

We discussed the concepts of relative speed in GMAT questions last week. This week, we will work on using those concepts to solve questions. The questions we take today will be 600-700 level. I intend to take the 700+ level questions next week (don't want to scare you away just yet!). Let's get going now.

Question 1: A man walking at a constant rate of 4 miles per hour is passed by a woman traveling in the same direction along the same path at a constant rate of 20 miles per hour. The woman stops to wait for the man 5 minutes after passing him, while the man continues to walk at his constant rate. How many minutes must the woman wait until the man catches up?

- (A) 16 mins
- (B) 20 mins
- (C) 24 mins
- (D) 25 mins
- (E) 28 mins

Solution: We can solve this question in different ways. I will discuss two methods here – one involving the concept of relative speed and the other using the concept of ratios. The method I will not discuss is the pure algebraic one since I am sure you know how to do it using algebra.

First notice that after the woman crosses the man, she keeps going for 5 mins and in that time, the man keeps going too. So after 5 mins, the distance between them will not be the distance covered by the woman in 5 mins. It will be the difference between the distance covered by the woman in 5 mins and the distance covered by the man in 5 mins.

Method 1:

Man's speed = 4 mph and the woman's speed = 20 mph so their relative speed = $20 - 4 = 16$ mph (since they travel in the same direction)

In 5 mins, the woman travels $16 \times (5/60) = 4/3$ miles more than the man.

Hence, the distance between the man and the woman 5 mins after the woman crosses the man is $4/3$ miles.

To cover $4/3$ miles, the man will take $(4/3)/4 = 1/3$ hr = 20 mins.

Answer (B)

Method 2:

Man's speed = 4 mph and the woman's speed = 20 mph so the ratio of their speeds = 1:5.

Ratio of the time taken to travel equal distances = 5:1 (inverse of ratio of speeds)

Notice that the woman and the man cover equal distances. The woman covers a certain distance in 5 mins and the man covers the same distance in some time which is more than 5 mins.

Time taken by man: time taken by woman = 5:1

Since the woman takes 5 mins to cover that distance, the man takes 25 mins to cover it. Hence, the woman must wait for $25 - 5 = 20$ mins. (we subtract 5 mins because she was traveling during that time, not waiting).

Answer (B)

Another method involves assuming variables and then solving equations but I am not going to get into that. Let's go on to the next question.

Question 2: Two trains of length 100 m and 250 m run on parallel tracks. When they run in the same direction, they take 70 sec to cross each other and when they run in opposite directions, they take 10 sec to cross each other. The speed of the faster train is

- (A) 5 m/s
- (B) 15 m/s
- (C) 20 m/s
- (D) 25 m/s
- (E) 35 m/s

Solution:

To cross each other (either in same or opposite direction), the trains have to cover a distance of $250 + 100 = 350$ m (the faster train should cover the entire slower train and then its own length so that they completely cross each other).

When they run in the same direction, they cover 350 m in 70 sec. This means that their relative speed in this case (which is the difference in their speeds) is $350/70 = 5$ m/s

When they run in opposite directions, they cover this distance in 10 sec. So their relative speed in this case (which is the sum of their speeds) is $350/10 = 35$ m/s

If the sum of two numbers is 35 and their difference is 5, you should quickly jump to 20 and 15.

The speed of the faster train must be 20 m/s. Answer (C)

If you are not sure how to get the numbers 20 and 15 given their sum and difference, you can go through the following calculations:

$$x + y = 35$$

$$x - y = 5$$

Adding these two equations, we get $2x = 40$ i.e. $x = 20$. Put $x = 20$ in any one of the two equations to get $y = 15$.

But with such easy numbers, I would suggest you to try to figure out these values on your own. Start by thinking this way: since the difference between the numbers is small, try to split 35 in two kind-of-equal numbers. You will get 20 and 15 in no time.