



GMAT

Quant Section Test

[RATES]

- Solutions

1. Solution:**Topic: Arithmetic****Concept Tested: Rates – Speed, Distance and Time****Type of Question: Problem Solving (PS)****Given:** The average speed is increased by 25%.**Question: By what percent the time will decrease?****Approach:** There is an inverse relationship between Speed(S) and Time (T), where Distance (D) is constant.i.e. $D=ST$ So, use shortcut $AB=C$. i.e. If A increases by $\frac{1}{x}$ then B will decrease by $\frac{1}{x+1}$ As speed is increased by 25%, $\Rightarrow \frac{25}{100} = \frac{1}{4} = \frac{1}{x}$ Then the time should decrease by $\frac{1}{x+1} = \frac{1}{5}$ \Rightarrow The percentage will be $\frac{1}{5} \times 100 = 20\%$.**Hence, the answer is C.**

2. Solution:

Topic: Arithmetic

Concept Tested: Rates – Work, Rate and Time

Type of Question: Data Sufficiency (DS)

Given: Two printing machines, X and Y work at a constant rate to produce flex.

f should be positive integer as the number of flex cannot be non-positive.

Question: Can both printing machines X and Y together produce at least $5f$ fluxes in 2 hours?

Approach: As it is a Yes/No Data Sufficiency Question, if we get a definite Yes or Definite No for the questions using the statements, then it is sufficient. Otherwise, it is insufficient.

As the question is related to work, rate and time, use $Work = Rate \times Time$

Statement I is sufficient:

Given that machine X produces f flex in $\frac{2}{5}$ of an hour.

Using $Work = Rate \times Time$,

$$Rate \text{ for } X = \frac{Work}{Time} = \frac{f}{2/5} = \frac{5f}{2}$$

So, the rate of machine X is $\frac{5f}{2}$.

If machine X is working alone for 2 hours, the number of flex produced by machine X is,

$$Work = Rate \times Time$$

$$Work = \frac{5f}{2} \times 2 = 5f$$

\Rightarrow Machine X is producing $5f$ flex in two hours working alone.

\Rightarrow When one more machine works with machine X, for sure both can together produce at least $5f$ flex.

Therefore, Statement I by itself is sufficient to answer the question.

So, eliminate B, C and E.

The answer is either A or D.

Statement II is insufficient:

Given that Machine Y produces f flux in $\frac{3}{5}$ of an hour.

Using $Work = Rate \times Time$,

$$Rate \text{ for } Y = \frac{Work}{Time} = \frac{f}{3/5} = \frac{5f}{3}$$

So, the rate of machine Y is $\frac{5f}{3}$.

If machine Y is working alone for 2 hours, the number of flex produced by machine Y is,

$$\text{Work} = \text{Rate} \times \text{Time}$$

$$\text{Work} = \frac{5f}{3} \times 2 = \frac{10}{3}f =$$

\Rightarrow Machine Y is producing less than $5f$ flex in two hours working alone.

Since we don't know about rate of machine X, it is not possible to say if both machine working together can produce at least $5f$ flex.

Therefore, Statement II by itself is insufficient to answer the question.

So, eliminate D.

Hence, the answer is A.

3. Solution:

Topic: Arithmetic

Concept Tested: Rates – Speed, Distance and Time

Type of Question: Problem Solving (PS)

Given:

Jim (J) and Carl(C) are running a 1000-meter race as a practice session.

Jim gives Carl a head-start of 20 seconds as the speed of Jim is more than the speed of Carl. That means Carl will start first and runs for 20 seconds.

Speed of Jim = 7 meter per second

Speed of Carl = 5 meter per second

Question: What is the time, in seconds, that Carl have run before Jim catches up with her?

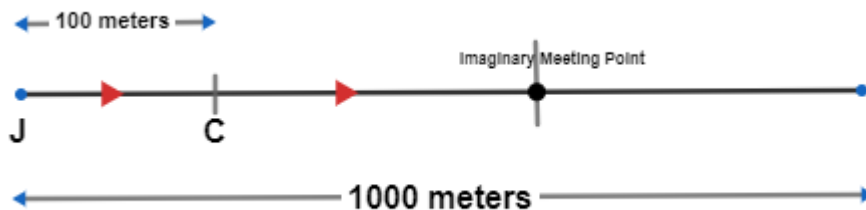
Approach: Since the question is related to Distance (D), Speed(S) and Time (T), use $D=ST$.

Also, when two bodies are going in same direction, you can subtract the speed to get the relative speed.

\Rightarrow Distance covered by Carl in 20 seconds $=5 \times 20=100$ meters.

Once Carl finishes 100 meters, Jim will start so that the current distance between them is 100 meters as shown below.

To meet at some point, both same to travel in the same direction. To find the time taken by them to meet at a point,



subtract the speed.

$$\Rightarrow T = \frac{D}{S} = \frac{100}{(7-5)} = 50 \text{ seconds}$$

\Rightarrow Jim and Carl each of them have taken 50 seconds to meet at some point.

Carl has already taken 20 seconds. So, the time, in seconds, that Carl have run before Jim catches up with her is $50 + 20 = 70 \text{ seconds}$

Hence, the answer is E.

4. Solution:

Topic: Arithmetic

Concept Tested: Rates – Work, Rate and Time

Type of Question: Data Sufficiency (DS)

Given: Length of the train is 300 meter.

The train crosses the platform in 12 seconds.

⇒ Distance covered by train = Length of Train + Length of platform.

Question: What is the speed of the battery car, in meter per second that crosses same platform?

To get this, we need to know the length of the platform(distance covered by battery car) and time taken by the battery car to cross the same platform.

Let the length of the platform in meters be x .

Approach: Since the question is related to Distance (D), Speed(S) and Time (T), use $D=ST$. Also be careful with the unit conversion.

Statement I is insufficient:

Given that the train crosses the platform with an average speed of 135km/hr.

Using $D=ST$,

Distance covered by train = Speed of Train \times Time Taken by Train to cross the platform

$$300 + x = \left(\frac{135 \times 1000}{3600}\right) \times 12$$

Solving, we get $x = 150$ meters

⇒The distance covered by the battery car = 150 meters.

But, the time taken by the battery car is still unknown.

Therefore, Statement I by itself is insufficient to answer the question.

So, eliminate A and D.

The answer is either B, C or E.

Statement II is insufficient:

Given that the battery car crosses the same platform in 10 seconds.

Here, there is no information about the distance covered by battery car(i.e. the length if the platform)

Therefore, Statement II by itself is insufficient to answer the question.

So, eliminate B.

The answer is either C or E.

Combine both Statements:

From 1st statement, we get the distance covered by the battery car as 150 meters. (Length of the platform)

From 2nd statement, we get the time taken by the battery car to cross the same platform.

Since, we got both distance and time, we can find the speed of the battery car to cross the same platform.

Therefore, combining the statements I and II is sufficient to answer the question asked.

So, eliminate E.

Hence, the answer is C.

5. Solution:

Topic: Arithmetic

Concept Tested: Rates – Speed, Distance and Time

Type of Question: Problem Solving (PS)

Given:

Lilly travelled the same distance every day, from the first to tenth day of a month (both inclusive).

Let the distance covered each day be 100.

For the first three days, she averaged 70 miles per hour.

For the remaining seven days, she averaged 30 miles per hour.

Question: What is Lilly's average speed for all ten days' commutes?

Approach: Average Speed = $\frac{\text{Total Distance}}{\text{Total Time}}$

For the first day, Time taken = $\frac{\text{Distance covered on first day}}{\text{Speed}} = \frac{100}{70} = \frac{10}{7}$

⇒ The time taken for first three days = $\frac{3 \times 10}{7} = \frac{30}{7}$

For the fourth day, Time taken = $\frac{\text{Distance covered on fourth day}}{\text{Speed}} = \frac{100}{30} = \frac{10}{3}$

⇒ The time taken last seven days = $\frac{7 \times 10}{3} = \frac{70}{3}$

Now, Average Speed = $\frac{\text{Total Distance for all 10 days}}{\text{Total Time taken in 10 days}} = \frac{(10 \times 100)}{(\frac{30}{7} + \frac{70}{3})} = 36.20$

Hence, the answer is D.

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