

Q1. In January of the year 1900, I was one more than eleven times as old as my son William. In January of 1909, I was seven more than three times as old as him. How old was my son in January 1900?

(a) 3

(b) 6

(c) 4

(d) 7

Ans = (a), 3.

 $a = \text{me}$ $b = \text{William}$

year 1900,

$$a = 11b + 1 \quad - (1)$$

year 1909,

$$a + 9 = 3(b + 9) + 7 \quad - (2)$$

in eqⁿ (1) & (2) $a = 11b + 1$

$$(11b + 1) + 9 = 3(b + 9) + 7$$

$$11b - 3b = 34 - 9 - 1$$

$$8b = 24$$

$$b = 3$$

 $\therefore b = \text{William} = \underline{3}$

Q 2. In a school of 600 boys and 400 girls and the average scholarship was Rs 25.50 per day. If a girl got Rs. 5 less than a boy, then what are their daily scholarship amount?

(a) boy = Rs. 25 ; girl = Rs. 20

(b) boy = Rs. 27.50 ; girl = Rs. 22.50

(c) boy = Rs. 30 ; girl = Rs. 25

(d) boy = Rs. 32.50 ; girl = Rs. 27.50

Ans = (b), boy = Rs. 27.50 ; girl = Rs. 22.50

Let the daily scholarship of a boy be Rs. x .
Then, daily scholarship of a woman = Rs. $(x - 5)$

$$600x + 400(x - 5) = 25.50 \times (600 + 400)$$

$$1000x = 27500$$

$$x = 27.50$$

$$\text{boy} = x = 27.50$$

$$\text{girl} = (x - 5) = 27.50 - 5 = 22.50$$

Q3 The average age of employees of a company is 15.8 years. The average age of males in the company is 16.4 years and that of females is 15.4 years. The ratio of the number of males to the number of females in the company is ?

(a) 1:2

(b) 3:4

(c) 3:5

(d) 2:3

Ans = (d), 2:3

$$\text{males} \therefore \text{females} = k:1$$

$$K \times 16.4 + 1 \times 15.4 = (K+1) \times 15.8$$

$$(16.4 - 15.8)K = 15.8 - 15.4$$

$$K = \frac{0.4}{0.6} = \frac{2}{3}$$

$$\text{Required ratio} = \frac{2}{3} : 1$$

$$\therefore \underline{2:3}$$

Q4. A company plans a salary cut for all its employees. The current salary of the employee is 1600. ~~65%~~ 65% employees take away Rs. 40,000 per month each, 22.5% employees takes away Rs. 25,000 per month each and 12.5% employees take away Rs. 15,000 per month each. If all the employees have to suffer a 10% cut from the salary for a month. What is the salary cut of the whole company for $\pm$ 1 month?

(a) Rs. 53.6×10^4

(b) Rs. 5.36×10^3

(c) Rs. 536×10^4

(d) None.

Ans = (c), Rs. 536×10^4 .

Let, $12.5\% = \frac{1}{8} = \frac{5}{40}$

$22.5\% = \frac{9}{40}$

$65\% = \frac{13}{20} = \frac{26}{40}$

$\therefore$ The total salary 'S' be,

$$S = \left(\frac{5}{40}\right) \times 1600 \times 15000 + \left(\frac{9}{40}\right) \times 1600 \times 25000 + \left(\frac{26}{40}\right) \times 1600 \times 40000$$

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$$= 40 \times 1000 \times (75 + 225 + 1040)$$

$$S = 5360 \times 10^4$$

$\therefore$ Salary cut off is 10%.

$$5360 \times 10^4 \times \frac{10}{100}$$

$$= 536 \times 10^4$$

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Q.5

In an election, 30% of the voters voted for candidate A whereas 60% of the remaining voted for candidate B.

The remaining voters did not vote. If the difference between those who voted for candidate A and those who did not vote was 1200, how many individuals were eligible for casting vote in that election?

(a) 16,000

(b) 40,000

(c) 60,000

(d) 54,000

Ans = (c), 60,000

Let the number of persons eligible to vote be x .

voters who voted for A = 30% of x

voters who voted for B = 60% of (70% of x)

$$= \left(\frac{60}{100} \times \frac{70}{100} \times 100 \right) \% \text{ of } x$$

$$= 42 \% \text{ of } x$$

$$\begin{aligned} \text{voters who did not vote} &= [100 - (30 + 42)] \% \text{ of } x \\ &= 28 \% \text{ of } x \end{aligned}$$

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$$\therefore 30\% \text{ of } x - 28\% \text{ of } x = 1200$$

$$2\% \text{ of } x = 1200$$

$$x = \frac{1200 \times 100}{2}$$

$$x = 60,000$$

Q6. Rahul and Hardik invested the same amount of money in different schemes. But as per the scheme where Rahul invested, the money grows to $196/169$ times when invested for 2 years where interest was compounded annually. whereas Hardik was suggested a scheme in which his money would become 5 times if invested at the same rate of interest as that of Rahul with interest being computed using simple interest method. Then approximately how many years would be needed to do so?

(a) 25

(b) 52

(c) 40

(d) 39

Ans = (b), 52.

In compound interest,

if a sum is invested for 2 years, then the amount after 2 years is given,

$$A = P \times \left(1 + \frac{R}{100}\right)^2$$

$$A = \left(\frac{196}{169}\right) P$$

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$$\left(1 + \frac{R}{100}\right)^2 = \frac{196}{169}$$

$$R = \left(\frac{14}{13} - 1\right) \times 100$$

$$R = \frac{100}{13}$$

In simple interest, if a sum is invested for 'N' years, then the amount after 'N' years is given by,

$$A = P + \frac{P \times N \times R}{100}$$

$$SP = P + P \times N \times \frac{1}{13}$$

$$4 = \frac{N}{13}$$

$$N = \underline{52} \text{ years}$$

Q7. Anil borrowed some money from John at 12% p.a Simple interest for 3 years. He then added some more money to the borrowed sum and lent it to David for the same period at 14% p.a rate of interest. If Anil gains Rs. 93.90 in the whole transaction, how much money did he add from his side?

(a) 105

(b) 100

(c) 90

(d) 95

Ans = (a), 105.

Let the money added be x .

Then,

$$\frac{(830 + x) \times 14 \times 3}{100} - \frac{830 \times 12 \times 3}{100} = 93.90$$

$$830 \times 42 + 42x - 830 \times 36 = 9390$$

$$42x + 830 \times (42 - 36) = 9390$$

$$42x = 9390 - 4980$$

$$x = \frac{4410}{42} = 105$$

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98. The difference between compound interest and simple interest on a sum for 2 years at 10% per annum, when the interest is compounded annually is Rs. 16. If the interest were compounded half yearly, the difference in two interests will be,

(a) Rs. 40.51

(b) Rs. 20.00

(c) Rs. 24.81

(d) Rs. 36.41

Ans = (c), Rs. 24.81.

For first year S.I. = C.I.

Now, Rs. 16 is the S.I. on S.I. for 1 yr.
Rs. 10 is S.I. on Rs. 100.

∴ Rs. 16 is S.I. on Rs. 1000 $\text{Rs.} \left(\frac{100 \times 16}{10} \right) = \text{Rs.} 160.$

So, S.I. on principal for 1 year at 10% is Rs. 160.

∴ Principal = Rs. $\left(\frac{100 \times 160}{10 \times 1} \right) = \text{Rs.} 1600.$

Amount for 2 years compounded half yearly = Rs. $\left[1600 \times \left(1 + \frac{5}{100} \right)^4 \right].$

= Rs. 1944.81

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$$C.I = Rs (1944.81 - 1600)$$

$$= Rs 344.81$$

$$S.I = Rs \left(\frac{1600 \times 10 \times 2}{100} \right) =$$

$$= Rs 320.$$

$$C.I - S.I = 344.81 - 320$$
$$= \underline{24.81}$$

99. Rohil ~~tells~~ has is selling wheat at price of Rs. 12 per kg after discount at Rs. 10 per kg. He was mixing lower quality wheat of price Rs. 6 per kg in some portion and thus makes a profit of 20%. What is the proportion in which the good quality and low quality wheat are mixed and sold to customers?

(a) $\frac{9}{4}$

(b) $\frac{7}{11}$

(c) $\frac{17}{12}$

(d) $\frac{14}{5}$

Ans = (b) $\frac{7}{11}$

At a selling price of Rs. 10 per kg, profit is 20%.

Actual cost price = $\frac{10}{1.2}$

Let there be x kg of Rs. 12 ^{wheat} and y kg of Rs. 6 ^{wheat}.

Cost price = $\frac{12x + 6y}{x + y} = \frac{10}{1.2}$

$\therefore \frac{x}{y} = \frac{7}{11}$

Q.10. 85 kg of a mixture contains petrol and water in the ratio 27:7. How much more water is to be added to get a new mixture containing petrol and water in the ratio 3:1?

(a) 10 kg

(b) 6 kg

(c) 5 kg

(d) 14 kg

Ans = (c), 5 kg.

Petrol in 85 kg of mixture,

$$\left(85 \times \frac{27}{34}\right) \text{ kg} = \frac{135}{2} \text{ kg}.$$

$$\text{Water in it} = \left(85 - \frac{135}{2}\right) \text{ kg} = \frac{35}{2} \text{ kg}.$$

Let = x

Let x kg of water be added to it.

$$\frac{\left(\frac{135}{2}\right)}{\left(\frac{35}{2} + x\right)} = \frac{3}{1}$$

$$\frac{135}{35 + 2x} = \frac{3}{1}$$

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$$105 + 6x = 135$$

$$6x = 30$$

$$x = 5 \text{ kg}$$

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Q.11. When three brands of orange juice are mixed in the ratio of 3:4:5 and 4:5:6, the cost price of the mixture of orange juice comes out to be Rs. 20 and Rs. 25 per litre respectively. What will be the cost price of a litre of mixture in which the three brands are mixed in the ratio 6:7:8?

(a) 35.35

(b) 21.46

(c) 30.70

(d) 11.29

Ans = (c), 30.70

Let a, b, c be the cost price of three brands of orange juice per litre,

$$\therefore \frac{3a + 4b + 5c}{12} = 20$$

$$3a + 4b + 5c = 240$$

$$\frac{4a + 5b + 6c}{15} = 25$$

$$4a + 5b + 6c = 375$$

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$$6a + 7b + 8c = 3 \times [4a + 5b + 6c] - 2 \times [3a + 4b + 5c]$$

$$= 3 \times 375 - 2 \times 240$$

$$= 645.$$

Cost price of mixture of orange juice mixed in the ratio 6:7:8 per litre.

$$6 + 7 + 8 = 21$$

$$= \frac{645}{21} = \underline{\underline{Rs. 30.70}}$$

Q.12 Riya travels from Mumbai to Pune a distance of 250 miles in $5\frac{1}{2}$ hrs. She returns to Mumbai at a speed of ~~2 km/hr~~ in 4 hrs 30 mins. Her average speed is.

(a) 45 mph

(b) 33 mph

(c) 60 mph

(d) 50 mph

Ans = (d), 50 mph.

Speed from Mumbai to Pune,

$$\left(250 \times \frac{2}{11}\right) \text{ mph} = \left(\frac{500}{11}\right) \text{ mph}.$$

Speed from Pune to Mumbai,

$$\left(250 \times \frac{2}{9}\right) \text{ mph} = \left(\frac{500}{9}\right) \text{ mph}.$$

$$\therefore \text{Average speed} = \left(\frac{2 \times \frac{500}{11} \times \frac{500}{9}}{\frac{500}{11} + \frac{500}{9}} \right) \text{ mph}$$

$$= \left(\frac{500000}{4500 + 5500} \right) \text{ mph} = 50 \text{ mph}.$$

Q.13.

In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. The duration of the flight is —.

(a) 3 hrs

(b) 1 hr

(c) 4 hrs

(d) 2 hrs

Ans = (b), 1 hr.

Let the duration of the flight be x hrs.

$$\frac{600}{x} = \frac{600}{x + \frac{1}{2}} = 200$$

$$\frac{600}{x} - \frac{1200}{2x+1} = 200$$

$$x(2x+1) = 3$$

$$2x^2 + x - 3 = 0$$

$$(2x+3)(x-1) = 0$$

$$x = \underline{1 \text{ hr}}$$

Q14.

A train 110 metres long is running with a speed of 60 kmph. In what time will it pass a man who is running at 6 kmph in the direction opposite to that in which the train is going?

(a) ~~8 sec~~ 8 sec

(b) 6 sec

(c) 10 sec

(d) 5 sec

Ans = (b), 6 sec.

Speed of train relative to man,

$$(60 + 6) \text{ km/hr} = 66 \text{ km/hr}$$

$$= \left(66 \times \frac{5}{18} \right) \text{ m/sec}$$

$$= \left(\frac{55}{3} \right) \text{ m/sec.}$$

$$\therefore \text{Time taken to pass the man} = \left(110 \times \frac{3}{55} \right) \text{ sec}$$

$$= \underline{6 \text{ sec.}}$$

Q15. A jogger running at 9 kmph alongside a railway track is 240 metres ahead of the engine of a 120 metre long train running at 45 kmph in the same direction. In how many much time will the train pass the jogger?

(a) 40 sec

(b) 36 sec

(c) 15 sec

(d) 20 sec.

Ans = (b), 36 sec.

Speed of train relative to jogger = $45 - 9 = 36 \text{ km/hr}$

$$= \left(\frac{36 \times 5}{18} \right) \text{ m/sec} = 10 \text{ m/sec}.$$

Distance to be covered = $(240 + 120) \text{ m}$
 $= 360 \text{ m}.$

$$\therefore \text{Time taken} = \left(\frac{360}{10} \right) \text{ sec} = 36$$

36 sec

Q16. Three pipes A, B and C can fill a tank in 6 hours. After working at it together for 2 hours, C is closed and A and B can fill the remaining part in 7 hours. The number of hours taken by C alone to fill the tank is.

(a) 14

(b) 10

(c) 20

(d) 16

Ans = (a), 14.

$$\text{Part filled in 2 hours} = \frac{2}{6} = \frac{1}{3}$$

$$\text{Remaining part} = 1 - \frac{1}{3} = \frac{2}{3}$$

$$\text{Work done by A \& B in 7 hours} = \frac{2}{3}$$

$$\text{work done by A \& B in 1 hour} = \frac{2}{21}$$

$$\begin{aligned} \text{work done by C in 1 hour} &= \\ &= \left[(A+B+C) \text{ 1 hr work} - (A+B) \text{ 1 hr work} \right] \\ &= \frac{1}{6} - \frac{2}{21} = \frac{1}{14} \end{aligned}$$

C can fill the tank in 14 hrs

Q17. Two pipes A and B can independently fill a cistern in 20 minutes and 25 minutes respectively. Both are opened together for 5 minutes, after which B is turned off. How much more time will the cistern take to fill?

(a) 23

(b) 12

(c) 11

(d) 19

Ans = (c), 11.

A and B can fill the cistern alone in 20 minutes and 25 minutes respectively.

∴ In one minute, they can together fill $\left(\frac{1}{20}\right) + \left(\frac{1}{25}\right) = \left(\frac{9}{100}\right)$ of the cistern.

∴ In 5 minutes, they can fill $\frac{9}{20}$ of the cistern.

After 5 minutes, B is turned off, so the remaining $11/20$ of the cistern is to be filled alone by A.

A takes 20 minutes to fill up the entire cistern, It will take 11 more minutes.

Q.18. A boat covers a certain distance downstream in 1 hour, while it comes back in $1\frac{1}{2}$ hrs. If the speed of the stream be 3 kmph, what is the speed of the boat in still water?

(a) 11

(b) 15

(c) 10

(d) 18

Ans = (b) , 15.

Let the speed of the boat in still water be x kmph.

Speed downstream = $(x+3)$ kmph.

Speed upstream = $(x-3)$ kmph.

$$(x+3) \times 1 = (x-3) \times \frac{3}{2}$$

$$2x+6 = 3x-9$$

$$\underline{x = 15 \text{ kmph.}}$$

819 At his usual rowing rate, Rahul can travel 12 miles downstream in a certain river in 6 hrs less than it takes him to travel the same distance upstream. But if he could double his usual rowing rate for his 24-mile round trip, the downstream 12 miles would then take only one hour less than the upstream 12 miles. What is the speed of the current in miles per hour?

(a) $1\frac{2}{3}$

(b) $4\frac{1}{3}$

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

(d) $5\frac{3}{2}$

Ans = (c) $2\frac{2}{3}$.

Let the speed in still water be x mph and the speed of the current be y mph.

Speed upstream = $(x - y)$

Speed downstream = $(x + y)$

$$\frac{12}{(x - y)} - \frac{12}{(x + y)} = 6$$

$$6(x^2 - y^2) = 24y$$

$$x^2 - y^2 = 4y$$

$$x^2 = (4y + y^2) \quad \text{--- (1)}$$

$$\frac{12}{(2x-y)} - \frac{12}{(2x+y)} = 4$$

$$4x^2 - y^2 = 24y$$

$$x^2 = \frac{24y + y^2}{4} \quad \text{--- (2)}$$

from eqⁿ (1) & (2)

$$4y + y^2 = \frac{24y + y^2}{4}$$

$$16y + 4y^2 = 24y + y^2$$

$$3y^2 = 8y$$

$$y = \frac{8}{3}$$

$\therefore$ Speed of the current = $\frac{8}{3}$ mph

$$= 2\frac{2}{3} \text{ mph}$$

Q.20 Cost of 3 Apples, 6 Oranges and 5 Bananas is same as cost of 5 Apples, 2 Oranges and 7 bananas, which in turn is equal to one third of the cost of 17 Apples, 2 Oranges and 23 Bananas. If 7 Apples, 2 Oranges and 23 Bananas together cost Rs. 132. Then what is the cost of 12 Apples and 16 Bananas?

(a) 88

(b) 90

(c) 120

(d) 118.

Ans = (a), 88.

Let the cost of 1 Apple, 1 Orange & 1 Banana be a , b and c respectively.

$$17a + 2b + 23c = 132$$

$$3a + 6b + 5c = 44 \quad \text{--- (1)}$$

$$5a + 2b + 7c = 44 \quad \text{--- (2)}$$

$$\text{Now } 12a + 6c = ?$$

multiply eqⁿ (2) by 3 and then subtract
eqⁿ (1) from it,

$$(15-3)a + (6-6)b + (21-5)c = 44(3-1)$$

$$12a + 16c = \underline{88}.$$

Q.21. Jaya, Megha, Abhay, Rohit and Harsha contested an election. There are 1200 valid voters. Rohit got half the number of votes that Jaya and Megha got. Abhay got half of the votes that the other four got. Jaya, Abhay, Rohit and Harsha's votes together were thrice the number of votes that Megha got. Jaya got one-fifth the votes that the others got. How many votes more than Harsha did Rohit get?

(a) 150

(b) 160

(c) 200

(d) 100

Ans = (c), 200.

Let Jaya, Megha and Abhay get a, b, c votes respectively.

$\therefore$ Jaya got one-fifth the votes that the others got,

$$5a = 1200 - a$$

$$a = 200.$$

$\therefore$ Jaya, Abhay, Rohit and Harsha votes together were thrice the no. of votes that Megha got,

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$$3b = 1200 - b$$

$$b = 300$$

Abhay got half of the votes that the other four got,

$$2c = 1200 - c$$

$$c = 400$$

Rohit got half the number of votes that Jaya and Megha got,

$$\text{No. of votes Rohit got} = \frac{200 + 300}{2} = 250 \text{ votes}$$

$$\begin{aligned} \text{Harsha got} &= 1200 - 200 - 300 - 400 - 250 \\ &= 50 \text{ votes} \end{aligned}$$

Rohit got $(250 - 50) = 200$ more votes than Harsha.

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Q22. Wheels of diameter 7 cm and 14 cm start rolling simultaneously from A and B, which are 1980 cm apart, towards each other in opposite directions. Both of them make the same number of revolutions per second. If both of them meet after 10 seconds, the speed of the smaller is —.

(a) 64 m/sec

(b) 22 m/sec

(c) 40 m/sec

(d) 18 m/sec

Ans = (b), 22 m/sec.

Let each wheel make x revolution per sec.

$$\left[\left(2\pi \times \frac{7}{2} \times x \right) + \left(2\pi \times 7 \times x \right) \right] \times 10 = 1980$$

$$\left(\frac{22}{7} \times 7 \times x \right) + \left(2 \times \frac{22}{7} \times 7 \times x \right) = 198$$

$$66x = 198$$

$$x = 3$$

Distance moved by smaller wheel in 3 revolution = $2 \times \frac{22}{7} \times \frac{7}{2} \times 3 = 66 \text{ cm}$.

$\therefore$ speed of smaller wheel = $\frac{66}{3} \text{ m/sec} = 22 \text{ m/sec}$.

Q.23 If a wire is bent into the shape of a square, then the area of the square is 81 sq. cm . When the wire is bent into a semi-circular shape, then the area of the semi-circle will be _____

(a) 77 cm^2

(b) 80 cm^2

(c) 149 cm^2

(d) 50 cm^2

Ans = (a), 77 cm^2

Length of each side of the square = $\sqrt{81}$
= 9 cm

Length of wire = $(9 \times 4) \text{ cm} = 36 \text{ cm}$

$\pi R + 2R = 36$

$(\pi + 2)R = 36$

$R = \frac{36}{\left(\frac{22}{7} + 2\right)} = 7 \text{ cm}$

$\left(\frac{22}{7} + 2\right)$

Area of the semi-circle = $\frac{1}{2} \pi R^2$

= $\left(\frac{1}{2} \times \frac{22}{7} \times 7 \times 7\right) \text{ cm}^2$

= 77 cm^2

Q.24. Three circles of radius 3.5 cm are placed in such a way that each circle touches the other two. The area of the portion enclosed by the circles is —

(a) 19.67 cm^2

(b) 2.410 cm^2

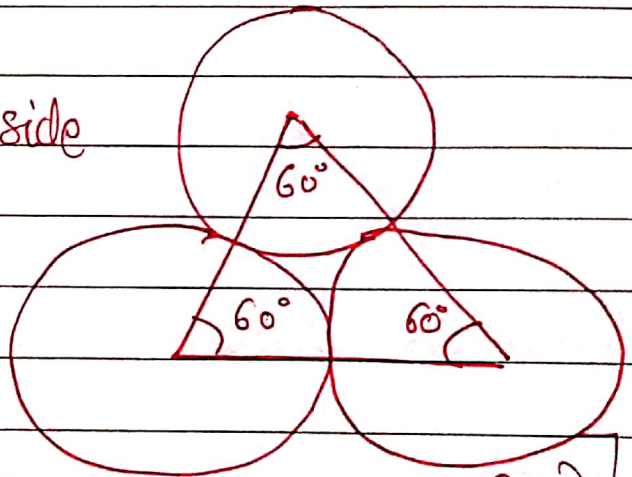
(c) 3.141 cm^2

(d) 1.967 cm^2

Ans = (d), 1.967 cm^2

Required area =

(Area of equilateral Δ of side 7 cm) - (3 $\times$ area of sector with $\theta = 60^\circ$).



$$= \left[\frac{\sqrt{3}}{4} \times 7 \times 7 \right] - \left(3 \times \frac{22}{7} \times 3.5 \times 3.5 \times \frac{60}{360} \right) \text{ cm}^2$$

$$= \left(\frac{49\sqrt{3}}{4} - 11 \times 0.5 \times 3.5 \right) \text{ cm}^2$$

$$= (21.217 - 19.25) \text{ cm}^2$$

$$= \underline{1.967 \text{ cm}^2}$$

Q25. The length and breadth of the floor of the room are 20 feet and 10 feet respectively.

Square tiles of 2 feet length of different colours are to be laid on the floor.

Black tiles are laid in the first row on all sides. If white tiles are laid in the one-third of the remaining and blue tiles in the rest, how many blue tiles will be there?

(a) 18

(b) 16

(c) 24

(d) 50

Ans = (b), 16.

Area left after laying black tiles

$$= \sqrt{[(20-4) \times (10-4)]} \text{ sq. ft} \\ = 96 \text{ sq. ft.}$$

$$\text{Area under white tiles} = \left(\frac{1}{3} \times 96\right) \text{ sq. ft} = 32 \text{ sq. ft}$$

$$\text{Area under blue tiles} = 96 - 32 = 64 \text{ sq. ft}$$

$$\text{No. of blue tiles} = \frac{64}{4} = \underline{16}$$

Q.26 The percentage increase in the area of a rectangle, if each of its sides is increased by 20% is —.

(a) 44 %

(b) 49 %

(c) 35 %

(d) 40 %

Ans = ~~(a)~~ (a), 44 %

Let original length = x meters

original length = y meters

original area = $(xy) m^2$

$$\text{New length} = \left(\frac{120}{100} x \right) m = \left(\frac{6}{5} x \right) m$$

$$\text{New breadth} = \left(\frac{120}{100} y \right) m = \left(\frac{6}{5} y \right) m$$

$$\text{New Area} = \left(\frac{6}{5} x \times \frac{6}{5} y \right) m^2 = \left(\frac{36}{25} xy \right) m^2$$

∴ Increased Percentage

$$= \left(\frac{11}{25} xy \times \frac{1}{xy} \times 100 \right) \%$$

$$= 44\%$$

Q27 John, Mary and Dassy enter into a partnership in the ratio $7\frac{1}{2} : 4\frac{1}{3} : 6\frac{1}{5}$.

After 4 months, John increases his share by 50%. If the total profit at the end of one year be Rs. 21,600, then Mary's share in the profit is ?

(a) 4200

(b) 2000

(c) 6000

(d) 4000

Ans = (d), 4000.

Ratio of initial investments = $\frac{7}{2} : \frac{4}{3} : \frac{6}{5}$

= 105 : 40 : 36

Let the initial investments be

$105x$, $40x$ and $36x$.

John : Mary : Dassy = $105x : 40x : 36x$

$= \left(105x \times 4 + \frac{150}{100} \times 105x \times 8 \right) :$

$(40x \times 12) : (36x \times 12)$

$= 1680x : 480x : 432x$

$= 35 : 10 : 9 = 35 + 10 + 9 = 54$

Mary's share = $\frac{21600 \times 10}{54} = \underline{4000}$

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Q28 Reena and Asha entered into partnership with capitals in the ratio 4:5. After 3 months, Reena withdrew $\frac{1}{4}$ of her capital and Asha withdrew $\frac{1}{5}$ of her capital. The gain at the end of 10 months was Rs. 760. What is Reena's share in the profit?

(a) 400

(b) 300

(c) 330

(d) 350

$\therefore$ Ans = (c), 330.

Reena : Asha

$$= \left[4x \times 3 + \left(4x - \frac{1}{4} \times 4x \right) \times 7 \right] : \left[5x \times 3 + \left(5x - \frac{1}{5} \times 5x \right) \times 7 \right]$$

$$= (12x + 21x) : (15x + 28x)$$

$$= 33x : 43x$$

$$= 33 : 43$$

$$33 + 43 = 76$$

$$\therefore \text{Reena's share} = 760 \times \frac{33}{76}$$

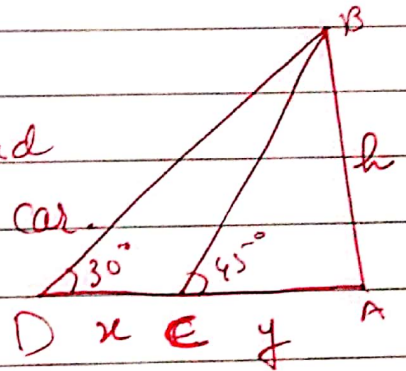
$$= 330$$

8.29. A man on the top of a vertical observation tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change from 30° to 45° , how soon after this will the car reach the observation tower?

- (a) 15 min 42 sec (b) 16 min 32 sec
 (c) 16 min 23 sec (d) 11 min 40 sec

Ans = (c), 16 min 23 sec.

Let AB be the tower and C and D be the two positions of the car.



$$\angle ACB = 45^\circ, \angle ADB = 30^\circ$$

Let

$$AB = h, CD = x, AC = y.$$

$$\frac{AB}{AC} = \tan 45^\circ = 1$$

$$\frac{h}{y} = 1 \therefore y = h$$

$$\frac{AB}{AO} = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

$$\frac{h}{x+y} = \frac{1}{\sqrt{3}} \therefore x+y = \sqrt{3}h$$

~~1600~~, ~~11(1.3+1)~~

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$$\therefore x = (x + y) - y = \sqrt{3}h - h \\ = h(\sqrt{3} - 1)$$

Now, $h(\sqrt{3} - 1)$ is covered in 12 min.

$$\text{So, } h \text{ will be covered ? in } \left(\frac{12}{h(\sqrt{3} - 1)} \times h \right) \\ = \frac{12}{(\sqrt{3} - 1)} \text{ min}$$

$$= \left(\frac{1200}{73} \right) \text{ min}$$

$$= \underline{16 \text{ min}} . 23 \text{ sec.}$$

Q30. A man is watching from the top of a tower a boat speeding away from the tower. The boat makes an angle of depression of 45° with the man's eye when at a distance of 60 metres from the tower. After 5 seconds, the angle of depression becomes 30° . What is the approximate speed of the boat, assuming that it is running in still water?

(a) 35 km/hr

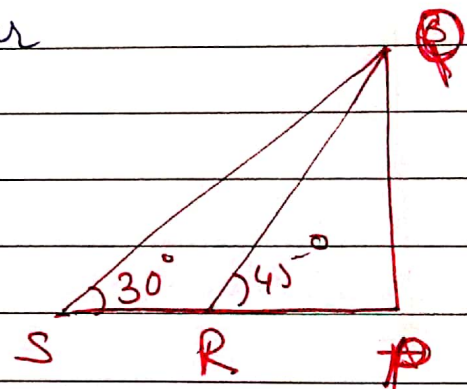
(b) 24 km/hr

(c) 42 km/hr

(d) 32 km/hr

Ans = (d), 32 km/hr

Let PQ be the tower, S and R be the two positions of the boat.



$$\angle PRQ = 45^\circ, \angle PSQ = 30^\circ, PR = 60 \text{ m}$$

$$\text{Let } PQ = h$$

$$\text{The } \frac{PQ}{PR} = \tan 45^\circ = 1$$

$$PQ = PR = h = 60 \text{ m}$$

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$$\frac{PQ}{PS} = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

$$PS = PQ \times \sqrt{3} = 60\sqrt{3} \text{ m}$$

$$\therefore SR = (PS - PR) = 60(\sqrt{3} - 1) \text{ m}$$

$$\text{Required speed} = \left[\frac{60(\sqrt{3} - 1)}{5} \right] \text{ m/sec}$$

$$= (12 \times 0.73) \text{ m/sec}$$

$$= \left(12 \times 0.73 \times \frac{18}{5} \right) \text{ km/hr}$$

$$= 31.5 \text{ km/hr}$$

$$= \underline{32 \text{ km/hr}}$$