

200 Important Quantitative Aptitude Questions

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LCM and HCF

Ques 1.

Six bells commencing tolling together toll at intervals of 2, 3, 6, 8, 10 and 12 seconds respectively. In 30 minutes how many times do they toll together?

Ans 1. L.C.M of 2, 4, 6, 8, 10 and 12 is 120.

so, the bells will toll together after 120 seconds i.e. 2 minutes .

In 30 minutes the bells toll together $30/2 + 1$ times i.e. times.

Ques 2.

The H.C.F of two numbers is 11 and their L.C.M is 7700. If one of these numbers is 275, then find the other number.

Ans 2. Product of two number s = product of their H.C.F. and L.C.M.

required number = $11 \times 7700/275 = 308$

Ques 3.

A gardener had a number of shrubs to plant in rows . At first he tried to plant 8, then 12 and then 16 in a row but he always had 3 shrubs left with him . On trying 7 shrubs he was left with none. Find the total number of shrubs.

Ans 3. L.C.M of 8,12,16 = 48

Now, $48 \times 1 + 3 = 51$ - not divisible by 7

$48 \times 2 + 3 = 99$ - not divisible by 7

$48 \times 3 + 3 = 147$ - not divisible by 7

Required number = 147

Ques 4.

Three measuring rods are 64 cm,80 cm and 96 cm in length . What is the least length of cloth that can be measured exact number of times using any one of these rods?

(a) 9.60 m

(b) 8 m

(c) 9.60 cm

(d) 96 m

Ans 4. 9.60 m

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Ques 5.

The sum of two numbers is 528 and their H.C.F is 33. What is the number of pairs of such numbers ?

- (a) 4
- (b) 12
- (c) 8
- (d) 6

Ans 5. 4

Hint : Let the number be $33x$ and $33y$ where x and y are co-prime.

Ques 6.

The largest numbers which divides 30, 78 and 102 to leave the same remainder in each case is

- (a) 24
- (b) 20
- (c) 8
- (d) 16

Ans 6. 24

Ques 7.

Find the least number of five digits which is exactly divisible by 12, 15 and 18.

- (a) 1080
- (b) 10080
- (c) 10025
- (d) 11080

Ans 7. 10080

Hint : The least number of 5 digits is 10000. L.C.M. of 12, 15 and 18 is 180 . On dividing 10000 is 100.

=> $10000 + 180 - 100 = 10080$ is divisible by 180.

Ques 8.

The smallest number which when divided by 20, 25, 35 and 40 leaves a remainder of 14, 19 , 29 and 34 respectively is

- (a) 1994
- (b) 1494
- (c) 1394
- (d) 1496

Ans 8. 1394

Hint: Note that $20 - 4 = 6$; $25 - 19 = 6$; $35 - 29 = 6$; $40 - 34 = 6$

Required number = L.C.M. of (20, 25, 35 and 40)-6

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Ques 9.

Find the greatest unit of time with which 5 hours 15 minutes and 8 hours 24 minutes can both be represented as integers.

- (a) 70 min.
- (b) 63 min.
- (c) 48 min.
- (d) 42 min.

Ans 9. 63 min.

Ques 10.

The L.C.M of two numbers is 14 times their H.C.F . The sum of the L.C.M. and the H.C.F . is 600. If one number is 280 , then the other number is

- (a) 40
- (b) 60
- (c) 80
- (d) 100

Ans 10. 80

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Average

Ques 1. The average weight of 45 passenger on board an aircraft is 50 kg. If the weight of 5 members of the crew is added, the average is reduced by half kilogram . What is the average weight of the crew members?

Ans 1. Total weight of 45 passenger = $45 \times 50 = 2250$ kg
Total weight of 45 passenger and 5 crews = $50 \times 49.5 = 2475$ kg
Total weight of 5 crews = $2475 - 2250 = 225$ kg
Average weight of 5 crews = $225/5 = 45$ kg.

Ques 2. A man spends Rs 1,800 per month on an average for the first four months and Rs 2,000 per month for the next 8 months and saves Rs 5,600 a year. What is his average monthly income ?

Ans 2. Total expenditure during first four months = $1,800 \times 4 = \text{Rs } 7,200$
Total expenditure during the next 8 months = $2,000 \times 8 = \text{Rs } 16,000$
Saving = Rs 5,600
Total of expenditure and saving (equal to income the year) = $7,200 + 16,000 + 5,600 = \text{Rs } 28,800$
Average monthly income = $28,800 / 12 = \text{Rs } 2,400$

Ques 3. The average of 5 numbers is 9 and the average of the last three numbers is 5. Find the average of the first two numbers.

Ans 3. Sum of 5 numbers = $9 \times 5 = 45$

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Sum of last three numbers = 15

The average of 1st two numbers = $45 - 15/2 = 30/2 = 15$.

Ques 4. A certain company employed 600 men and 400 women and the average wage was 2.55 per hour. If a woman got 50 paise less than a man, what were their wages per hour?

- (a) Man Rs 3.00, Woman Rs 2.50
- (b) Man Rs 3.50, Woman Rs 3.00
- (c) Man Rs 2.75, Woman Rs 2.25
- (d) Man Rs 3.25, Woman Rs 2.75

Ans 4. Man = Rs 2.75, woman = Rs 2.25

Hint: Let a man's wage per hour be x .

Woman's wage per hour = $x - \frac{1}{2}$

$$\therefore \frac{600x + 400(x - \frac{1}{2})}{1000} = 2.25$$

Ques 5. A man went uphill with a speed of 20 km.p.h. and came downhill with a speed of 30 km p.h. The average speed for his journey was

- (a) 25 km. p.h.
- (b) $22 \frac{1}{2}$ km. p.h.
- (c) 24 km. p.h.
- (d) $25 \frac{1}{2}$ km. p.h.

Ans 5. 24 km.p.h.

Hint: Average speed = $\frac{2xy}{x+y}$

Ques 6. A ship sails out to a mark at the rate of 10 km per hour and sails back at the rate of 15 km per hour. What is its average rate of sailing?

- (a) 10 km. p.h.
- (b) 12 km. p.h.
- (c) 15 km. p.h.
- (d) 11 km. p.h.

Ans 6. 12 km. p.h.

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Ques 7. One third of a certain journey was covered at a rate of 25 km per hour, one fourth at the rate of 30 km per hour and the rest at the rate of 50 km per hour. The average speed for the whole journey is

- (a) $33 \frac{1}{3}$ km/hr
- (b) $66 \frac{1}{3}$ km/hr
- (c) $36 \frac{1}{6}$ km/hr
- (d) $63 \frac{1}{3}$ km/hr

Ans 7.

$$33\frac{1}{3} \text{ km/hr.}$$

Hint: Average Speed

$$= \frac{\text{Total distance travelled}}{\text{Total time taken}}$$

Ques 8. Monica's average expenses for 4 days is Rs 6.0. She spent Rs 7.70 on first day, Rs 6.30 on second day. If she spent 10 on third day, How much did she spend on the 4th day?

- (a) Rs 2
- (b) Rs 3
- (c) Rs 4
- (d) Rs 0

Ans 8. Rs 0

Hint : Required Amount
 $= 24 - (7.70 + 6.30 + 10)$

Ques 9. The average age of A and B is 20 years. If C were to replace A, the average would be 19 and if C were to replace B, the average would be 21. The ages of A, B and C are (in years)

- (a) 22, 17, 16
- (b) 22, 18, 20
- (c) 30, 18, 15
- (d) 23, 17, 15

Ans 9. 22, 18, 20

Hint : $A + B = 2 \times 20$

$C + B = 2 \times 19$

$A + C = 2 \times 21$

Ques 10. The average age of a board of 8 trustees remains the same as it was 3 years ago, when one of them is replaced by a new member. The new member is younger than the trustee in whose place he has been replaced by

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- (a) 24 years
- (b) 26 years
- (c) 47 years
- (d) 32 years

Ans 10. 24 years

Equations

Ques 1.

If $x:y=3:4$, find the value of $\left(\frac{6x+9y}{6x-2y}\right)$

Ans 1.

Given expression = $\frac{6x+9y}{6x-2y}$

Dividing numerator and denominator by y :

$$\text{Given expression} = \frac{\left(\frac{x}{y}\right)+9}{\left(\frac{x}{y}\right)-2} = \frac{6 \times \frac{3}{4} + 9}{6 \times \frac{3}{4} - 2} = \frac{\frac{9}{2} + 9}{\frac{9}{2} - 2} = \frac{27}{5}$$

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Ques 2. What number should be subtracted from each of the numbers 18,24,28,38, so that the remainders may be in proportion ?

Ans 2. Let the number be x .

$$\therefore \frac{18-x}{24-x} = \frac{28-x}{38-x}$$

$$\Rightarrow \frac{18-x}{6} = \frac{28-x}{10}$$

$$\left[\text{If } \frac{a}{b} = \frac{c}{d} \text{ then } \frac{a}{b-a} = \frac{c}{d-c} \right]$$

$$\text{or } 180 - 10x = 168 - 6x$$

$$\text{or } 4x = 12$$

$$x = 3$$

Ques 3. The average age of three girls is 24 years. If their ages are in the ratio of 5 : 6 : 7. find the age of the youngest girl.

Ans 3. Let the respective ages of the three girls be $5x$, $6x$ and $7x$

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$$\therefore 5x + 6x + 7x = 24 \times 3 = 72 \text{ Years}$$

$$\Rightarrow 18x = 72$$

$$\text{or } x = 4$$

$$\therefore \text{Age of the youngest girl} = 5x = 5 \times 4 = 20 \text{ years.}$$

Ques 4. X, Y and Z share a sum of money in the ratio of 11 : 13 : 16 . If Z receives Rs 25 more than X, then Find the total money shared.

Ans 4. Let the respective shares of X, Y and Z be Rs 11x , 13x and 16x respectively

$$\text{Total money} = 11x + 13x + 16x = 40x$$

$$\text{Now. } 16x - 11x = 25$$

$$\Rightarrow x = 5$$

$$\therefore \text{Total money shared} = \text{Rs } 200.$$

Ques 5. The speeds of three cars are in the ratio of 3 : 4 : 5 find the ratio of the time taken by them to travel the same distance.

Ans 5. As distance is constant, time is inversely proportion to speed.

$$\therefore \text{Required ratio} = \frac{1}{3} : \frac{1}{4} : \frac{1}{5} = \frac{1}{3} \times 60 : \frac{1}{4} \times 60 : \frac{1}{5} \times 60$$

$$= 20 : 15 : 12.$$

Ques 6. An alloy is to contain copper and nickel in the ratio of 3 : 7. Find the amount (in kg) of copper required to be melted with 28 kg of nickel to form the alloy.

Ans 6.

$$\frac{\text{Weight of Copper}}{\text{Weight of Nickel}} = \frac{3}{7}$$

$$\therefore \text{Weight of Copper} = \frac{3}{7} \times 28 = 12 \text{ kg.}$$

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Ques 7. The ratio of income of A to that of B is 7 : 5 and the expenditure of A to that of B is 3 : 2 . If, at the end of the year, each saves Rs. 500, find the income of A.

Ans 7. Let the income of A and B be $7x$ and $5x$

Let the expenditure of A and B be $3y$ and $2y$

$$\therefore 7x - 3y = \text{Rs } 500 \dots(i)$$

$$\text{and } 5x - 2y = \text{Rs } 500 \dots(ii)$$

Multiplying equation (i) and (ii) by 2 and 3 respectively and subtracting, we get $x = 500$

$$\therefore \text{income of A} = 7 \times 500 = \text{Rs } 3500.$$

Ques 8. Rs 200 contained in a box consists of one rupee, 50 paise and 25 paise coins in the ratio of 3 : 4 : 5 Find the number and value of 50 paise coins.

Ans 8. Value of 1 Re coins : Value of 50 paise coins : Value of 25 paise coins

$$= 3 : \frac{4}{2} : \frac{5}{4} = 12 : 8 : 5$$

$$\therefore \text{value of 50 Paise Coins} = \frac{8}{12+8+5} \times \text{Rs } 200 = \text{Rs } 64$$

$$\therefore \text{No. of 50 Paise Coins} = 64 \times 2 = 128.$$

Ques 9. 40% of a man's daily output is equal to 60% of a second man's daily output. If the first man turns out 1440 toys everyday, the second man's output in terms of number of toys is

- (a) 960
- (b) 1000
- (c) 840
- (d) 900

Ans 9. (a) 960

Ques 10. 24 liters of a mixture contain milk and water in the ratio of 1 : 5 . If 6 liters of the mixture are replaced by 6 liters of milk, the ratio of milk to water in the new mixture will be

- (a) 3 : 5
- (b) 3 : 4
- (c) 5 : 6
- (d) 2 : 3

Ans 10. 3 : 5

Time and Work

Ques 1.

Randhir is $1\frac{1}{2}$ times faster than sudhir . If Randhir can complete a piece of work in 20 Days , how long will it take for both Randhir and Sudhir to complete the same piece of wrok ?

Ans 1.

Randhir and Sudhir, both would take $\frac{\frac{3}{2} \times 20}{\frac{3}{2} + 1}$ days i.e. 12 days

Ques 2. A can do a job in 24 days ,B in 9 days and C in 12 days. B and C together start the work but leave after 3 days . How much time was taken by A to complete the remaining work ?

Ans 2.

(B+C)'s 3 days' work = $3 \left(\frac{1}{9} + \frac{1}{12} \right) = \frac{7}{12}$
 Remaining $\frac{5}{12}$ of the work was done by A alone.
 $\frac{5}{12}$ of the work is done by A in $\frac{5}{12} \times 24$ or 10 days.

Ques 3. Ram is thrice as good a workman as Sham and is therefore able to finish a piece of work in 60 days less than B. Find the time in which they can do it, working together?

Ans 3.

Required time = $\frac{3 \times 60}{3-1}$ days = $22\frac{1}{2}$ days.

Ques 4.

If half of the plastering of a wall is done on the first day by a group of workers and one-fourth of the remaining on the second day, find the area of the wall , given that the work gets finished after plastering remaining 45 m² of the wall .

Ans 4.

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Let the area of the wall be A m².
∴ Area of the wall remaining to be plastered after
2 days = $\frac{3}{4} \times \frac{1}{2} \times A$ m²
Or $\frac{3A}{8} = 45 \Rightarrow A = 120$
Hence, area of the wall is 120 m².

Ques 5.

9 men and 12 boys finish a job in 12 days. 12 men and 12 boys finish it in 10 days. In how many days will 10 men and 10 boys finish the job?

- (a) 8 days
- (b) 10 days
- (c) 12 days
- (d) None of these

Ans 5. (c) 12 days

$$\text{Hint} = 9M + 12B = \frac{1}{12}; \quad 12M + 12B = \frac{1}{10}$$

Here M and B give the one day's work of a man a boy respectively.

Ques 6. A piece of work which could be finished in 9 days was finished 3 days earlier after 10 more men joined. The number of men employed was

- (a) 18
- (b) 20
- (c) 22
- (d) 24

Ans 6. (b) 20

Hint : $9x = 6(x + 10)$

Ques 7.

If A, B and C together can finish a piece of work in 4 Days, A alone in 12 days and B in 18 Days, then C alone can do it in

- (a) 21 days
- (b) 15 days
- (c) 12 days

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(d) 9 days

Ans 7. (d) 9 days

Ques 8.

A can do half of a piece of work in one day whereas B can do full, B can do half the work as C in one day. Ratio of their efficiencies is

(a) 4 : 2 : 1

(b) 2 : 4 : 1

(c) 2 : 1 : 4

(d) 1 : 2 : 4

Ans 8. 1 : 2 : 4

Hint : Ratio of their efficiencies = Ratio of the amount of work they do in one day .

Ques 9.

If 5 men or 9 boys can do a piece of work in 15 days then 10 men 12 boys can finish the same work in

(a) 4 1/2

(b) 9 days

(c) 18 days

(d) 36 days

Ans 9.

(a) $4\frac{1}{2}$ days
Hint: 1 man in 1 days does $\frac{1}{15 \times 5}$ of the work
1 boy in 1 day does $\frac{1}{15 \times 9}$ of the work

Ques 10.

Some persons can do a piece of work in 12 Days . Two times the number of these persons will do half of that work in

(a) 3 days

(b) 4 days

(c) 6 days

(d) 12 days

Ans 10. (a) 3 days

Hint: Use the formula : $M_1 D_1 W_2 = M_2 D_2 W_1$

Partnership

Ques 1.

Ramu started a business with Rs 2100 and was joined by Sham with Rs 3600 afterwards . After how many months did Sham join , If the profits at the end of the year are shared equally ?

Ans 1. Suppose Sham joined after X months . Then sham's money remained for (12 - x) months.

$$\begin{aligned} \therefore 2100 \times 12 &= 3600(12-x) \\ \text{Or } 3600x &= 43200 - 25200 \quad \text{Or } x = \frac{18000}{3600} = 5 \end{aligned}$$

So, Sham joined after 5 months .

Ques 2.

A,B and C enter into partnership by making investments in the ratio 3 : 5: 7 . After a year , C invests another Rs 337600 while A withdraws Rs 45600 . The ratio of investments then changes to 24 : 59 : 167 . How much does A invest initially ?

Ans 2. Let initial investment be 3x, 5x and 7x rupees.

$$\begin{aligned} (3x - 45600) : 5x : (7x + 337600) &= 24 : 59 : 167 \\ \therefore \frac{3x - 45600}{5x} &= \frac{24}{59} \quad \text{Or } x = 47200 \\ \text{Initial investment of A} &= \text{Rs } (47200 \times 3) = \text{Rs } 141600. \end{aligned}$$

Ques 3.

P and Q invest in a business in the ratio 3 : 2 . If 5% of the total profit goes to charity and P's share is Rs 912, find the total profit

Ans 3. Let the total profit be P.

$$\therefore \text{resultant total profit} = P - \frac{5P}{100} = \frac{19P}{20}$$

$$\text{Or } \frac{19P}{20} \times \frac{3}{5} = 912$$

$$\Rightarrow 57P = 912 \times 100$$

$$\therefore P = \text{Rs } 1600.$$

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Ques 4.

P and Q start a business with initial investments in the ratio of 13:8 . Their corresponding annual profits are in the ratio of 7:5 . If P invested his money for 7 months, find the time period for which Q invested his money.

Ans 4. Suppose Q invested money for a period of x months .

$$\begin{aligned} \therefore \frac{13 \times 7}{8 \times x} &= \frac{7}{5} \\ \Rightarrow 8x &= 65 \\ \therefore x &= 8 \text{ months} \\ \text{Or Q invested money for a period of about 8 months.} \end{aligned}$$

Ques 5.

P and Q entered into partnership with capitals in the ratio of 4 : 5 . After 3 months , P withdrew 1/4th of the capital and Q withdrew 1/5th of the capital . The profit at the end of the year was trs 60000. Find the share of P in the profit .

Ans 5. Let the capitals of P and Q be 4x and 5x respectively .

$$\begin{aligned} \text{Ratio of P's and Q's share of Profit} &= \\ &= (4x \times 3) + \left(\frac{3}{4} \times 4x \times 9\right) : (5x \times 3) + \left(\frac{4}{5} \times 5x \times 9\right) \\ &= 39 : 51 \\ \therefore \text{P's share} &= \frac{39}{90} \times 60000 = \text{Rs. } 26000. \end{aligned}$$

Ques 6.

A and B put in Rs 300 and Rs 400 respectively into a business . A reinvests into the business his share of the first year's profit of Rs 210 whereas B does not .In what should they divide the second year's profit ?

- (a) 39 : 40
- (b) 40 : 39
- (c) 3 : 4
- (d) 39 : 49

Ans 6. (a) 39:40

Hint : A's share of first year's profit

$$\begin{aligned} &= \frac{3}{7} \times 210 = \text{Rs } 90 \\ \text{Required ratio} &= (300 + 90) : 400 \end{aligned}$$

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Ques 7.

A and B entered into partnership , investing Rs 3000 and Rs 2000 respectively . A was the sleeping partner . At the end of one month, both got Rs 150 each. What was B's remuneration for his work ?

- (a) Rs 60
- (b) Rs 50
- (c) Rs 40
- (d) Rs 30

Ans 7. Rs 50

Hint : Let John's capital be Rs x.

$$\frac{150}{150-x} = \frac{3}{2}$$

Ques 8.

The ratio of investments of two partners P and Q is 7 : 5 and the ratio of their profits is 7 : 10. If P invested the money for months , Find for how much time did Q invest the money.

- (a) 7 months
- (b) 10 months
- (c) 9 months
- (d) 11 months

Ans 8 10 months

Series is an important chapter for competitive exams. In every exam you will find at least 5 questions from this chapter. Today I am sharing 10 questions that are repeated in the exams.

Series

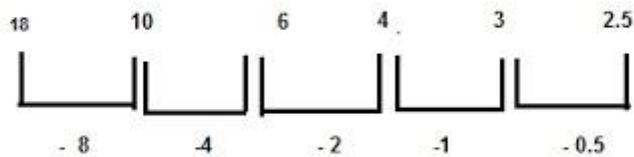
Ques 1.

8 , 10 , 6 , 4 , 3 , ?

- (a) 8
- (b) 2
- (c) 3.5
- (d) 2.5

Ans 1. The difference between the numbers is reduced by half at each step.

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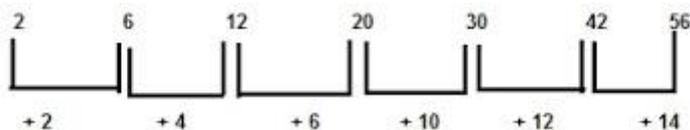


Ques 2.

2, 6, 12, 20, 30, 42 ?

- (a) 50
- (b) 52
- (c) 54
- (d) 56

Ans 2. The difference between the numbers in this series is increased by 2 at each step.

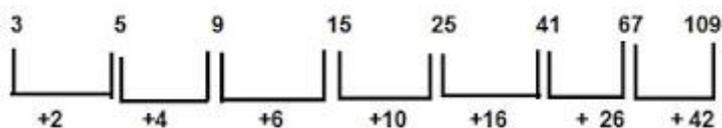


Ques 3.

3, 5, 9, 15, 25, 41, 67, ?

- (a) 108
- (b) 52
- (c) 110
- (d) 111

Ans 3. The difference between the number in this series is the sum of two previous differences .



$$(2+4) (4+6) (6+10) (10+16) (16+26)$$

Ques 4.

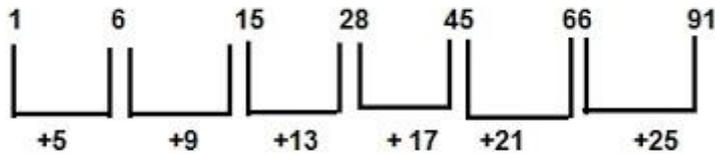
1, 6, 15, ? 45, 66, 91

- (a) 25
- (b) 26
- (c) 27

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(d) 28

Ans 4. The difference between the number in this series is increased by 4 at each step .



Ques 5.

1 , 2 , 5 , 12 , 27 , 58 , 121 , ?

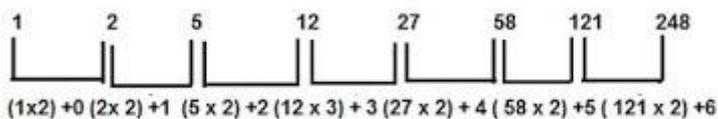
(a) 246

(b) 247

(c) 248

(d) 249

Ans 5. The sequence in this series is number into 2 plus the numbers in natural order starting from 0.



Ques 6.

4 , 9 , 16 , 25 , 36 , ?

(a) 47

(b) 48

(c) 49

(d) 64

Ans 6. The numbers in the series are squares of numbers in natural order starting from 2.

Ques 7.

3 , 8 , 15 , 24 , ? 48 , 63

(a) 30

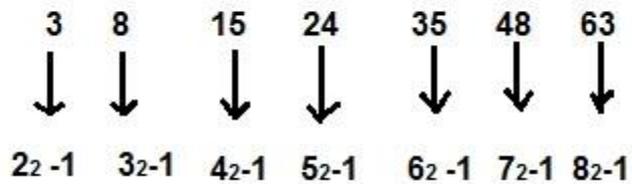
(b) 32

(c) 35

(d) 36

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Ans 7. The numbers in this series are the squares of numbers in natural order minus 1 starting from 2.

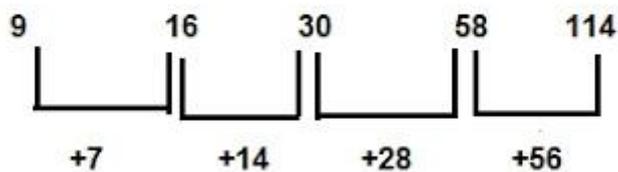


Ques 8.

9, 16, 30, 58, ?

- (a) 104
- (b) 114
- (c) 116
- (d) 118

Ans 8. The difference between the number is doubled at each step.



Ques 9.

5, 14, 41, 86, ?

- (a) 149
- (b) 123
- (c) 157
- (d) 131

Ans 9. The difference between the numbers is the multiple of 9 with odd numbers.

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- (b) 41
- (c) 206
- (d) 1236

Ans 12. The sequence followed in this series is :

$$3 \times 3 + 1 = 10$$

$$10 \times 4 + 1 = 41$$

$$41 \times 5 + 1 = 206$$

$$206 \times 6 + 1 = 1237; \text{ and}$$

\therefore 1237 should be in place of 1236.

Ques 13.

12 , 20 , 38 , 42 , 56 , 72

- (a) 20
- (b) 38
- (c) 56
- (d) 72

Ans 13. The sequence followed in this series is :

$$3 \times 4 = 12$$

$$4 \times 5 = 20$$

$$5 \times 6 = 30$$

$$6 \times 7 = 42$$

$$7 \times 8 = 56$$

$$8 \times 9 = 63$$

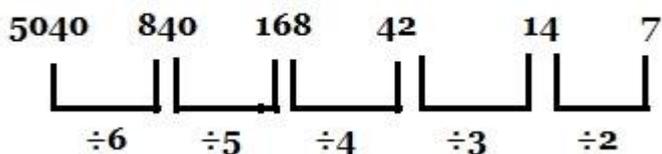
\therefore 30 should be in place of 38.

Ques 14.

5040 , 840 , 160 , 42 , 14 , 7

- (a) 7
- (b) 160
- (c) 14
- (d) 840

Ans 14. The numbers in the series are divided by numbers in reverse order starting from 6 to get the next number .



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∴ 168 should be in place of 32.

Ques 15.

81, 64, 49, 35, 25, 16

- (a) 64
- (b) 35
- (c) 35
- (d) 16

Ans 15. The sequence is the square of the number in decreasing order starting from 9, i.e

$$9_2 = 9 \times 9 = 81$$

$$8_2 = 8 \times 8 = 64$$

$$7_2 = 7 \times 7 = 49$$

$$6_2 = 6 \times 6 = 36$$

$$5_2 = 5 \times 5 = 25$$

$$4_2 = 4 \times 4 = 16$$

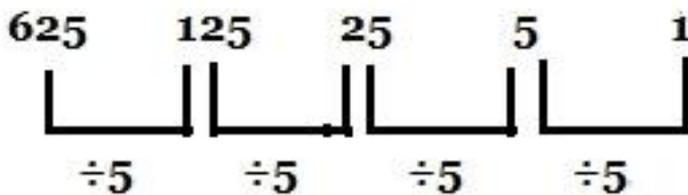
∴ 36 should be in place of 35

Ques 16.

625, 125, 25, 5, 0

- (a) 0
- (b) 125
- (c) 5
- (d) 625

Ans 16 . The number in the series are divided by 5 to get the next number .



∴ 1 should be in place of 0 digit.

Ques 17.

25, 19, 17, 13, 11, 7

- (a) 25
- (b) 17
- (c) 13
- (d) 7

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Ans 17. Other numbers are prime numbers.

Ques 18.

3 , 10 , 27 , 4 , 16 , 64 , 5 , 25 , 125

- (a) 25
- (b) 16
- (c) 10
- (d) 3

Ans 18. The sequence of the series is formed by a number , its square , its cube, then the next number is natural order , i.e.,

$$3_1 = 3$$

$$3_2 = 3 \times 3 = 9$$

$$3_3 = 3 \times 3 \times 3 = 27$$

next number :

$$4_1 = 4$$

$$4_2 = 4 \times 4 = 16$$

$$4_3 = 4 \times 4 \times 4 = 64$$

next number :

$$5_1 = 5$$

$$5_2 = 5 \times 5 = 25$$

$$5_3 = 5 \times 5 \times 5 = 125$$

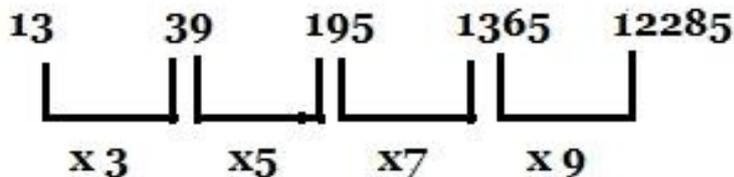
∴ 9 should be in place of 10 .

Ques 19.

13, 39 , 195 , 1363 , 12285

- (a) 13
- (b) 1363
- (c) 39
- (d) 195

Ans 19. In this series the numbers are multiplied by odd numbers in natural order numbers in natural order starting from 3, i.e.



∴ 1365 should be in place of 1363

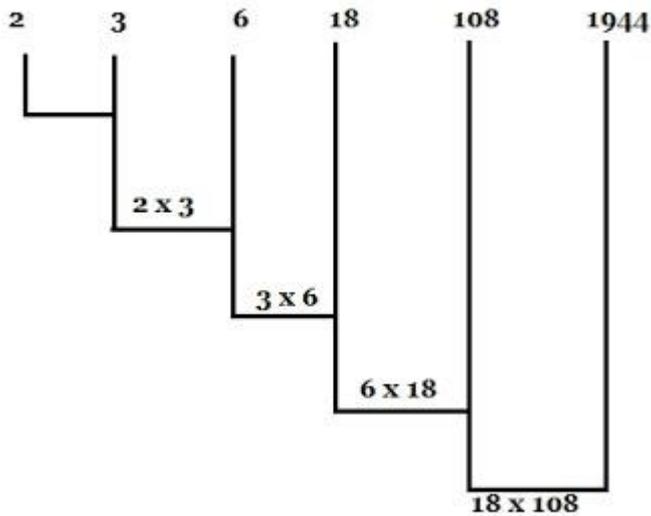
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Ques 20.

2 , 3, 6, 18 , 108 , 1942

- (a) 6
- (b) 18
- (C) 1942
- (d) 3

Ans 20. The numbers in the series are the product of two numbers preceding it , i.e.



∴ 1944 should be in place Of 1942.

Ques 21.

5 , 15 , 30 , 135, 405, 1215, 3645

- (a) 3645
- (b) 5
- (c) 405
- (d) 1215
- (e) 30

Ans 21. Each term of the series is obtained by multiplying the previous term by 3 .

⇒ Therefore the particular order is 5, (5 x 3 = 15), (15 x 3 = 45), (45 x 3 = 135), (135 x 3 = 405) , (405 x 3 = 1215), (1215 x 3 = 3645), .. and so on .

⇒ Hence , alternative (e) consists of the wrong term.

Ques 22.

2, 3, 6, 10, 18, 27, 54

- (a) 10
- (b) 27
- (c) 3

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- (d) 6
- (e) 18

Ans 22. In the given sequence second term is 1.5 the first , the third term is 2 times the second and so on, Therefore , alternative (a) consists of the wrong term.

Ques 23.

3 , 4 , 8 , 17 , 33 , 49 , 94

- (a) 17
- (b) 8
- (c) 4
- (d) 33
- (e) 49

Ans 23. In the given sequence difference between successive terms is in the order $1_2, 2_2, 3_2, \dots$. Therefore 58 should replace 49 to form the series .

⇒ Hence alternative (e) consists of the wrong term.

Ques 24.

36 , 49 , 100 , 144 , 196 , 256 , 324

- (a) 256
- (b) 36
- (c) 49
- (d) 144
- (e) 100

Ans 24. Terms of the series would be $6_2, 8_2, 10_2, 12_2, \dots, 18_2$ if 49 is replaced 64 .

⇒ Therefore , alternative (c) consists of the wrong term.

Ques 25.

508 , 250 , 124 , 60 , 28 , 12 , 4

- (a) 28
- (b) 124
- (c) 60
- (d) 12
- (e) 250

Ans 25. If 250 is replaced by 252, then difference successive terms of the series will be in the order of 256 , 128, 64, 32 , 16 , 8 respectively which form a particular order .

⇒ Therefore , alternative (e) consists of the wrong term.

Ques 26.

2 , 3 , 5 , 8 , 15 , 21 , 34 , 55

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- (a) 5
- (b) 8
- (c) 3
- (d) 21
- (d) 15

Ans 26. If 15 is replaced by 13 then a particular order of terms in the series will be formed in which sum of two successive terms is equal to the next term.

⇒ Therefore, alternative (e) consists of the wrong term.

Ques 27.

2, 5, 10, 18, 26, 37, 50

- (a) 37
- (b) 18
- (c) 5
- (d) 50
- (e) 2

Ans 27. If 18 is replaced by 17 then terms of the series will be arranged in the order of $1^2 + 1$, $2^2 + 1$, $3^2 + 1$... $7^2 + 1$.

⇒ Therefore, alternative (b) consists of the wrong term.

Ques 28.

1, 4, 7, 11, 16, 22, 29

- (a) 4
- (b) 11
- (c) 22
- (d) 29
- (e) 1

Ans 28. If first term of the series is replaced by 2 then difference between successive terms of the series will be in the order of 2, 3, 4, 5, 6, 7.

⇒ Therefore, alternative (e) consists of the wrong term.

Ques 29.

4, 6, 9, 18, 34, 59, 95

- (a) 34
- (b) 6
- (c) 18
- (d) 95
- (e) 9

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Ans 29. If 6 is replaced by 5 then difference between successive terms will be in the order of 1, 4, 9, 16, 25, 36.

⇒ Therefore, alternative (b) contain the wrong term.

Ques 30.

54, 43, 34, 26, 22, 19, 18

- (a) 26
- (b) 18
- (c) 43
- (d) 22
- (e) 34

Ans 30. If 26 is replaced by 27, then difference between successive terms of the series will be on the order of 11, 9, 7, 5, 3, 1.

Compound Interest

Ques 1.

If Inflation increases at a rate of 8 p.c.p.a What will a Rs.20 article cost at the end of two years ?

- (a) between Rs,20 and Rs.21
- (b) between Rs.21 and Rs.22
- (c) between Rs.22 and Rs.23
- (d) between Rs.23 and Rs.24

Ans 1..(d) Required sum =

$$20\left\{1 + \frac{8}{100}\right\}^2 = \frac{20 \times 27 \times 27}{25 \times 25} = 23.3$$

Ques 2.

What sum invested for 2 years at 12% compounded annually will glow to Rs.4390.40?

- (a) Rs.4000
- (b) Rs.3500
- (c) Rs.3800
- (d) Rs.3875

Ans 2.

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$$p\left\{1 + \frac{R}{100}\right\}^2 = \text{Amount} \Rightarrow \left\{1 + \frac{12}{100}\right\}^2 = 4390.40$$

$$\Rightarrow p\left\{\frac{112}{100}\right\}^2 = 4390.40 \Rightarrow p = \frac{43904000}{112 \times 112} = 3500$$

Ques 3.

What sum of money will become Rs.1352 in 2 years at 4 percent per annul compound interest ?

- (a) Rs.1200
- (b) Rs.1225
- (c) Rs.1250
- (d) Rs.1300

Ans 3.

$$1352 = p\left\{1 + \frac{4}{100}\right\}^2$$

$$1352 = P \times \frac{26}{25} \times \frac{26}{25} \Rightarrow P = \text{Rs. } 1250.$$

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Ques 4.

What sum lent at 5%per annul compound interest will amount to Rs. 441 in 2 years?

- (a) Rs. 390
- (b) Rs. 395
- (c) Rs.400
- (d) Rs.405

Ans 4.

$$= p\left\{1 + \frac{5}{100}\right\}^2 = 441$$

$$\Rightarrow P = 441 \times \frac{20}{21} \times \frac{20}{21} = 400$$

Ques 5.

The principal that amount to Rs.4913 in 3 years at per annul compound interest compounded annually is

- (a) Rs.4096
- (b) Rs.4085
- (c) Rs.4076
- (d) Rs.3096

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Ans 5.

$$= p \left\{ 1 + \frac{25}{400} \right\}^3 = 4913$$

$$\Rightarrow 4913 \times \frac{16}{17} \times \frac{16}{17} \times \frac{16}{17} = 4096$$

Ques 6.

If the total amount interest earned after 2 years at the rate of 12% per annual is Rs.228.96, then the principal amount is

- (a) 1,200
- (b) 1,100
- (c) 1,000
- (d) 900

Ans 6. Let P be the principal

$$= p \left\{ 1 + \frac{12}{100} \right\}^2 - P = 228.96 \Rightarrow P = \text{Rs.}900$$

Ques 7.

If a sum of Rs.1000 deposited at compound interest double after 4 years. After 20 years, it will become

- (a) Rs.20,000
- (b) Rs 24,000
- (c) Rs.28,000
- (d) Rs.32,000

Ans 7. = (d)

Ques 8.

If Raja paid total amount of Rs.324.48 after 2 years with compound interest at 4% per annum, then the principal amount taken by Raja must be

- (a) Rs.300
- (b) Rs.320
- (c) Rs.310
- (d) Rs.316

Ans 8. = (a)

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Ques 9.

What is the time in which Rs 2000 will amount to Rs. 2420 at 10% per annum compound interest?

Ans 9.

$$\begin{aligned}2000 \left(1 + \frac{10}{100}\right)^n &= 2420 \\ \left(1 + \frac{10}{100}\right)^n &= \frac{2420}{2000} = \frac{121}{100} = \left(\frac{11}{10}\right)^2 \\ \therefore \left(\frac{11}{10}\right)^n &= \left(\frac{11}{10}\right)^2 \quad \text{or } n=2 \\ \therefore \text{Time} &= 2 \text{ years}\end{aligned}$$

Ques 10.

What sum will become Rs. 6,690 after three years and Rs. 10,035 after six years on compound interest ?

Ans 10.

$$P \left(1 + \frac{R}{100}\right)^3 = 6,690 \quad \text{and} \quad P \left(1 + \frac{R}{100}\right)^6 = 10,035$$

Now dividing the second equation by the first equation , we get :

$$\left(1 + \frac{R}{100}\right)^3 = \frac{10,035}{6,690} = \frac{3}{2}$$

Substituting this value of $\left(1 + \frac{R}{100}\right)^3$ in the first equation we get : $3P/2 = 6,690$

\therefore Required sum = Rs. 4,460.

Ques 11.

The difference between the compound interest and the simple interest on a certain sum at 5% per annum for 2 years is Rs. 1.50. Find the sum.

Ans11.

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$$(1 - 5\%)^2 = P \left(\frac{R}{100} \right)^2 \quad \text{or} \quad 1.50 = P \left(\frac{5}{100} \right)^2$$

$$\therefore \text{Principal} = \frac{1.50 \times 100 \times 100}{5 \times 5} = 600$$

Ques 12.

Compound interest on a certain sum for 2 years at 10% p.a. is Rs 420. What would be the simple interest at the same rate and for the same time.

Ans 12.

$$420 = P \left[\left(1 + \frac{10}{100} \right)^2 - 1 \right] = P \times \frac{10}{100} \times \left(2 \times \frac{10}{100} \right)$$

$$\text{Or } P = \frac{420 \times 100 \times 100}{210} = \text{Rs } 2000$$

$$\therefore \text{Simple interest} = \frac{2000 \times 10 \times 2}{100} = \text{Rs } 400.$$

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Ques 13.

A sum of money placed at compound interest doubles itself in 4 years. In how many years will it amount to eight times itself?

Ans 13.

$$P \left(1 + \frac{R}{100} \right)^4 = 2P \quad \text{or} \quad \left(1 + \frac{R}{100} \right)^4 = 2$$
$$\Rightarrow \left[\left(1 + \frac{R}{100} \right)^4 \right]^3 = 2^3 = 8 \quad \text{i.e.} \quad \left(1 + \frac{R}{100} \right)^{12} = 8$$

Hence, the sum will be 8 times itself in 12 years.

[Note : The sum is 2 times in 4 years ; it will be 8 (i.e. 2³) times in 4 x 3 years i.e. 12 years]

Ques 14.

Find the least number of complete years in which a sum of money put at 25% p.a. compound interest will be more than double itself.

Ans 14.

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$$P\left(1 + \frac{25}{100}\right)^n > 2P \quad \text{or} \quad \left(\frac{5}{4}\right)^n > 2$$
$$\text{But } \frac{5 \times 5 \times 5}{4 \times 4 \times 4} = \frac{125}{64} < 2 \quad \text{and} \quad \frac{5 \times 5 \times 5 \times 5}{4 \times 4 \times 4 \times 4} = \frac{625}{256} > 2$$

=> the least possible value of n is 4.

Hence, the least number of years required is 4.

Ques 15.

Divide Rs. 3903 between A and B, so that when compounded annually A's share at the end of 7 years may be equal to B's share at the end of 9 years. The rate of interest is given to be 4% per annum.

Ans 15.

$$\begin{aligned} \text{A's Share} \times \left(1 + \frac{4}{100}\right)^7 &= \text{B's Share} \times \left(1 + \frac{4}{100}\right)^9 \\ \text{A's Share} &= \text{B's Share} \times \left(1 + \frac{4}{100}\right)^2 \\ \Rightarrow \frac{\text{A's Share}}{\text{B's Share}} &= \frac{676}{625} \\ \therefore \text{A's Share} &= \frac{676}{676+625} \times 3903 = \text{Rs. } 2028 \\ \text{B's Share} &= \frac{625}{676+625} \times 3903 = \text{Rs. } 1875 \end{aligned}$$

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Ques 16.

How much more would Rs. 20,000 fetch, after two years, if it is put at 20% p.a. . Compound interest payable half yearly than if it is put at 20% p.a. compound interest payable yearly?

- (a) Rs. 482
- (b) Rs. 424
- (c) Rs. 842
- (d) Rs. 512

Ans 16.

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Rs 482
Hint : Required amount
$$= 2000 \left[\left(1 + \frac{10}{100}\right)^4 - \left(1 + \frac{20}{100}\right)^2 \right]$$

Ques 17.

A sum is invested at compound interest payable annually. The interest in two successive years is Rs. 225 and Rs. 236.25. The rate of interest is

- (a) 4%
- (b) 5%
- (c) 3%
- (d) 8%

Ans 17.5%

Ques 18.

Population of a city is 198000. It increased by 7% in the 1st year and decreased by 5% in the 2nd year. What is the population of the city in the 3rd year.

- (a) 218900
- (b) 201267
- (c) 201860
- (d) 212453

Ans 18.

$$\begin{aligned} \text{Required Population} &= 198000 \left(1 + \frac{7}{100}\right) \left(1 - \frac{5}{100}\right) \\ &= 198000 \times \frac{107}{100} \times \frac{95}{100} = 201267 \end{aligned}$$

Ques 19.

What will be the difference in annual simple and compound interests at the rate of 12% p.a on the sum Rs. 960 after 2 years compounded annually? **(Very important)**

- (a) Rs. 13.824
- (b) Rs. 20.224
- (c) Rs. 24.04
- (d) Rs. 31

Ans 19.

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$$\begin{aligned}\text{Required difference} &= 960 \left[\left(1 + \frac{12}{100} \right)^2 - 1 \right] - \frac{960 \times 12 \times 2}{100} \\ &= 960 \left[\frac{784}{625} - 1 \right] - 230.4 = 960 \times \frac{159}{625} - 230.4 \\ &= 244.224 - 230.4 = \text{Rs. } 13.824\end{aligned}$$

Ques 20.

If rate of interest is 4% compounded quarterly. What will be the amount if a man invests Rs. 2000 for 1 year ?

- (a) Rs. 2060
- (b) Rs. 2081.21
- (c) Rs. 2100.25
- (d) Rs. 2125.54

Ans 20.

$$\begin{aligned}\text{Required amount} &= 2000 \left[1 + \frac{4}{100} \right]^4 = 2000 \times 1.04060401 \\ &= \text{Rs. } 2081.21\end{aligned}$$

Ques 21.

A bank offers 5% interest compounded half yearly. 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 the way of interest is :

- (a) Rs. 123
- (b) Rs, 122
- (C) Rs. 121
- (d) Rs. 120

Ans 21.

$$\begin{aligned}\text{Total Amount} &= 1600 \left(1 + \frac{5}{2 \times 100} \right)^2 + 1600 \left(1 + \frac{5}{2 \times 100} \right) \\ &= 1600 \times \frac{1681}{1600} + 1600 \times \frac{41}{40} = 1681 + 1640 \\ &= \text{Rs. } 3321\end{aligned}$$

Hence, required interest = 3321 - 3200 = Rs. 121

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Ques 22.

An amount increased by 60% in years at simple interest. What will be the compound interest of Rs. 12000 after 3 years at the same rate ?

- (a) Rs. 6240
- (b) Rs. 3972
- (c) Rs. 3120
- (d) Rs. 2160

Ans 22.

Let, P = Rs. 100; then S.I = Rs. 60

Since, rate = $\frac{60 \times 100}{100 \times 6} = 10\%$ p.a.

$$\begin{aligned} \text{Hence, C.I.} &= 12000 \left[\left(1 + \frac{10}{100}\right)^3 - 1 \right] = 12000 \left[\frac{331}{1000} - 1 \right] \\ &= 12000 \times \frac{31}{1000} \\ &= \text{Rs. } 3972 \end{aligned}$$

Ques 23.

If a sum of money is borrowed and returned in equal installments of Rs.882. Find the sum borrowed : **(Very important)**

- (a) Rs. 1700
- (b) Rs. 1680
- (c) Rs. 1640
- (d) Rs.1620

Ans 23.

$$\begin{aligned} \text{Required Sum} &= \frac{882}{\left(1 + \frac{5}{100}\right)} + \frac{882}{\left(1 + \frac{5}{100}\right)^2} = 882 \left[\frac{20}{21} + \left(\frac{20}{21}\right)^2 \right] \\ &= 882 \times \frac{20}{21} \left(1 + \frac{20}{21}\right) = 882 \times \frac{20}{21} \times \frac{41}{21} = \text{Rs. } 1640 \end{aligned}$$

Ques 24.

In how many years a sum of money will be doubled if interest rate is 20% compounded annually.

- (a) 6
- (b) 5
- (c) 4
- (d) 3

Ans 24.

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$$\text{Here, } P\left(1 + \frac{20}{100}\right)^n > 2P \Rightarrow \left(\frac{6}{5}\right)^n > 2$$
$$\text{Hence, if } n = 4 \text{ Then, } \left(\frac{6}{5}\right)^4 = \frac{1296}{625} > 2$$

So, $n = 4$ years

Ques 25.

Nominal rate of compound interest is 6% per annum paid half yearly. Find effective rate of interest :

- (a) Rs. 6.09%
- (b) Rs. 6.08%
- (c) Rs. 6.07%
- (d) Rs. 6.06%

Ans 25.

Let $P = \text{Rs. } 100$; then

$$A = 100\left(1 + \frac{3}{100}\right)^2 = 100 \times 1.0609 = \text{Rs. } 106.09$$

Hence, C.I = $106.09 - 100 = \text{Rs. } 6.09$

So, required effective rate = 6.09% p.a.

Races and Games

Ques 1 .

In a kilometre race, A beats B by 30 metres or 6 seconds . Find the time taken by A to finish the race.

Ans 1. It is obvious that B runs 30 metres in 6 seconds .

$$\therefore B \text{ runs } 1000 \text{ metres in } \left(\frac{60}{30} \times 1000\right) \text{ seconds i.e. } 200 \text{ Seconds.}$$

Time taken by A to finish the race = $200 - 6 = 194$ seconds = 3 minutes 14 seconds

Ques 2.

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In a 125 m Race , A runs at 10 km/hour. A gives B a start of 5 metres and still beats him by 5 seconds . Find the speed of B.

$$\text{Time Taken by A to finish 125 m Race} = \frac{125}{10 \times \frac{5}{18}} = 45 \text{ s}$$

B covers $125 - 5 = 120 \text{ m}$ in $45 + 5 = 50 \text{ s}$

$$\therefore \text{Speed of B} = \frac{120}{50} \times \frac{18}{5} \text{ km/hour} = 8.64 \text{ km/hour.}$$

Ans 2.

Ques 3.

In a kilometre race, if A gives B 30 m start, A wins by 20 seconds but if A gives B 30 seconds start, B wins by 20 m. Find the speed of B.

Ans 3. Let the speed of A be $x \text{ m/s}$ and speed of B $y \text{ m/s}$.

$$\therefore \frac{1000}{x} + 20 = \frac{1000 - 30}{y} \text{ and } \frac{1000}{y} = \frac{1000 - 20}{x} + 30$$

$$\text{Let } \frac{1}{x} = u \text{ and } \frac{1}{y} = v$$

$$\therefore 1000u + 20 = 970v \text{ and } 1000v - 30 = 980u$$

Solving these equations we get,

$$v = \frac{52}{247} \Rightarrow y = \frac{247}{52} \text{ ms}^{-1} = 4.75 \text{ m/s}$$

Hence speed of B = 4.75 m/s.

Ques 4.

A can run a kilometre race in 2 minutes and B in 2 minutes. by what distance can A beat

$$\therefore \text{Distance Covered by B in 40 seconds} = \frac{1000}{2 \text{ min}} \times 40 \text{ sec}$$

$$= \frac{1000 \times 40}{160} = 250 \text{ metres}$$

B ?

Ans 4. A beats B by 40 sec.

A beats B by 20 metres .

Ques 5.

In a 100 m race , A beats B by 12 m and C by 15 m , In a race of 176 m, Find by how much distance would B beat C.

Ans 5. When A covers 100 m, B covers 88 m and C covers 85 m.

i.e. when B covers 88 m C covers 85 m.

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when B covers 176 m, C would cover

$$\left(\frac{85}{88} \times 176\right) \text{ m} = 170 \text{ m}$$

B would beat C by 6 m in a race of 176 m.

Ques 6.

In a race of 600 m, A can beat B by 50 m and in a race of 500 m, B can beat C by 40 m .
by how many metres will A beat C in a race of 400 m?

Ans 6. When A covers 600 m , B covers 550 m.

$$\text{When A covers 400 m, B covers } \frac{550}{600} \times 400 = \frac{1100}{3} \text{ m}$$

$$\text{When B covers 500 m, C covers 460 m.}$$
$$\text{When B covers } \frac{1100}{3} \text{ m, C covers } \frac{46}{50} \times \frac{1100}{3} = 337\frac{1}{3} \text{ m}$$

$$\text{A beats C by } \left(400 - 337\frac{1}{3}\right) = 62\frac{2}{3} \text{ m.}$$

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Ques 7.

In a 400 m. race , the ratio of speeds of two runners A and B is 3:4. a Has a start of 130 m. A wins by

- (a) 50 m
- (b) 25 m
- (c) 40 m
- (d) 75 m

Ans 7. 40 m.

$$\text{Hint : Distance run by B} = \frac{400 - 130}{3} \times 4$$

Ques 8.

In a 100 m race , P runs at 8 km/hour . If P gives Q a start of 4 m and still beats him by 15 seconds , the speed of Q is

- (a) 6 km/hour
- (b) 5.5 km/hour
- (c) 6.2 km/hour
- (d) 5.76 km/hour

Ans 8. 5.76 km/hour

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$$\text{Hint : } \frac{100-4}{5} = \frac{100}{8 \times \frac{5}{18}} + 15$$

Ques 9.

Ram and shyam run at 4 km on a course 250 m round . If their rates be 5 : 4 , how often does the winner pass the other?

- (a) Ram passes Shyam thrice
- (b) Ram passes Shyam twice
- (c) Ram passes Shyam once
- (d) Shyam passes Ram twice

Ans 9. Ram passes Shyam thrice

Hint : Speed of Ram with respect to shyam = $5x - 4x = x$ ms⁻¹

$$\begin{aligned} \text{Time Taken by Ram to Pass Shyam} &= \frac{250}{x} \text{ s} \\ \text{Total time taken by Ram to finish the race} &= \frac{4000}{5x} \text{ s} \\ \therefore \text{no. of Times Ram Passes Shyam} &= \frac{4000}{5x} \div \frac{250}{x} \end{aligned}$$

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Ques 10.

P can run one kilometre in half a minute less time than Q. In a kilometre race , Q gets a start of 100 m and still losses by 100 m. Find the time P and Q take to run a kilometre .

- (a) 3 min , 2 min
- (b) $3\frac{1}{2}$ min , 2 min
- (c) 2 min , $2\frac{1}{2}$ min
- (d) $2\frac{1}{2}$ min , 4 min

Ans 10. 2 min , $2\frac{1}{2}$ min

Hint : Let the speed of P and Q be P m/s and q m/s respectively .

$$\frac{1000}{P} + \frac{60}{2} = \frac{1000}{q}$$

$$\frac{1000 - 100 - 100}{q} = \frac{1000}{P}$$

Installments

200 Important Quantitative Aptitude Questions

Ques 1.

An electric iron is sold for Rs 110 cash or Rs 50 cash down payment followed by Rs 62 after a month. Find the rate of interest charged under the installment plan.

Ans 1. Present worth of the amount to be paid in installment = Rs (110-50) = Rs 60

Let the rate of interest be $r\%$ p.a.

After a month the worth of Rs 60 would be : Rs (60 + 20 \times r /100 \times 1/12)

But $60 + r/20 = 62$

$\therefore r = (62 - 60) \times 20 = 40\%$ p.a.

Ques 2.

A loan of Rs 2550 is to be paid back in two equal half - yearly installments . How much is each installment if the interest is compounded half - yearly at 8% p.a.?

Ans 2. Present worth of loan = Rs 2550

Let each installment be Rs x .

$$\begin{aligned} \text{Present worth of Rs } x \text{ due six months hence} &= \frac{x}{\left(1 + \frac{4}{100}\right)^1} \\ \text{Present worth of Rs } x \text{ due 12 months hence} &= \frac{x}{\left(1 + \frac{4}{100}\right)^2} \\ \therefore \frac{x}{\left(1 + \frac{4}{100}\right)^1} + \frac{x}{\left(1 + \frac{4}{100}\right)^2} &= 2550 \\ \frac{25x}{26} + \frac{25x}{26} &= 2550 \quad \text{OR} \quad \frac{25}{26} \times x \left[1 + \frac{25}{26}\right] = 2550 \\ \text{OR } x &= 2550 \times \frac{26}{25} \times \frac{26}{51} = \text{Rs } 1352 \\ \therefore \text{Each half-yearly installment} &= \text{Rs } 1352. \end{aligned}$$

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Ques 3.

Kusum borrowed money and returned it in 3 equal quarterly installments of Rs.4630.50 each .

What sum had she borrowed if the rate of interest was 20% p.a. compounded quarterly ? Find also the total interest charged .

Ans 3. Using the concept of present worth we have :

$$\begin{aligned} \text{Sum borrowed} &= \frac{4630.50}{\left(1 + \frac{5}{100}\right)^1} + \frac{4630.50}{\left(1 + \frac{5}{100}\right)^2} + \frac{4630.50}{\left(1 + \frac{5}{100}\right)^3} \\ &= 4630.50 \left[\frac{100}{105} + \frac{(100)^2}{(105)^2} + \frac{(100)^3}{(105)^3} \right] \\ &= 4630.50 \times \frac{20}{21} \left[\frac{41}{21} + \left(\frac{20}{21}\right)^2 \right] \\ &= 4410 \times \frac{1}{21} \times \frac{1261}{21} = \text{Rs } 12610 \end{aligned}$$

Total value of the three installment = Rs (4630.50 \times 3) = Rs 13891.50

\therefore Total interest charged = Rs(13891.50 - 12610) = 1281.50.

Ques 4.

A steel container is sold at Rs 120 cash or Rs 25 as cash down payment and Rs.25 a month for 4 months .The rate of interest per annum charged under the installment plan is .

(a) 26.09%

(b) 24.09%

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- (c) 20 %
(d) 23.25%

Ans 4. 26.09%

Hint : Present worth of the balance amount to be paid = Rs (120-25) = Rs 95
Worth of Rs 95 after 4 months =

$$95 \left(1 + \frac{4R}{100}\right) \text{ where } R \rightarrow \text{rate \% per month}$$

$$\begin{aligned} \text{Using the formula: } 100 \times 95 \left(1 + \frac{4R}{100}\right) \\ = 25 \left[(100 \times 4) + \frac{R \times 4 \times 3}{2} \right] \end{aligned}$$

Ques 5.

A sum of Rs 7500 is to be paid back in three equal annual installments. How much is each installment if the interest is compounded annually at 4% p.a.?

- (a) Rs. 1000.05
(b) Rs 981.65
(c) Rs 163.58
(d) Rs 2701.61

Ans 5. 2701.61

Hint : 7500 =

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$$\frac{x}{\left(1 + \frac{4}{100}\right)^1} + \frac{x}{\left(1 + \frac{4}{100}\right)^2} + \frac{x}{\left(1 + \frac{4}{100}\right)^3}$$

Ques 6.

A man borrows money on compound interest and returns it in two equal half-yearly installments of Rs 4410 each. Find the interest charged if the rate of interest is 10% p.a. compounded half-yearly.

- (a) Rs 600
(b) Rs 720
(c) Rs 620
(d) Rs 660

Ans 6. RS 620

Hint : Sum borrowed

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$$= \frac{4410}{\left(1 + \frac{5}{100}\right)^1} + \frac{4410}{\left(1 + \frac{5}{100}\right)^2}$$

Ques 7.

Sunder borrowed money and returned it in 3 equal quarterly installments of Rs. 17576 each . What sum had he borrowed if the rate of interest was 16% p.a. compounded quarterly ?

- (a) Rs 50000
- (b) Rs 48786
- (c) Rs 48775
- (d) None of these

Ans 7. 48775

Hint : Required sum =

$$\frac{17576}{\left(1 + \frac{4}{100}\right)^1} + \frac{17576}{\left(1 + \frac{4}{100}\right)^2} + \frac{17576}{\left(1 + \frac{4}{100}\right)^3}$$

Ques 8.

A loan of Rs 8400 is to be paid in two equal half - yearly installment the interest being charged at 10% per annum compounded half - yearly . Find each installment(approx).

- (a) Rs 4450
- (b) Rs 4400
- (c) Rs 4850
- (d) Rs 4500

Ans 8. 4500

Boats and Streams

Ques 1.

It is 200 miles from Jaipur to Coimbatore . If a bus takes 2 hours to travel the first 75 miles. How long must the train take to travel the final 125 miles in order to have an average of 50 miles per hour for the entire trip ?

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- (a) 60 minutes
- (b) 94 minutes
- (c) 120 minutes
- (d) 110 minutes

Ques 2.

Vijay rows 3 km per hour in still water. if the river is running at 1 km per hour , it takes him 45 minutes to row to a place and back .How far is the place ?

- (a) 2 km
- (b) 1.5
- (c) 1 km
- (d) 2.5 km

Ques 3.

Ram starts walking . He walked 2 km in the first hour . Then he walked two-thirds of the distance of the previous hour in each next hour . If he walked continuously then how long could he walk maximum ?

- (a) 60 km
- (b) 7 km
- (c) 12 km
- (d) 8 km

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Ques 4.

Ravi leaves home for stadium which is 12 km from his house .After the stadium, he goes to his club which is 7 km from his stadium . If his house, stadium and club all fail in a time, then what is the minimum distance he has to travel to get back home ?

- (a) 19 km
- (b) 7 km
- (c) 5 km
- (d) 12 km

Ques 5.

I walk a certain distance and ride back taking a total time of 37 minutes . i could walk both ways in 55 minutes . How long would it take me to ride both ways.?

- (a) 9.5 minutes
- (b) 19 minutes
- (c) 18 minutes
- (d) 20 minutes

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Ques 6.

Sudhir cycles with a speed of 10 km/h and reaches his bank at 1 pm. However, when he cycles with a speed of 15 km/h, he reaches his bank at 11 am. At what speed should he cycle, so that he reaches his bank at 12 noon?

- (a) 12.5 km/h
- (b) 12 km/h
- (c) 13 km/h
- (d) 13.5 km/h

Ques 7.

A railway engine moves with the speed of 42 km/h. The reduction in speed varies as the square root of the number of compartments attached to it. The speed is 24 km when 9 compartments are attached. What is the maximum number of compartments that the engine can pull?

- (a) 47
- (b) 48
- (c) 49
- (d) 42

Ques 8.

Three runners A, B and C run a race, with runner A finishing 12 meters ahead of runner B and 18 meters ahead of runner C, while runner B finishes 8 meters ahead of C. Each runner travels the entire distance at constant speed. What was the length of the race?

- (a) 36 meters
- (b) 48 meters
- (c) 60 meters
- (d) 72 meters

Ques 9.

If a man cycles at 10 km/hr, then he arrives at a certain place at 1 p.m. If he cycles at 15 km/hr, he will arrive at the same place at 11 a.m. At what speed must he cycle to get there at noon?

- (a) 11 km/hr
- (b) 12 km/hr
- (c) 13 km/hr
- (d) 14 km/hr

Ques 10.

Two boats, traveling at 5 and 10 km per hour, head directly towards each other. They begin at a distance 20 km from each other. How far apart are they (in kms) one minute before they collide?

- (a) $\frac{1}{12}$ (b) $\frac{1}{6}$ (c) $\frac{1}{4}$ (d) $\frac{1}{3}$

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solutions:

Ans.1 (c)

Ans.2

(c) Suppose distance is x km

⇒ speed in downstream = (3 + 1) km/hr = 4 km/hr

⇒ speed in upstream = (3 - 1) km/hr = 2 km/hr

According to question

⇒ Time-taken by vijay for downstream + time- taken for upstream =

$$\frac{45}{60} = \frac{x}{4} + \frac{x}{2} = \frac{45}{60} \Rightarrow x = 1 \text{ km.}$$

Ans.3

Required distance =

$$= 2 \left\{ 1 + \frac{2}{3} + \left\{ \frac{2}{3} \right\}^2 + \left\{ \frac{2}{3} \right\}^2 + \dots \right.$$

$$= 2 \times \frac{1}{1 - \frac{2}{3}} = 2 \times 3 = 6 \text{ km.}$$

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Ans.4

(d) House 5 km house 7 km stadium

Ans.5

(a) Time taken in walking a certain distance from x to y =

$27 \frac{1}{2}$ minutes

Time-taken in riding the same distance =

$$37 - 27 \frac{1}{2} = 9 \frac{1}{2} \text{ minutes}$$

$$\frac{60}{5} = 12 \text{ km/h}$$

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Ans.6

Let t h be the time taken by the sudhir to reach his bank at the speed of 15 km/hr Then , time taken to reach the bank at the speed of 10 km/hr = $(t + 2)$ h. Now.

$$s_1 \times t_1 = s_2 \times t_2$$

$$\Rightarrow 10 \times (t + 2) = 15 \times t$$

$$\Rightarrow 10t + 20 = 15t$$

$$\Rightarrow 5t = 20$$

$$\text{Thus } t = 4\text{h}$$

$$\begin{aligned} \text{Distance covered to reach office} &= s_1 \times t_1 \\ &= 10 \times (4 + 2) \\ &= 10 \times 6 \\ &= 60\text{km} \end{aligned}$$

speed required to reach the bank at 12 noon (i.e. in 5 h) = distance / time

$$\frac{60}{5} = 12 \text{ km/h}$$

Thus, speed =

Ans.7

Let r = reduction in speed and w = number of wagons

Given that $r \propto 1/w$

$$r' = 42 - 24 = 18 ; w' = 9$$

Now let us find out how many wagons will be required so that the train stops . For tht let's take the speed as 0.

For this to happen the reduction has to be 42.

$$\frac{18}{42} = \frac{9}{w} \Rightarrow w = 49$$

With 49 wagons the train will stop.

Thus we subtract one wagon so that the train will just move.

Hence the answer is 48.

Ans.8

(b) Let l be length in meters pf the race which A finishes in t seconds.

speed of A = speed of B=

$$\frac{l}{t} \text{ m/s} , \quad \frac{l-12}{t} \text{ m/s},$$

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speed of C=

$$\frac{L-18}{t} \text{ m/s,}$$

Time taken by B to finish the race =

$$\frac{L}{(L-12)/t} = \left(\frac{L}{L-12}\right)t \text{ seconds}$$

In this time, C covers (L - 8) m,

$$\left(\frac{L-18}{t}\right) = \left(\frac{L}{L-12}\right)t = L-8 \Rightarrow L=48 \text{ m.}$$

Ans.9

$$\frac{d}{10} = x \text{ or } d = 10x \dots \text{(i)}$$

$$\frac{d}{15} = x - 2 \text{ or } d = 15x - 30 \dots \text{(ii)}$$

$$\Rightarrow 10x = 15x - 30 \text{ or } 5x = 30 \text{ or } x = 6 \text{ hrs and } d = 60 \text{ km}$$

\Rightarrow To reach at noon, he cycles for 5 hrs

\Rightarrow Thus , he cycles at speed =

$$\frac{60}{5} = 12 \text{ km/hrs}$$

Ans.10

(c) Relative velocity of the boats = 15 km/hour =

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$$\frac{15}{60} = \frac{1}{4} \text{ km/m.}$$

Therefore, they cover 1/4 km in the last one minute before collision.

Data Sufficiency

Directions:

Each question given below is followed by two statements I and II. choose a if the question can be answered by using one of the statements alone, but cannot be answered by using the other statement alone.

choose b if the question can be answered by using either statement alone.

Choose c if the question can be answered by using both statement together, but cannot be answered by using either statement alone.

Choose d if the question cannot be answered even by using both the statement together.

Ques 1. What is the average of the best and the worst score out of 8 tests taken by a student?

I. The average of all 8 tests is 84%.

II. After dropping the best and the worst grade, the average of remaining 6 tests is 86%.

Ans 1. By statement I average of all 8 tests is 84%.

By statement II average of 6 tests excluding the best and the worst scorers 86%.

Average of the best and the worst score

$$= 1/2 [8 \times 84 - 6 \times 86] \%$$

Hence, both the statements are needed to answer the question.

Ques 2. What is the value of $18x + 5$?

I. $x = 2$

II. $9x + 5 = 23$

Ans 2. Both statements I and II can independently answer the question as each of them gives the value of X.

Ques 3. What fraction of the student body of a school eats in the canteen ?

I. Half of the girls of the school eat in the canteen.

II. One -third of the boys of the school eat in the canteen.

Ans 3. Both the statement are not sufficient to answer the question as we do not know the ratio of the number of boys and the number of girls in the school.

Ques 4. What is the distance between city B and city C?

I. The distance between city A and city B is 700 km.

II. The distance between city A and City C is 900 km.

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Ans 4. It is not possible to determine the distance between B and C as we do not know the relative positions of A, B and C.

Ques 5. How many restaurants are there in Delhi?

I. You make 3 meals a day and every meal is in a restaurant you have not visited before.

II. It takes you 3 years to cover all the restaurants in Delhi.

Ans 5. By statement I, restaurants covered in a day = 3

By statement II, total restaurant

$$= 3 \times 365 \times 3$$

Thus, both the statements are needed to answer the question.

Ques 6. What is the profit on an article?

I. The cost price is Rs 368.35.

II. There is 20% profit on the selling price.

Ans 6. By statement I, C.P. = Rs 368.35

By statement II, profit = 20% of S.P.

$$\text{profit} = \text{Rs } 20/80 \times 368.35$$

It is thus clear that both statements I and II are needed to answer the question.

Ques 7. In how many years from now, will the population of village A today have become equal?

I. Village A today has a population of 68000 and is decreasing at a rate of 1200 per year.

II. Village B today has a population of 42000 and is increasing at a rate of 800 per year.

Ans 7. Let the required number of years be n .

$$68000 + n(-1200)$$

$$= 42000 + n(800) \text{ which gives the value of } n.$$

Hence, both the statements I and II are required to answer the question.

Ques 8. What is the net effect on gross receipts?

I. Prices are reduced by 25%

II. Sales are increased by 20%

Ans 8. Let Rs x be the price per unit and let y units be sold at this price.

$$\text{Gross receipts} = \text{Rs } xy$$

Statement I: Reduced Price per Unit

$$= \frac{75}{100}x$$

Statement II: Increased Sale of Units

$$= \frac{120}{100}y$$

\therefore % decrease in gross receipts

$$= \left[1 - \frac{75 \times 120}{10000} \right] \times 100\%$$

Hence, both the statements are required to answer the question.

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Ques 9. what is the value of $2P + Q$?

I. $P/Q = 4/5$

II. $6P + 3Q = 15$

Ans 9. Statement I: The required value cannot be obtained.

Statement II: $6P + 3Q = 15$

$\Rightarrow 3(2P + Q) = 15$

$\Rightarrow 2P + Q = 5.$

Hence, statement II alone answer the question.

Ques 10. What is the area of rectangle ABCD?

I. The diagonal of rectangle ABCD is 10 cm.

II. Its perpendicular sides are 20 cm and 16 cm respectively.

Ans 10. Statement I: The area of rectangle ABCD cannot be known as only the length of the diagonal is known.

Statement II: Area of rectangle = $20 \times 16 \text{ cm}^2$

Hence, statement II alone answer the question.

Ques 11. What is the maximum value possible for x/y ?

I. x is a Fraction between $(1/4)$ and $(1/2)$.

II. Y is a fraction between $(3/4)$ and $(11/12)$.

Ans 11.

By Statement I, $\frac{1}{4} \leq x \leq \frac{1}{2}$.

By Statement II, $\frac{3}{4} \leq y \leq \frac{11}{12}$.

$\frac{x}{y}$ would have the maximum value when x has the greatest possible value and y has the least possible value.

The maximum value = $\frac{1}{2} \div \frac{3}{4}$

Hence, both the statements are required to answer this question.

Ques 12. Is $12x/7$ an integer?

I. $x = 63$

II. $x = 49$

Ans 12. Either statement is sufficient to answer this question.

Ques 13. Which of the four businessmen, from amongst Doorlight, Limona, Platt and Cameron is the richest?

I. The average worth of all four is Rs 22 crore.

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II. The net worth of each of Limona, Platt and Cameron is less than Rs 22 crore.

Ans 13. By statement I, total worth of four businessmen = Rs 100 crore

By statement II, net worth of Limona, Platt and Cameron < Rs 66 crore

From both the statement it can be concluded that the net worth of Doorlight is > 34 crore. 34 crore is > 22 crore. Hence, Doorlight is the richest.

(Both the statements together answer the question.)

Ques 14. Is a given Number N divisible by 2?

I. N is divisible by 8.

II. N is divisible by 4.

Ans 14. Either statement is sufficient to answer this question.

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