Questions

Instructions
For the following questions answer them individually

Question 1

The mean score of ten batsmen of Hyderabad cricket team in a match is 60. If the top five scores of the batsmen are removed while calculating the average, the average falls by five. If the top six scores are distinct integers, what is the maximum possible score of any batsmen?

A 102

B 87

C 95

D 126

Answer: C

Explanation:
Total score of the 10 batsmen = 600
Average of bottom five batsmen = 55
Total score of bottom five batsmen = 275
Total score of top 5 batsmen = 325
To obtain the maximum score, the scores of others are to be minimised
The minimum score of the top five batsmen can be 56 when all the bottom five batsman have 55 as their score.
Hence, 56,57,58,59,95 are the scores of the top five batsmen.

Question 2

A dishonest milkman dilutes milk with water and then sells the diluted milk at 25% more than the price at which he purchased the milk. If he makes a profit of 40% by implementing this process. Find the volume of water(in ml) added to every litre of pure milk (Assume water is free of cost)

Answer:120

Explanation:
Let the cost price of 1 litre of pure milk = Rs. 12 (value taken for easier calculations)

Then the selling price of 1 liter of solution= Rs 15

y be the volume of water added to every 1 litre of solution => SP of (1+y) litres of solution = 15 x (1+y)

$\frac{(1+y)15-12}{12}$ = 0.4

y = $\frac{1.8}{15}$

The volume of water added in ml = $\frac{1.8}{15}$ *1000 = 120ml

120 is the correct answer.

Question 3

You travel by Delhi Metro every day from Botanical Garden, Noida to Hauz Khas, Delhi. At Hauz Khas metro station, you use an escalator to get out of the station. The escalator takes 80 seconds to get you down. One day, the escalator was not working and you walk up the escalator in 50 seconds. How many minutes does it approximately take you to walk up the working escalator?

A 1.5 minutes

B 2.2 minutes

C 2.8 minutes

D 2.6 minutes

Answer: B

Explanation:
It is given that by using the escalator, one can get out of the station in 80 sec.

Let us consider the number of steps =80

Speed of the escalator = 1 step/sec

When the escalator was not working, the time taken by a person = 50 sec

The speed of the person = 80/50=8/5 steps/sec

Time taken by a person walking down a moving escalator = $\frac{80}{\frac{8}{5}-1}$

= $\frac{80}{3}$
5

=2.22 min

B is the correct answer.

Question 4

The ratio of the cost price of item A and item B is 3:2. The ratio of marked price of both the items in 5:3. The ratio of the percentage discount is 9:5. What is the discount percentage on item A if the profit percentage is the same?

A 33.33%

B 40%

C 20%

D 30%

Answer: C

Explanation:
Assuming the cost price of A = 3x and the cost price of B = 2x

The marked price of A = 5y and the marked price of B = 3y

Now selling price of A = a and the selling price of B = b

Equating profit percentages, $\frac{a-3x}{3x} = \frac{b-2x}{2x}$

=> $\frac{a}{3x} - 1 = \frac{b}{2x} - 1$

=> $\frac{a}{3} = \frac{b}{2}$ => 2a=3b => b = 2a/3

Now, ratio of the discount percentages = $\frac{\frac{5y-a}{5y} \times 100}{\frac{3y-\frac{2a}{3}}{3y} \times 100}$

=> $\frac{9(5y-a)}{5(9y-2a)} = \frac{9}{5}$

=> 5y-a=9y-2a =>a=4y

Hence, discount percentage on item A = $\frac{5y-a}{5y} \times 100 = \frac{5y-4y}{5y} \times 100$ = 20%

Question 5

Two natural numbers m and n are in the ratio 17:19. When a natural number k is subtracted from each of the numbers, the new ratio is less than 5/6. What is the minimum value that 'k' can take?

Answer:8

Explanation:

Let the two numbers be 17x and 19x respectively.

So we have

$\frac{17x-k}{19x-k} < \frac{5}{6}$

=> 102x - 6k < 95x - 5k

=> 7x < k

=> k > 7x

For k to be minimum, x has to minimum.

putting x = 1, we get k > 7

Hence k >7, so the minimum possible integral value of k is 8

Question 6

Rinesh dropped a ball from a height of 360m. Each time the ball hits the ground it rebounds to 60% of the height from where it fell. Find the total distance(in metres) travelled by the ball before coming to rest.

Answer:1440

Explanation:

Total distance travelled by the ball = 360+360*0.6+360*0.6+360*0.6*0.6+360*0.6*0.6..... ∞

= 360+360*0.6*2+360*0.6*0.6*2 ..... ∞

= 360+2[360*0.6+360*0.6*0.6 .....∞]

= 360+2[$360 * 0.6^1 + 360 * 0.6^2$.....∞]

= 360+2* $\frac{360*0.6}{1-0.6}$

= 360+2* $\frac{360*0.6}{0.4}$

= 1440m

Question 7

A table is sold at 20% profit from a manufacturer to a whole seller. The whole seller sells each table at 60% profit with an offer of 1 table free on every purchase of 5 tables. The retailer bought 30 tables (free tables included) at Rs 24000. The retailer sold the table to customers with a profit margin of 10%. What is the difference between the manufacturing cost and the customer price of a table?

A Rs 420

B Rs 380

C Rs 240

D Rs 300

Answer: B

Explanation:

Let the Manufacturing cost = M

A table is sold at 20% profit from a manufacturer to a whole seller.

Price of the table for the whole seller =1.2 M

The whole seller sold the tables at 60% profit with an offer of 1 table free with a purchase of 5 tables.

Price of 5 tables for the whole seller = 1.2 M * 5= 6M

The retailer bought 30 tables {free tables included} at Rs 24000.

Price of 6 tables(+1 free) for retailer = 1.6*6M= 9.6M

Price of 30 tables = 5* 9.6M = 24000

M= Rs 500

Price of each table for Retailer = 24000/30= Rs 800

Price for the customers= 1.1*800= Rs 880

The difference between the manufacturing cost and the customer price of the table= Rs 880-Rs 500= Rs380

Question 8

Ten men can complete a piece of work in 8 days while fifteen women take 6 days to complete the work. If 9 women and x men can complete the work in 8 days. What is the value of x?

A 5

B 4

C 2

D 3

Answer: C

Explanation:
Let m be the number of units of work done by a man on one day.
w be the number of units of work done by a woman in one day.

10m*8 = 15w*6

$\frac{m}{w} = \frac{9v}{8v}$

(9w+xm)*8 = 10m*8

9*8v+x*9v = 10*9v

8+x=10

x = 2

C is the correct answer.

Question 9

A toy train is running around a circular track and a boy is running next to it. If the toy train stops at all 4 of the equally spaced stations (excluding the originating station) for 10 minutes each, the boy is able to catch up with the train just before it leaves the 4th station. If the train covers the length of the track in 1 hour (without stoppages) what is the ratio of the speed of the train (without stoppages) to that of the boy?

A 11:6

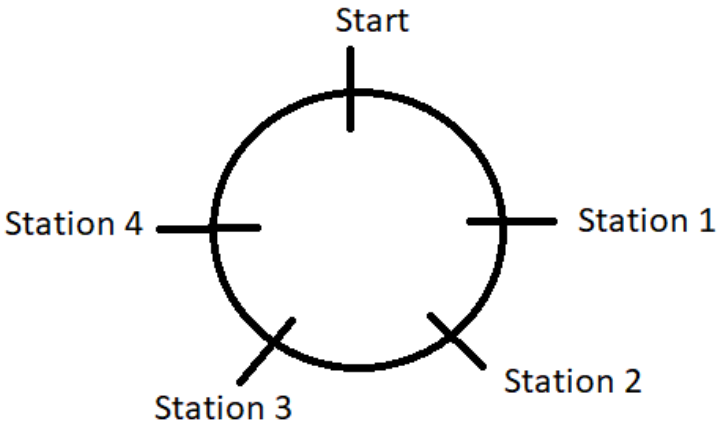
B 20:9

C 2:1

D 25:12

Answer: A

Explanation:



Consider the diagram, we know that the boy catches up with the train at the 4th station (if the train is going in clockwise direction)
Time taken by the boy to cover 4/5th of the distance=time taken by the train to cover it+40 minutes
Time taken by the train to cover the full distance=60 minutes
To cover 4/5th of the distance without stoppages=60*4/5=48 minutes.
Speed of the train: Speed of the boy

$$= \frac{1}{\text{Time taken by train}} : \frac{1}{\text{Time taken by boy}}$$

$$\frac{1}{48} : \frac{1}{48+40}$$

=11:6

Question 10

In a ceremony, a total of 5000 people were present. The ratio of boys to the ratio of girls was 13:12 and the ratio of men to the ratio of women was 14:15. If there is atleast one boy and one man present in the ceremony, what can be the maximum number of males (men+boys) in the ceremony?

A 2453

B 2573

C 2237

D 2593

Answer: B

Explanation:
Assuming the number of boys and girls to be 13x and 12x, the number of men and women to be 14y and 15y.
The total number of people present = 25x+29y = 5000 => x = $\frac{(5000-29y)}{25}$
Total number of males = 13x+14y = 14y+ $\frac{13(5000-29y)}{25}$ = 14y− $\frac{29*13y}{25}$ + 2600 = $2600 - \frac{27y}{25}$
Since x and y cannot be zero as the ratio will become undefined.
To maximize number of males, y=25

$2600 - \frac{27y}{25}$ = 2600 - $2600 - \frac{27}{25} \times 25 = 2600 - 27 = 2573$

Question 11

Two types of rice, type A and type B are mixed in the ratio 3:2 and sold at a profit of 25%. If the selling price per kg is kept the same and the ratio is changed to 2:3, then the profit would be 20%. What would be the approximate percentage profit if they are mixed in the ratio 1:4 and sold on the same price per kg?

A 17.3

B 15.4

C 13.7

D 11.2

Answer: B

Explanation:

Assume the price per kg for type A = a and the price per kg for type B = b

Cost price per kg = $\frac{3a+2b}{5}$

=> Selling Price = $\frac{3a+2b}{5} \times \left(1+\frac{25}{100}\right) = \frac{3a+2b}{5} \times \frac{5}{4} = \frac{3a+2b}{4}$

After changing the ratio, the new cost price = $\frac{2a+3b}{5}$

The new selling price per kg = $\frac{2a+3b}{5} \times \left(1+\frac{20}{100}\right) = \frac{6(2a+3b)}{25}$

Since both the selling prices are the same. $\frac{3a+2b}{4} = \frac{6(2a+3b)}{25}$

=> 25(3a+2b)=24(2a+3b)

=> 75a-48a = 72b-50b

=> 27a = 22b

=> $\frac{a}{b} = \frac{22}{27}$ .....(1)

Cost price per kg while mixing in the ratio 1:4 = $\frac{a+4b}{5}$ =

Selling price per kg = $\frac{3a+2b}{4}$

% Profit = $\left(\frac{SP}{CP}-1\right) \times 100 = \left(\frac{(3a+2b) \times 5}{4 \times (a+4b)}-1\right) \times 100$

$= \left(\frac{15a+10b}{4a+16b}-1\right) \times 100 = \frac{11\frac{a}{b}-6}{4\frac{a}{b}+16} \times 100$

$= \frac{11 \times \frac{22}{27}-6}{4 \times \frac{22}{27}+16} \times 100 = \frac{11 \times 0.815-6}{4 \times 0.815+16} \times 100$

$= 19.26 \times 100 = 15.4\%$

Question 12

A class of 100 students is divided into two groups such that the average of the first group is 10 less than the average of the second group. The overall average is 58 and the number of students in the first group can not be more than 75. Find the maximum integral value of the average of the first group.

Answer:55

Explanation:

Assuming the average of the first group is 'a' and the average of the second group = a+10. Assume the number of first group = x and the number of the second group = 100-x

Overall average = 58 = $\frac{ax+(a+10)(100-x)}{100}$

=> 5800 = ax+1000+100a-10x-ax

=> 10a-x=480

=> a = $\frac{x}{10}+48$

To get an integral value of a, x should be a multiple of 10. Since, the value of x cannot be more than 75, x will be 70.

Hence, a = $\frac{70}{10}+48$ = 55

Question 13

A sum of 36 lakhs is divided into n equal parts and deposited in a bank such that the first part is deposited at a simple interest of 2% for 1 year, the second part is deposited for a simple interest of 4% for 2 years, the third part is deposited for 6% for 3 years and so on until the nth year. If the total interest earned is 14.4 lakhs, then find the value of n.

A 7

B 6

C 5

D 8

Answer: A

Explanation:

The initial value of each amount = $\frac{36}{n}$

The interest from the first part = $\frac{36\times 1\times 2}{n\times 100}$

The interest from the second part = $\frac{36\times 2\times 4}{n\times 100}$

.....

The interest from nth part = $\frac{36\times n\times 2n}{n\times 100}$

Sum of all the interests = $\left(\frac{36}{n\times 100}\right)(1\times 2+2\times 4+3\times 6.....+n\times 2n)$

= $\left(\frac{36\times 2}{n\times 100}\right)(1^2+2^2+3^2+.....n^2)$

Hence, $\frac{72}{n\times 100}\times\frac{n(n+1)(2n+1)}{6}$ = 14.4

=> (n+1)(2n+1)=120

=> $2n^2+3n-119=0$

=> n = 7 or $-\frac{17}{2}$

Rejecting the negative value, we have n = 7

Question 14

Three pipes P1, P2 and P3 can fill a tank in 5, 10 and 25 minutes respectively. All the three taps are opened simultaneously but after some time P1 is closed and sequentially after some more time P2 is closed. The difference in the duration for which P1 and P2 stayed open is double that between P2 and P3. If the tank was filled in 6 minutes, for how many minutes was tap P2 open?

A 28/35 minutes

B 158/35 minutes

C 122/35 minutes

D 54/35 minutes

Answer: B

Explanation:

Three pipes P1, P2 and P3 can fill a tank in 5, 10 and 25 minutes respectively.

Let the capacity of the tank =50l

Rate of flow of pipe P1= 10l/min

Rate of flow of pipe P2= 5l/min

Rate of flow of pipe P3= 2l/min

The difference in the duration for which P1 and P2 were opened is double as that between P2 and P3.

P1 was open for A minutes, P2 was open for A+2B minutes, P3 was was open for A+3B minutes

If the tank was filled in 6 minutes,

A+3B=6

10A+5(A+2B)+2(A+3B)= 50

17A+16B=50

B=52/35 minutes

tap P2 was open for A+2B minutes= 6-B = 6-52/35 = 158/35 minutes

Option B

Question 15

An ice-cream vendor can sell 100 ice-cream bricks for Rs.800 each. He realizes that he can sell 50 more bricks for every 25 rupees he reduces in the selling price of the ice-cream brick. What should be his selling price if he wants to maximize revenue? (The answer must be a multiple of 25)

Answer:425

Explanation:

The revenue can be written as a function of quantity into price.

Revenue= (800-25x)(100+50x)

Taking 25 common from both the brackets, we get 25*25*(32-x)(4+2x) = 625*(32-x)(4+2x)

Again, we can take 2 in common from the term in the second bracket, so revenue=1250(32-x)(2+x)

We need to maximize this. So, we need to maximise (32-x)(x+2)

$=32x + 64 - x^2 - 2x$

$=64 + 30x - x^2$

There are two methods in which we can find the maximum value of x.

Method 1: Differentiation

Differentiating $64 + 30x - x^2$ and equating with 0 we get 2x=30 so, x=15

Method 2: Completion of squares

$64 + 30x - x^2$ can be rewritten as $289 - [225 - 30x + x^2]$ = $289 - (x - 15)^2$

We must maximise $289 - (x - 15)^2$

$(x - 15)^2$ will always be positive, the minimum value it can take is when x=15, $(x - 15)^2$=0

So, $289 - (x - 15)^2$ is maximum when x=15

Hence, price=800-25*15

=800-375

Price=425

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Question 16

Nawab has two sons Saif and Amir who have export businesses. Nawab's satisfaction/ utility level is given by adding twice of the satisfaction level of Saif with the satisfaction level of Amir. If Saif makes a profit of ₹ 100, his satisfaction level goes up by 10% and if he suffers a loss of ₹100, his satisfaction level goes down by 10%. If Amir makes profit of ₹ 100, his satisfaction level goes up by 5% and if he suffers a loss of ₹ 100, his satisfaction level goes down by 15%. Currently, Nawab's satisfaction level is 24 and the satisfaction level of Saif is the same as the satisfaction level of Amir. If Saif makes a profit of 100 and Amir suffers a loss of ₹ 100, what is the approximate percentage change in Nawab's satisfaction level?

A 1.25%

B 1.33%

C 1.5%

D 1.66%

Answer: D

Explanation:
Nawab's satisfaction/ utility level is given by adding twice of the satisfaction level of Saif with the satisfaction level of Amir.

Saif makes a profit of ₹ 100, his satisfaction level goes up by 10% and if he suffers a loss of ₹100, his satisfaction level goes down by 10%.

Amir makes profit of ₹ 100, his satisfaction level goes up by 5% and if he suffers a loss of ₹ 100, his satisfaction level goes down by 15%.

Nawab's satisfaction level is 24 and the satisfaction level of Saif is the same as the satisfaction level of Amir

Let x be the satisfaction level of Saif

24=3x

x=8

If Saif makes a profit of 100 and Amir suffers a loss of ₹ 100, the satisfaction level of Saif and Amir goes up by 10% and goes down by 15% respectively.

The satisfaction of Saif and Amir = 8.8 and 6.8

Nawab's new satisfaction/ utility level = 2*8.8+6.8 =24.4

Percentage change = $\frac{24.4-24}{24}$

=1.67%

D is the correct answer.

Question 17

Pipes A, B and C are fitted to a tank such that A is an inlet pipe, B and C are outlet pipes. Pipe A is at the bottom of the tank, Pipe B is situated at half the height of the tank while C is situated at one fourth the height of the tank from the bottom. All the pipes are opened simultaneously for an empty tank. The ratio of the outlet flow of pipes B & C is 1:5. The tank is full in a total of 16 hours and was half-filled in 6 hours. Which of the following is the ratio of the rate of flow of in pipe A to pipe B?

A 10:1

B 15:4

C 4:1

D 8:1

Answer: A

Explanation:
Pipes A, B and C are fitted to a tank, such that A is an inlet pipe, B and C are outlet pipes.
Pipe B is situated at half the height of the tank while C is situated at one fourth the height of the tank from the bottom.

All the pipes are opened simultaneously for an empty tank.

Let the flow in pipe A = y

The ratio of the outlet flow of pipes B & C is 1 : 5.

The flow in pipe B and C is x and 5x.

.

The time taken to fill T/4 tank = t

The net rate of flow of water= y

Thus, **yt=T/4.....(1)**

.

The time taken to next fill T/4 tank = 6-t

Now, the net rate of flow of water= y-5x

(y-5x)(6-t)= T/4.....(2)

.

The time taken to next fill T/2 tank = 16-6=10h

The net rate of flow of water= y-5x-x=y-6x.

10(y-6x)=T/2.....(3)

From (1) and (3)

2*yt= 10(y-6x)

t=5(y-6x)/y .....(4)

From (3) and (2)

(y-5x)(6-t)=5**(y-6x) .....(5)**

Thus,

$\frac{(y-5x)(y+30x)}{y} = 5\,(y-6x)$ (Subsituting the value of t from (4) into (5))

$4y^2 - 55xy + 150x^2 = 0$

$4y^2 - 40xy - 15xy + 150x^2 = 0$

$(4y - 15x)\,(y - 10x) = 0$

y/x= 15/4 or y/x=10

Now, 15/4 will be rejected because the flow rate y-6x will become negative.
Hence, y:x = 10:1

Option A

Question 18

Joseph is in a dilemma. He has been offered a job which would pay him ₹ 80,000 per month for first three years and ₹ 1,20,000 per month for the next three years, and ₹ 1,50,000 per month for the remaining four years. He has also been offered an MBA at a prestigious place and he is considering whether to accept the job or go for the MBA. The first year tuition fee for the MBA program is ₹ 16,00,000 and the second year tuition fee for the MBA program is ₹ 20,00,000. After MBA, he'll get a salary of ₹ 2,00,000 per month for the first four years and then ₹ 2,50,000 per month for the remaining four years. What will be the approximate percentage gain for Joseph in opting for the MBA instead of the job in the 10 years horizon considering no discounting of money ?

A 23%

B 25%

C 27%

D 29%

Answer: B

Explanation:
The sum accrued by Joseph if he had taken the job = (80000*3+120000*3+150000*4)*12

=144*10^5

If Joseph has taken the MBA program, tuition fee for the program = 1600000+2000000

Sum accrued post MBA = 200000*12*4+250000*12*4=21600000

Net amount = 21600000-3600000 = 180* 10^5

Net gain if Joseph had taken MBA over job 10 years down the lane= 36*10^5

Percentage of gain = $\frac{36\times 10^5}{144\times 10^5}$

=25%

B is the correct answer.

Question 19

Ram and Shyam start a business together by investing a fixed amount of money on the first day of each month. In the year 2019, Ram invested an amount of A each month starting from January. Shyam invested an amount of B each month starting from May. They made a profit of Rs 210,000 at the end of September. If Ram got Rs 60000 more in profit than Shyam, find the ratio of A and B.

A 3:4

B 2:3

C 4:5

D 3:5

Answer: D

Explanation:
Assume Shyam's profit is equal to S, then the Ram's profit = S+60000
Now, S+S+60000 = Rs 210000 => 2S = Rs 150000 => S = Rs 75000
Profit share of Ram = 75000+60000 = Rs 135000
Assume the return for an amount of Rs 1 invested for 1 month is k.
Ram invests from January to September 9 months. For the amount invested in January, the return will be for 9 months = 9kA
For the amount invested in February by Ram, the return will be 8kA and so on.
Total Return of Ram = kA(9+8+7+6.....2+1) = 45kA = 135000 => kA = 3000 .....(1)
Similarly, the total return for Shyam = kB(5+4+3+2+1) = 15kB = 75000 = kB = 5000 .....(2)
From (1) and (2), $\frac{A}{B} = \frac{3}{5}$

Question 20

Aman and Bala started running from the same point around a hexagonal track. They started running in the same direction with their speed in the ratio a:b. If they meet each other only at the corners of the hexagon, not necessarily all corners, which of the following cannot be the value of the ratio a:b?

A 7:6

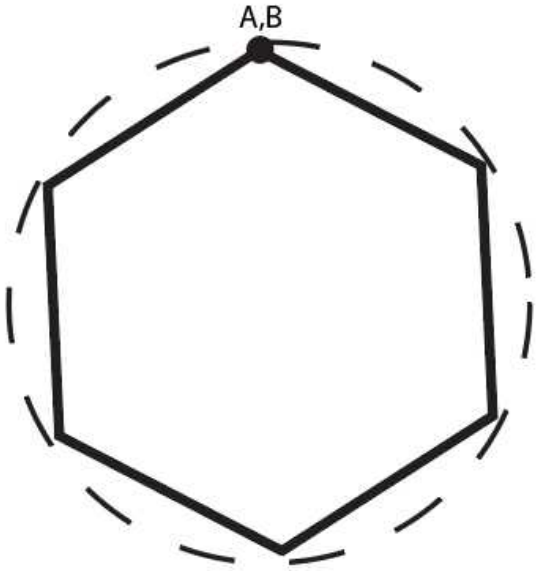
B 3:1

C 5:2

D 5:1

Answer: D

Explanation:
The number of points of intersection of two racers running around a circular track in the same direction is |a-b| where a:b is the ratio of their speeds.



The number of points of intersections must be a factor of 6(1,2,3 or 6) so that they meet only at the corners.

A:|7-6|= 1

B:|3-1|= 2

C:|5-2|= 3

D:|5-1|= 4

4 does not belong to 1, 2, 3 or 6. Hence, D is the answer.

Question 21

One day, Rahul started a work at 9 AM and Gautam joined him two hours later. They then worked together and completed the work at 5 PM the same day. If both had started at 9 AM and worked together, the work would have been completed 30 minutes earlier. Working alone, the time Rahul would have taken, in hours, to complete the work is

A 11.5

B 10

C 12.5

D 12

Answer: B

Video Solution

Explanation:
Let Rahul work at a units/hr and Gautam at b units/hour
Now as per the condition :
8a+6b =7.5a+7.5b
so we get 0.5a=1.5b
or a=3b
Therefore total work = 8a +6b = 8a +2a =10a
Now Rahul alone takes 10a/10 = 10 hours.

Question 22

In a running race, when one runner allows another runner to stay ahead at the start of the race, then it is termed as startup and when runners reach the finishing line at the same time, then it is termed as dead heat. In a race of 4 km distance, Anu wins by 600m over Binu. Binu can give a startup of 200m to Caira in a 4 km race. By how much distance should Caira get startup so that the race between Anu and Caira ends in dead heat in the same race of 4 km?

A 700m

B 750m

C 770m

D 725m

Answer: C

Explanation:
Let Anu finishes the race in t hours.

Speed of Anu = $\frac{4000}{t}$ m/hour

Speed of Bhanu = $\frac{(4000-600)}{t}$ m/hour Since Anu wins the race by 600m

Time taken by Bhanu to finish the race = Time taken by Caira to cover 3800m.

Time taken by Bhanu = $\frac{4000}{\frac{3400}{t}} = \frac{20}{17}t$

Speed of Caira = $\frac{3800}{\frac{20}{17t}} = \frac{3230}{t}$ m.hr.

To finish the race at the same time Anu should give Caira a headstart of 4000-3230 = 770m

C is the correct answer.

Question 23

Three metals A, B and C are mixed such that the quantity of A is x % more than that of C and the quantity of A is x % less than that of B. The quantity of C is increased by 66.67% by adding pure C to the alloy mixture. This results in the metal C contribution to the alloy becoming 33.33% of the total. Find the value of x.

A 66.67

B 25

C 33.33

D 50

Answer: C

Explanation:
Assuming the quantity of C initially = c

Hence, the quantity of A = $\left(1+\frac{x}{100}\right)c$

$\left(1+\frac{x}{100}\right)c$

Also, the quantity of B = $\left(1-\frac{x}{100}\right)$

Now, after increasing the quantity of c by 66.67%, we get

$c\left(1+\frac{66.67}{100}\right)$ $c\left(1+\frac{x}{100}\right)$

$c\left(1+\frac{66.67}{100}\right)+c\left(1+\frac{x}{100}\right)+$ $1-\frac{x}{100}$ 33.33

= 100

$\frac{5}{3}\left(1-\frac{x}{100}\right)c$

=> $\frac{5}{3}\left(1-\frac{x}{100}\right)c + c\left(1+\frac{x}{100}\right) + c\left(1-\frac{x^2}{100}\right) = \frac{33.33}{100}$

Assuming $\frac{x}{100} = y$, we have

$5(1-y) \quad\quad 1$

$5(1-y) + 3(1+y) + 3(1-y^2) = 3$

15-15y =5-5y+3+3y+3-3y^2

=> 3y^2-13y+4=0

=> (3y-1)(y-4)=0

=> y = $\frac{1}{3}$

Hence, x = 100y = 33.33%

C is the answer.

Question 24

Three solutions A, B and C having equal volume are made up of water and alcohol in the ratio 1:3, 2:5 and 3:4 respectively. 24 litres of A is taken out and mixed into B, then the composition of water and alcohol in B changes to 11:29. Had 14 litres been taken from the original B solution and mixed into C, what would had been the final ratio of C?

A 4:7

B 2:3

C 5:8

D 3:5

Answer: B

Explanation:

Since volumes of A, B and C are the same. It can be assumed as multiple of LCM(1+3,2+5,3+4) = LCM(4,7,7) = 28

Consider the volume as 28x.

In solution A, volume of water =7x, volume of alcohol = 21x

In solution B, the volume of water =8x volume of alcohol = 20x

In solution C, the volume of water =12x volume of alcohol = 16x

If 24 litres of A and B is taken out, then water and alcohol in the ratio 1:3.

So water taken out will be $24 \times \frac{1}{1+3} = 6$

Alcohol taken out will be $24 \times \frac{3}{1+3} = 18$

After adding 24 litres of A to B, the final ratio of B = $\frac{8x+6}{20x+18} = \frac{11}{29}$

Solving for x, we get x=2

So the volume = 28x = 28*2 = 56 litres

If 14 litres is taken out of original solution B, the water taken out will be $14 \times \frac{2}{2+5}$ = 4

And the alcohol taken out will be 14-4 =10

Volume of C = 56 litres, Volume of water in C = 12x = 24 and the volume of alcohol = 16x = 32

Now adding this to C, the ratio of water and alcohol = $\frac{24+4}{32+10} = \frac{2}{3}$

Question 25

In a class of 60 students, the average weight of the class is 65kg. If the average weight of boys and girls in the class is 75 and 50 respectively. then the ratio of girls and boys is

A $\frac{2}{3}$

B $\frac{3}{2}$

C $\frac{2}{5}$

D $\frac{5}{3}$

Answer: A

Explanation:
The total number of students in class = 60

Let the number of boys and girls be x, y respectively.

$\frac{75x+50y}{60}$ = 65

3x+2y = 156

3x+3y = 180

y = 24, x = 36

Required ratio = $\frac{2}{3}$

A is the correct answer.

Question 26

Four runners are running along a circular track. They start from the same point and run in the same direction. The speeds of the runners are in the ratio 1:2:3:5. At how many unique points on the circular track will the runners (two or more) cross each other?

A 4

B 12

C 6

D 13

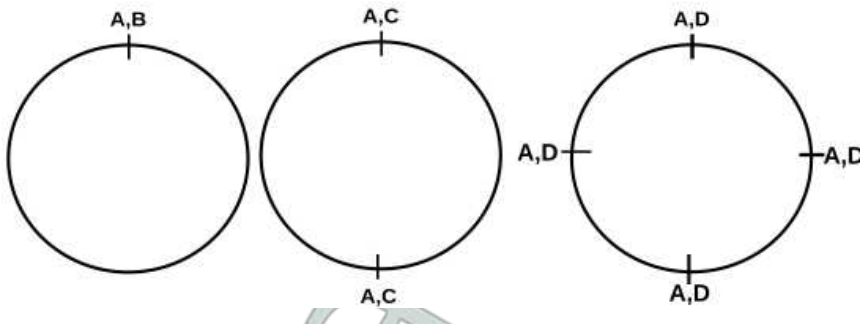
Answer: C

Explanation:
Two runners running in the same direction at the speed a:b will intersect at b-a different points. Similarly, two runners running in different directions will intersect at a+b points. Given 'a' and 'b' are coprime.
For the data given in the question, Lets assume four runners be A,B,C,D such that the run at the speed in ratio 1:2:3:5 respectively

The runners A and B with speed in ratio 1:2 will intersect at 2-1 =1 point i.e. the point they begin the race.

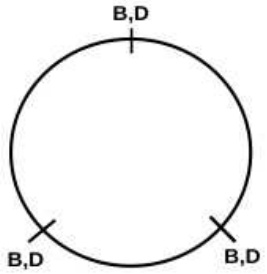
The runners A and C with speed in ratio 1:3 will intersect at 3-1 =2 points.

The runners A and D with speed in ratio 1:5 will intersect at 5-1 =4 points.



The runners B and C with speed in ratio 2:3 will intersect at 3-2 =1 points.

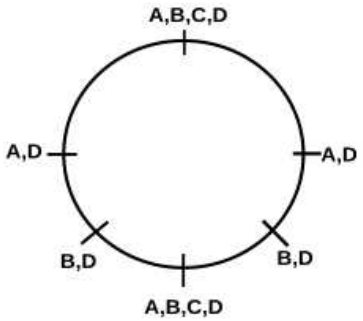
The runners B and D with speed in ratio 2:5 will intersect at 5-2 =3 points.



The runners C and D with speed in ratio 3:5 will intersect at 5-2 =2 points.

The points will coincide for runners A,B; A,C; B,C ;C,D and A,D with each other as they are start the race from the same point.

Number of different points at which they will intersect is given in the figure below.



They will intersect at 6 different points.

Question 27

Swarn a SME enterprise borrowed a sum of money from a nationalized bank at 10% simple interest per annum and the same amount at 8% simple interest per annum from a microfinance firm for the same period: It cleared the first loan 6 months before the scheduled date of repayment and repaid the second loan just at the end of the scheduled period: If in each case it had to pay Rs. 62100 as amount then how much money and for what time period did it borrow?

A Rs. 55750, 2 years

B Rs. 52500, 2 years

C Rs. 51750, 2.5 years

D Rs. 55750, 2.5 years

Answer: C

Explanation:

The sum that was returned is same in both cases that means interest accrued is same in both cases.

Assume that the duration is 't' years for which amount is borrowed in both case and principal amount is 'P'.

$\frac{P*(t-0.5)*10}{100} = \frac{P*t*8}{100}$

t=2.5 years

Principal amount that the enterprise borrowed :

$P(1+\frac{2*10}{100})$ =62100

P=51750