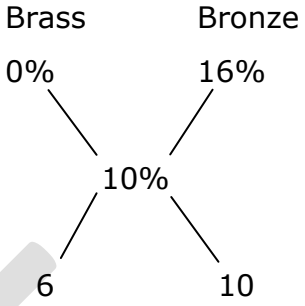
$\left(\frac{(total\ mass \times final\ copper\ \%) - (initial\ mass \times initial\ copper)}{16-10}\right)$

$= \frac{(16 \times 74) - (10 \times 80)}{16 - 10} = 64\%$

Zinc % in brass = 36%

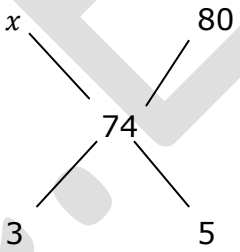
Ratio of C: Z = 64: 36

Other method:



= 3:5

% of copper in brass



x = 64%

So zinc = 36%

2. $x + y = 150$

$0.25x + 0.5y = 58$

by solving, we get

$x = 68, y = 82$

Other method

25 p is ¼ of a Rs. 1

So option will be a 4th table multiples68 & 52

So from here we get 2 options only

Take 68

68 girls. Hence 82 boys

Amt with girls $= 68 \times 0.25 = 17$

Amt with boys $= 82 \times 0.5 = 41$

$we\ get = 17 + 41 = 58$

3. Let the person have Rs. x

Share of elder son $= Rs.\ \frac{2x}{5}$

Share of younger son $= Rs.\ \frac{3x}{10}$

According to the question, $\frac{2x}{5} - \frac{3x}{10} = 2000$

$x = 20000$

Remaining amt saved in trusts $= 1 - \left(\frac{2x}{5} + \frac{3x}{10}\right)$

$$= 1 - \frac{7x}{10} = \frac{3x}{10} = \frac{3 \times 20000}{10} = 6000$$

Given that A: B: C = 3:5:2

Share of $C = \frac{2}{3+5+2} \times 6000 = 1200$

Other method:

Let x =100 $\frac{2}{5} th\ part\ of\ x = 40\% = elder\ son$

$= 30\ \% = younger\ son = 70\ \% = total\ spent$

$saved = 30\%$

Given diff between 2 son's share = 2000

40:30

4:3

$\vee$

1 = 2000

3= 6000

C's share $= \frac{2}{10} \times 6000 = Rs. 1200$

4. Female population in state B = 33 million

3x =33 million,

2x= $\frac{2 \times 33}{3}\ million = 22m$

Female population of State A = 22 million

Male population of A $= \frac{1000}{926} \times 22m$

Total population of A

$= 22\left(1 + \frac{1000}{926}\right) = 45.76\ million$

5. $12\frac{1}{2}\%\ of\ vote\ for\ none = 840$

So 100% is $840 \times 8 = 6720$

Let us track for D alone

$\frac{A\ votes}{half\ of\ 6720} = 3360$

$= is\ divided\ in\ the\ ratio\ 3:2:1$

B: C: D

D's share $= \frac{3360}{6} = 560 \ \ldots\ldots\ldots\ldots\ldots (1)$

B votes $= \frac{3360}{2} = 1680\ is\ divided\ in\ ration\ 2:1$

D's = 1680/3 = 560..... (2)

C and D voters $= 840\ ,\ 840 \ldots\ldots\ldots\ldots\ldots\ldots (3)$

C D

Equation 1+2+3

D's voter $= 560 + 560 + 840 = 1960$

Seeing the options only (A) has 1960 for D

Other method:

$total\ no\ of\ voters = 840 \times 8 = 6720$

$\left[12\frac{1}{2}\%\ of\ vote\ for\ none = 840\right]$

$\left[100\% = \frac{840 \times 8}{100}\ (12.5 \times 8 = 100)\right]$

840 do not vote

$6720 - 840 = 5880\ persons\ voted\ twice$

There should be total $5880 \times 2 = 11760\ votes$

So, choices (3) & (4) are rejected. From the ratios it is also clear that C gets more votes than D. so out correct choice is (1)

6. Let Tanya age 16 yrs ago =x

Grandfather's age 16 yrs ago = 8x

8 yrs from now, $3(x + 16 + 8) = (8x + 16 + 8)$

$x = \frac{48}{5}$

8 yrs ago ratio was:

$$\frac{x+8}{8x+8}=\frac{\frac{48}{5}+8}{8x+\frac{48}{5}+8}$$

$$\frac{88}{424}=\frac{11}{53}$$

Other method:

Tanya

Grandfather

Past 16 years = 1 8

= 7 difference: so multiply by 2

↕

After 8 years = 1 3

= 2 difference: multiply by 3

	T	GF	
	2	16	
Diff 5			5
	7	21	

This 5 → 24 (16years ago +8 years now)

$$1 \rightarrow 4.8$$

16 years ago T GF

2×4.8 16×4.8

9.6 : 76.8

Asked 8 years ago

So add 8

17.6 : 84.8

Now solving, we get = 11:53

7. Mother's age when Ayesha's brother was born = 36 years

Father's age when Ayesha's brother was born = 38+4 = 42 years

Required difference $= 42 - 36 = 6\ years$

8. Let A, S and K respectively be the nuts that Anil, Sunil and Kapil gets

Their ages are mA, mS and mK respectively

Given that

$$\frac{A}{s}=\frac{4}{3}\ and\ \frac{A}{K}=\frac{6}{7}$$

$$\frac{A}{12}=\frac{s}{9}=\frac{k}{14}=\frac{17.5}{35}=\frac{1}{2}$$

Their ages will be respectively 6 years, 4.5 years and 7 years.

Other method:

Working back from the options, quickly add all the ages in each option.

Option (1) gets ruled out. Check the ratio Anil: Sunil = 4:3 you get option (2) as your answer.

9. Skilled: unskilled: clerks

8 : 5 : 1

Wages = 5 : 2 : 3

Hence the amount must be paid in the ratio

$8 \times 5 : 5 \times 2 : 1 \times 3$

$= 40 : 10 : 3$

Sum of the ratios $= 40 + 10 + 3 = 53$

If total = 53, then skilled workers get Rs. 40

If total = 318, the skilled workers get = Rs

$\frac{40}{53} \times 318$

$$= 240\ Rs \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Unskilled workers get

$\frac{10}{53} \times 318 = Rs.60 \ldots\ldots\ldots\ldots\ldots\ldots (2)$

Clerks get

$= \frac{3}{53} \times 318 = Rs.18 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$

So answer = 240, 60, 18

10. Present age of Denis = 5 years

Present age of Rahul = 5-2 = 3 years

Let present age of Ajay = x

Then $\frac{x-6}{18} = present\ age\ of\ Rahul = 3$

$x - 6 = 3 \times 18 = 54 \quad ; \quad x = 54 + 6 = 60$

SIMPLE INTERERST AND COMPOUND INTEREST

1) Rate of interest = 16% per annum

Actual rate of interest = 4% per quarterly

Principle of all 3 installments = $17576\left[\left(\frac{25}{26}\right) + \left(\frac{25}{26}\right)^2 + \left(\frac{25}{26}\right)^3\right]$

$= \frac{17576 \times 25 \times \times 1951}{26 \times 676} = 48775$

2) Balance (installments) = 1150 (1500 – 350)

Total amt for next 3 months = $\left(1150 + \right.$

1150×r×312××100=[400+400+400×r×1100×12 +400+400×r×2100×12

$\frac{46000 + 115r}{40} = 1200 + \frac{400 \times 3r}{1200}$

$r = \frac{80}{3} = 26.66\%$

3) Worth of hotel after 3 years = 10L × $(1.2)^3$

= 1728000

Worth of car after 3 years = 16L × $\left(\frac{3}{4}\right)^3$

= Rs 675000

Difference = 1728000 – 675000 = 1053000

4) Sum = x

Org. rate = y%

New rate = $(y + 3)\%$

$\frac{x(y+3) \times 2}{100} - \frac{x(y) \times 2}{100} = 300$

$xy + 3x - xy = 15000\ (or) x = 5000$

Shortcut:

Formula: $S = \frac{A \times 100}{t \times x}$

Sum = $\frac{300 \times 100}{2 \times 3} = 5000$

5) SI for 4 yrs = $\frac{P \times r \times 4}{100} = 300$

4Pr = $300 \times 100 \rightarrow (1)$

SI for next 6 yrs = $\frac{4P \times r \times 6}{100}$

SI = $\frac{300 \times 100 \times 6}{100} = 1800\ Rs$

Total SI at the end of 10th yr = 300+ 1800 = 2100

Shortcut:

Formula: Total SI = $x\left[\left(1 + \left(\frac{t_2}{t_1}\right) n\right]\right.$

$= 300\left[1 + \left(\frac{6}{4}\right) 4\right]$

$= 300 \times 7$

$= 2100$

6) Sum = x

$I = \frac{x \times 8 \times 4}{100} = \frac{32x}{100}$

$\frac{32x}{100} = x - 340$

$32x = 100x - 34000$

$x = \frac{34000}{68} = Rs.500$

Shortcut:

Formula: Sum $= \frac{100A}{100-rt}$

Sum $= \frac{100\times340}{100-8\times4} = \frac{340\times100}{68}$

$Rs.500$

7) CI on 1 rupee $= \left(1+\frac{10}{100}\right)^2 - 1$

$\left(\frac{11}{10}\right)^2 - 1 => \frac{21}{100}$

SI on 1 rupee $= \frac{2\times10}{100} => \frac{1}{5}$

$\frac{SI}{CI} = \frac{1}{5} \times \frac{100}{21}$

$SI = \frac{1}{5} \times \frac{100}{21} \times 420$

$= 400$

Shortcut:

$t = 2$

$SI = \frac{200}{203} \times 101.5$

$= \frac{100}{105} \times 420$

$= Rs.400$

8) $sum = x$

$3x = x(1+\frac{r}{100})^3$

Squaring on both sides

$3^2 = \left[\left(1+\frac{r}{100}\right)^3\right]^2$

$9 = \left(1+\frac{r}{100}\right)^6$

Sum money will be 9 times in 6 years

Shortcut:

If a sum becomes 'n' times in't' years at CI.

It will be $(n)^m$ times in mt years.

Sum becomes 3 times in 3 yrs

$(3)^2$ times in 2×3 = 6 yrs

9) Diff b/w SI & CI for 2 yrs is the interest on first yrs interest

1st yr= $\frac{40}{2} = 20$

CI – SI = 40.8-40 = 0.8

Interest on Rs. 20 for 1 yr = 0.8

Interest on Rs. 100 for 1 yr= $\frac{80\times100}{100\times20}$

= Rs. 4

Rate = 4%

$P = \frac{100 \times I}{n \times r} = \frac{100 \times 40}{2 \times 4} = 500$

Shortcut:

$r = \frac{2 \times (C-S)}{3} \times 100\%$

$r = \frac{2 \times 0.8}{40} \times 100 => 4\%$

$Sum = \frac{40 \times 100}{4 \times 2} = Rs:500$

10) $CI = 3200\left(1+\frac{15}{200}\right)\left(1+\frac{25}{200}\right) - 3200$

$= 3200\left[\left(\frac{43}{40}\right)\left(\frac{9}{8}\right) - 1\right]$

$= 3200\left[\frac{67}{320}\right] = 670$

11) $sum = x$

$$\left[x\left(1+\frac{5}{100}\right)^4 - x\right] - \left[\frac{x \times 10 \times 2}{100}\right] = 124.05$$

$$x = 8000$$

12)

$$P\left(1+\frac{20}{100}\right)^t > 2P$$

$$\left(\frac{6}{5}\right)^t > 2$$

By trial,

$$\frac{6}{5} \times \frac{6}{5} \times \frac{6}{5} \times \frac{6}{5} > 2$$

Required time is 4 years.

TIME AND WORK

1) Let time taken by $P = x\ days$

$Q = 3x$

From question,

$3x - x = 48\ days$

$2x = 48\ days$

$\therefore P's\ work => x = 24$

$Q's\ work => 3x = 72\ days$

$$working\ together\ of\ P\ \&\ Q = \frac{P \times Q}{P + Q}$$

$$= \frac{24 \times 72}{96}$$

$= 18\ days$

Shortcut:

Required time $= \frac{Given\ \ time \times n}{n^2 - 1}$

Given time = Diff bt P and Q in days

n = how much time P is efficient than Q (or)

n = efficiency

$$= \frac{48 \times 3}{9 - 1}$$

$= 18\ days$

2) Kamal can do the work in 15 days

The efficiency of Bimal: Kamal

(In terms of work) 150: 100

(So, in time) 100: 150

2: 3

10 days: 15 days

So Bimal finished it in 10 days

3) Pipe A can fill it in 15 mins

AB together work in 45 mins

So, B work, $= \frac{45 \times 15}{45 - 15}$

$$= \frac{45 \times 15}{30}$$

B's individual work $= \frac{45}{2}\ mins$

Per mins 40 liters

Overall capacity $= 40 \times \frac{45}{2} = 900\ lts$

4) Here 12 men complete the work in 36 days and, 12 women complete 3/4th work in 36 days.

1 women's work = $\frac{3}{4}th$ of man's work

So, 8 women work = $\frac{3}{4} \times 8$ = 6 men

They ask for 10 men + 8 women

So, 10 men + 6 men = 16 men

12 men = 36 days

16 men =?

So, 10 men + 6 men finished in 27 days

5) Remaining work (in days) = Remaining work to be completed × Individual efficiency of the person

$23 = x \times 40$

$x = \frac{23}{40}$ (B's work)

$so\ A\ complete \frac{17}{40}\ of\ the\ whole\ work$

$total\ work = \frac{45 \times 40}{45 + 40}$

So, A's work $\frac{45 \times 40}{85} \times \frac{17}{40}$

$= 9\ days$

6) A, B, C together work = $\frac{2 \times 6 \times 12 \times 8}{12 \times 6 + 12 \times 8 + 8 \times 6} = \frac{6}{16}$

In 3 days $\frac{6}{16}$ completed

In 6 days $\frac{12}{16}\ completed$

Remaining $\frac{4}{16} = \frac{1}{4}$

Then alternate work start by A,

$= \frac{1}{4} - \frac{1}{6} = \frac{1}{12}$

Then B complete the remaining work =

$\frac{1}{12}\ X\ 12$ = 1 day

Total number of days = 6+1+1=8

Shortcut:

Efficiency of A = $\frac{1}{6}\ X\ 100\%$ =16.66%

B = 8.33%

C = 12.5%

Efficiency of A+B = 25%

A+B+C = 37.5%

In 3 days 87.5% completed

6 days 75% completed

Rest 25% work done,

A and B in alternate days

So total 8 days

7) Here, $a_1 = 14, b_1 = 12, x = 4$

$a_2 = 8, b_2 = 16, y = 5$

$\frac{one\ day\ work\ of\ 1\ man}{one\ day\ work\ of\ 1\ boy} = \frac{yb_2 - xb_1}{xa_1 - ya_2}$

$= \frac{5 \times 16 - 4 \times 12}{4 \times 14 - 5 \times 8} = \frac{32}{16} = \frac{2}{1}$ = 2

8) Here, a = 16 and b = 9

Required time = $\sqrt{ab}$

$= \sqrt{16 \times 9}$

$= 12\ days$

9) 7 men = 10 women

1 men = $\frac{10}{7}$ women

14 men + 20 women $= \left(14 \times \frac{10}{7} + 20\right)$

$= 40\ women$

$By, \frac{M_1 D_1}{W_1} = \frac{M_2 D_2}{W_2}$

$\frac{10 \times 10}{600} = \frac{40 \times D_2}{600}$

$D_2 = 15\ days$

10) 10 men + 15 women = 6 days

60 men + 90 women = 1 day

1 man do in 100 days, so 100 men do in 1 day

60 men + 90 women = 100 men

90 women = 40 men

1 woman $= \frac{4}{9}$ men

1 man = 100 days

Therefore, 1 man = $\frac{1}{100}$ $(in\ work)$

1 woman $= \frac{4}{9} \times \frac{1}{100} = \frac{1}{225}$ (in work) = 225 days

11) Number of men = x

Time taken = 80 days

$(x - 10)$ Men finish in 100 days

$M_1D_1 = M_2D_2$

$80 \times x = 100 \times (x - 10)$

$80x = 100x - 1000$

$x = 50$

Shortcut:

Here a = 10, D = 80 and d = 20

$\therefore Number\ of\ men\ in\ starting = \frac{a(D+d)}{d}$

$= \left(\frac{10(80+20)}{20}\right)$

$$\frac{100 \times 10}{20} = 50$$

TIME AND DISTANCE

1) If you start at 12 noon, you would reach at 4.30 p.m.

Therefore, you would be able to meet the train which left Mumbai from 8 p.m to 4 p.m (8, 9, 10, 11, 12, 1, 2, 3, 4) = Total no of 9 trains

(∴ Note: Trains left Mumbai at 6 a.m, 7 a.m reach Pune at 10.30 a.m, 11.30 a.m respectively)

2) Each pace in length = 25 cm

50 paces per mins

60% of Journey completed in 1 hour

∴ Therefore in one minute distance covered

$= 50 \times 0.25$

$= 50 \times \frac{1}{4}\ m$

60% Total Distance => Distance covered in one hour $= 60 \times 50 \times \frac{1}{4}$

Total distance = $60 \times 50 \times \frac{1}{4} \times \frac{100}{60}$

Total distance = 1250 m

Length of street = 1250 + 500 m (length of column of men)

= 1.75 Km

3) Total time travelled $= 6 - \frac{35}{60} = \frac{65}{12}\ hrs$

$\frac{d}{36} + \frac{d}{14} = \frac{65}{12}$

$\therefore d = 54.6\ Km$

Another Method:

$\therefore avg\ speed = \frac{2xy}{x+y} = \frac{2(36 \times 14)}{36 \times 14} = \frac{504}{25}$

$\therefore Distance = Avg.Speed \times time$

(It is To and Fro distance) => Distance

$= \frac{504}{25} \times \frac{65}{12} = 109.2\ Km$

$\therefore Distance\ from\ house = \frac{109.2}{2} = 54.6\ Km$

4) Total time = 6 hours

Distance = 48 km

Let 'x' is speed of boat in still water

$\frac{D}{x+6} + \frac{D}{x-6} = 6$

$48\left(\frac{2x}{x^2-36}\right) = 6$

$x^2 - 16x - 36 = 0$

$x = 18, -2$

Speed of boat in still water = 18 Km/hr

5) Let speed of train as 'x' km/hr

Length of train $= \frac{(x-2)9}{60\times60} = \frac{(x-4)10}{60\times60}$

$(x-2)9 = (x-4)10$

$x = 22\frac{km}{hr}$ of train = (22-2)$\frac{9}{60\times60}$

$= 20 \times \frac{9}{60\times60}$

Length $= \frac{1}{20}$

$= \frac{1}{20} km$

$= \frac{1000}{20} m$

$length = 50m$

Alternate method:

$M_1 = 2$ Km/hr = $\frac{5}{9}$ m/s

$M_2 = 4$ Km/hr = $\frac{10}{9}$ m/s

Speed of train $= \frac{\frac{10}{9}\times10 - \frac{5}{9}\times9}{10-9} = \frac{55}{9}$ m/s

Speed of train = 22 km/hr

Length of train = $\frac{\left(\frac{10}{9} - \frac{5}{9}\right)10\times9}{10-9} = 50\ m$

6) Distance = $v \times t$

$(v-t)(t+1) = vt = 120\ km$

$vt - 4t + v - 4 = vt$

$v - 4t = 4$

$\frac{120}{t} - 4t = 4$

$120 - 4t^2 = 4t$

$4t^2 + 4t - 120 = 0$

$t^2 + t - 30 = 0$

$t = 5, -6 => t = 5\ hrs$

$v = \frac{120}{5} = 24$ Km/hr

Alternate method:

Let time taken in 1st case is '$x'\ hrs$

Speed $\frac{120}{x} - 4 = \frac{120}{x+1}$

On solving we get $x = 5$

Original speed $= \frac{120}{5} = 24$ km/hr

Short cut:

Distance = speed × time

120 = speed × time

They given, train moves one hour before and speed 4 km/hr slow, and it reaches on same time.

So let we take 5 × 24 = 120

6 × 20 = 120

Therefore the initial speed is 24 km/hr.

7) Two trains move towards each other (opposite)

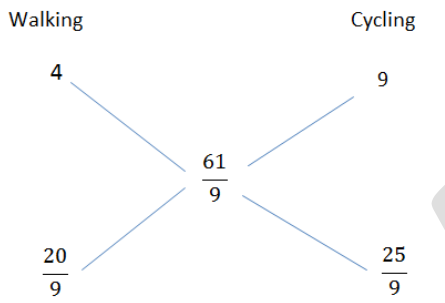
Relative speed = 20 + 30 = 50 km/hr

Time taken to cross each other

$= \frac{200+200}{50\times\frac{5}{18}}$m/s

Time $= \frac{400\times18}{250} = 28.8\ seconds$

8)



Time shared in 9 hrs→ 4 : 5

$\therefore walking\ distance = 4\ hr\ \times 4\ km/hr$

$= 16\ km$

Alternate:

Let $'x'$ *be distance covered in walking.*

$\frac{x}{4}+\frac{61-x}{9} = 9$

On solving $5x = 80$

$x = 16\ km$

9) Relative speed of A with respect to B = 50 + 30 = 80 m/s

Initially A & B are diametrically opposite

$2\pi r = 800\ m$

$\pi r = 400m$

Time for first meet => Time taken = $\frac{400}{80} = 5s$

10) Speed of boat in still water = 48 m/min

Distance = 200 m

Time $t_1 - t_2 = 10\ mins$

$\frac{200}{(48-v)} - \frac{200}{(48+v)} = 10$

$v^2 + 40v - 48^2 = 0$

$v = 32, -72$

Speed of current $v = 32$ m/min

11) Here length of train is always same,

So time is directly proportional to length of the bridge

So, $\frac{t_1}{t_2} = \frac{l_1}{l_2}$

(Since $\frac{l_1}{t_1} = \frac{l_2}{t_2}$)

$t_1 = time\ for\ 1st\ bridge$

$t_2 = time\ for\ 2nd\ bridge$

$l_1 = length\ of\ 1st\ bridge$

$l_2 = length\ of\ 2nd\ bridge$

$\frac{7}{4} = \frac{280}{l_2}$

Length of 2nd bridge =>$l_2 = 160\ m$

12) Speed of two persons $= 30\frac{m}{s}\ and\ \frac{125}{6}\frac{m}{s}$

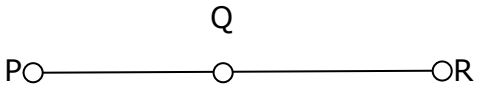
108 km/hr 75 km/hr

In these higher speed is 1st person.

and he covers 1080 km in 10 hrs

In that he makes $\frac{1080}{90} = 12\ Rounds$

13)



In 1st case P to R $\rightarrow 7\ hrs$

$P\ to\ Q\ \rightarrow 3.5\ hrs$

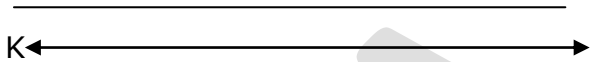
Again in 2nd case, $P\ \rightarrow Q\ \&\ Q\ \rightarrow P\ = 8hrs$

$\therefore Q\ \rightarrow P\ = 8 - 3.5 = 4.5\ hrs$

$R\ to\ Q\ \rightarrow 4.5\ hrs$

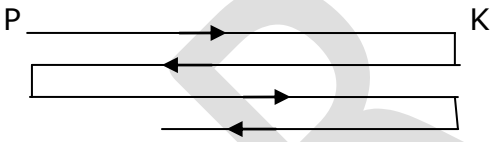
$R\ to\ P\ \rightarrow 4.5\ X\ 2 = 9\ hrs$

14) P



60 km

$speed\ \rightarrow 120\frac{km}{hr}$



In 18 hrs = distance = 2160

$\frac{2160}{600} = 3 + \frac{360}{600}$

Therefore 360 km away from K

15)

$speed\ of\ train\ A = \frac{x}{4}\ km/hr$

(in 1st case since 4 hrs to complete the journey)

$speed\ of\ B = \frac{x}{\frac{7}{2}} = \frac{2x}{7}\ km/hr$

$relative\ speed = \frac{x}{4} + \frac{2x}{7} = \frac{15x}{28}\frac{km}{hr}$

at 7 am, train A at half distance from one end train B at other end

$time\ taken\ to\ each\ other$

$$= \frac{\frac{x}{2}}{\frac{15x}{28}}\ hrs = \frac{x}{2} \times \frac{28}{15x} = \frac{28}{30} = \frac{56}{60} hrs$$

$time = 56\ mins$

PROBABILITY

1)

$$P = \frac{Total\ no\ of\ ways\ in\ which\ two\ people\ sit\ together}{Total\ no\ of\ ways}$$

$$\left(\frac{10! \times 2!}{11!}\right) = \frac{2}{11}$$

2) $P = \frac{(5! \times 4! \times 2!)(3!)}{11!}$

$$= \frac{24 \times 2 \times 6}{11 \times 10 \times 9 \times 8 \times 7 \times 6} = \frac{1}{1155}$$

3) Method 1:

$$\frac{4C_2 \times 7C_4}{11C_6} = \frac{5}{11}$$

Method 2:

$$6C_2 \times \left[\left(\frac{7}{11}\right) \times \left(\frac{6}{10}\right) \times \left(\frac{5}{9}\right) \times \left(\frac{4}{8}\right) \times \left(\frac{4}{7}\right) \times \left(\frac{3}{6}\right)\right]$$

$$= \frac{5}{11}$$

4) There are 6 multiples of three within 20

$P(A) = \frac{6}{20}$

There are 5 multiples of 4 within 20

$P(B) = \frac{5}{20}$

Only 12 has both 3 and 4 factors

$P(A \cap B) = \frac{1}{20}$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) = \frac{1}{2}$$

5) The word "ASSISTANT" contains 2→ $A's, 1 \rightarrow I, 1 \rightarrow N, 3 \rightarrow S, 2 \rightarrow T$

The word "STATISTICS" contains $1 \rightarrow A, 1 \rightarrow C, 2 \rightarrow I, 3 \rightarrow S\ AND\ 3 \rightarrow T$

Total number of ways of choosing one letter from each word

$= 9C_1 \times 10C_1 = 90$

Way of same letter from both

$= 2C_1.1C_1 + 1C_1.2C_1 + 3C_1.3C_1 + 2C_1.3C_1 = 19$

$P = \frac{19}{90}$

PERMUTATION

1) Total no of ways of arranging 16 people = 15! Ways

No. of ways in which 2 brothers together = 14! × 2

No. of ways in which 2 brothers never together = 15! – 14!× 2 = 14! (13)

2) Total no. of ways = 7!

Let A to speak before B

Now since half of the total cases in which A speaks before B

(Similarly in half of the total cases B speaks before A)

Reqd. no. of ways $= \frac{1}{2} \times 7! = 2520$

3) Reqd. no. of times = No. of selections of 3 children taking at a time $= 8C_3 = 56$

4) We should place the coloured ball with their respective coloured box or else it will mismatch

5) Total no. of permutation = 8! = 40320

No. of permutation when LURY occurs = (8-4+1)! = 5! = 120

No. of permutation when MINA occurs = 5! = 120

No. of permutation when LURY & MINA occurs = 3! = 6

Required no. of permutations = 40320 – (120+120) +6 = 40086

ANSWER KEY

Average

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

Partnership

1. (b) 2. (a) 3. (a) 4. (d) 5. (b) 6. (c) 7. (b)

8.(a) 9. (a) 10. (a)

Percentage

1. (b) 2. (c) 3. (b) 4. (c) 5. (c) 6. (d) 7. (a)

8. (b) 9. (a) 10. (d)

Ratio proportion and ages

1. (a) 2. (b) 3. (b) 4. (b) 5. (a) 6. (c) 7. (c)

8. (b) 9. (a) 10. (b)

Profit and loss

1. (a) 2. (a) 3. (c) 4. (b) 5. (c) 6. (a) 7. (b)

8. (a) 9. (c) 10. (c) 11. (a) 12. (a)

SIMPLE INTEREST AND COMPOUND INTEREST

1.(b) 2.(d) 3.(b) 4.(b) 5.(d) 6.(c) 7.(d) 8.(d)

9.(a) 10.(b) 11.(d) 12.(c)

TIME AND WORK

1.(a) 2.(c) 3.(c) 4.(b) 5.(b) 6.(a) 7.(a) 8.(c)

9.(a) 10.(d) 11.(b)

TIME AND DISTANCE

1.(c) 2.(c) 3.(a) 4.(a) 5.(a) 6.(c) 7.(b) 8.(c)

9.(a) 10.(d) 11.(b) 12.(d) 13.(d) 14.(a)

15.(b)

PROBABILITY

1. (a) 2.(d) 3.(a) 4.(a) 5.(c)

PERMUTATION

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