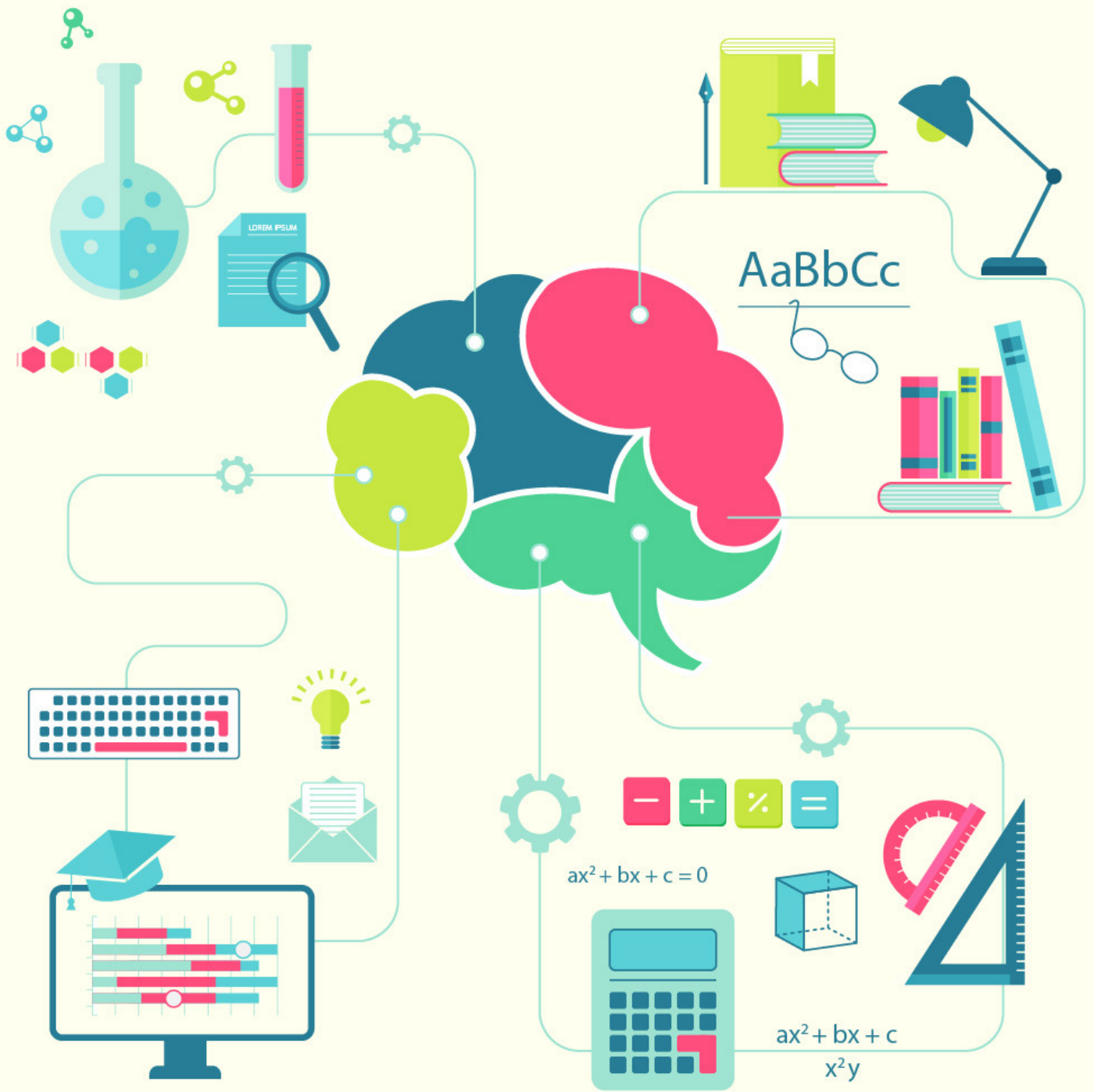


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CAT Questions on Relative Speed

05 March 2018





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Question 1:

Two friends A and B start running from the opposite ends of the road PQ towards each other. The length of PQ is 180 km and it takes $12/7$ hours for A and B to meet each other. If A reaches Q one hour before B reaches P, find the speed of A?

- a) 60
- b) 45
- c) 30
- d) 90

Question 2:

A and B start a race between points P and Q that are 5 km apart. A starts the race at 11 AM from P with the speed of 5 km/hr, reaches Q and comes back to P. B starts from P at 11:45 AM with the speed of 10 km/hr, reaches Q and then comes to P. At what time does B overtake A?

- a) 12:15PM
- b) 12:30PM
- c) 12:20PM
- d) 12:00PM

Question 3:

Two points A and B are 1159km apart. Two friends P and Q start from A and B respectively at the same time and move towards B and A respectively. They meet after 19 hours. After that, P increases his speed by 5km/hr while Q decreases his speed by 5km/hr. They reach their destinations at the same time. Find the original speed of P.

- a) 33km/hr
- b) 28km/hr
- c) 38km/hr
- d) None of these

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Question 4:

Madhu went to a mall. While climbing an escalator at her normal speed, she noticed that she took 25 steps and it took her 60 seconds to reach the top. In the next run, she climbed at a speed double of that of the previous time and reached the top in 45 seconds. How much time will Madhu take to reach the top of a stationary escalator if she climbs at her normal speed?

- a) 3 minutes
- b) 3 minutes 15 seconds
- c) 2 minutes 45 seconds
- d) None of these

Question 5:

Rahul moves on an escalator with constant speed of 3 steps/second. Karan moves at a constant speed of 1 step/second. When the escalator is moving downward, Rahul takes 120 steps and Karan takes 80 steps to reach the bottom from the top of the escalator. How many steps would they have to take if escalator becomes stationary?

Answer: 160

Solution:

Let's say that escalator moves at x steps per second.

Rahul takes 120 steps so he would have taken 40 seconds for it. In the meantime, escalator would cover $40x$ steps.

Similarly, Karan takes 80 steps so he will take 80 seconds. Escalator would cover $80x$ steps in that time.

Now total steps would be equal for both of them,

Hence $120 + 40x = 80 + 80x \Rightarrow 40x = 40 \Rightarrow x = 1$

So the number of steps visible for stationary escalator = $120 + 40 = 160$

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Question 6:

While chasing Vijay, Ram observes that when he is 80m away from a tunnel, Vijay is already inside the tunnel and has covered some distance in the tunnel. While emerging out, Ram observes that Vijay is 80m away from the tunnel. If the length of the tunnel is 120m and the speed of Vijay is $\frac{3}{5}$ th of the speed of Ram, find the distance between Vijay and the entrance of the tunnel when Ram is 80m away from the tunnel?

Answer: 80

Solution:

In the duration given, the ratio of distances covered by Vijay and Ram would be equal to $\frac{3}{5}$

Let the distance covered by Vijay inside the tunnel be y .

Distance covered by Vijay = $120 - y + 80$

Distance covered by Ram = $120 + 80 = 200$

$\frac{200}{200 - y} = \frac{5}{3}$

$y = 80\text{m}$

Solutions: (1 to 4)

1) Answer (a)

Let the speed of A and B be x and y $(\frac{12}{7})(x + y) = 180x + y =$
 $105 \frac{180}{x} = \frac{180}{y} - 1 \frac{x - y}{xy} = \frac{1}{180}x = 60$ and $y = 45$

2) Answer (b)

A will take 1 hour to reach Q. A will reach Q at 12 AM. By that time, B would have covered 2.5 km. In order to overtake A, he has to cover 2.5 km more than A. As speed of B is twice that of A, when A covers 2.5 km, B covers 5 km. B takes half hour to complete 5 km as speed of B is 10 km/hr. Thus, B would take half hour more after 12:00 to catch up with A. Hence, B over takes A at 12:30 pm.



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3) Answer (b)

Let the speed of P and Q be x and y $x+y = 1159/19 = 61$ $\frac{1159 - 19x}{x + 5} = \frac{1159 - 19y}{y - 5}$

$$1159y - 5795 - 19xy + 95x = 1159x - 19xy + 5795 - 95y$$

$$95(x + y) + 1159(y - x) = 11590(95 \cdot 61) + 1159(y - x) = 11590y - x = 5$$

Now $y - x = 5$ and $y + x = 61 = 33\text{km/hr}$ and $x = 28\text{km/hr}$

4) Answer (a)

Let us assume that there are k steps on the escalator. In the first run, she took 25 steps in 60 seconds. In the same time, the escalator also moved $k-25$ steps.

=> Speed of madhu = $25/60 = 5/12$ steps/sec and speed of escalator = $(k-25)/60$ steps/sec

When she doubles her speed, it takes her 45 seconds to reach the top.

=> Total number of steps =

$$= k = \frac{10}{12} \times 45 + \frac{k - 25}{60} \times 45 \Rightarrow \frac{150 + 3k - 75}{4} = k \Rightarrow k = 75.$$

Time taken by Madhu to reach the top on a stationary escalator

$$= \frac{75}{\frac{5}{12}} = 15 \times 12 = 180 \text{ seconds} = 3 \text{ minutes}$$



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