MATHEMATICS SPEED, DISTANCE & TIME

YEAR 5

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EDITOR'S NOTE

Editor's Note

My name is Steve and I set out on a mission to truly empower kids in their educational endeavours. Having been through all the rigorous tests myself and in the education industry for over a decade I have come to understand the fundamental factors required for students to excel in their education.

I know you will find this book valuable and if you would like to speak to my team and I reach out to us here:

https://scholarlytraining.com/

Regards, Steve

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SPEED DISTANCE & TIME

Speed is a measure of how quickly an object moves from one place to another. It is equal to the distance traveled divided by the time. It is possible to find any of these three values using the other two. This picture is helpful:

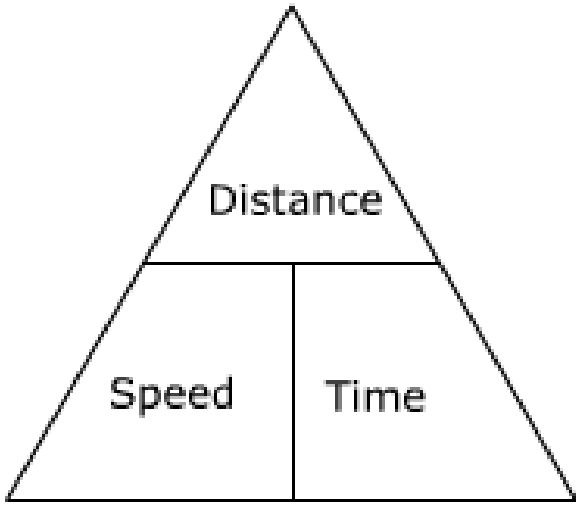


Image 1.1

The positions of the words in the triangle show where they need to go in the equations. To find the speed, distance is over time in the triangle, so speed is distance divided by time. To find distance, speed is beside time, so distance is speed multiplied by time.

$$speed = \frac{distance}{time} = \frac{d}{t}$$

$$time = \frac{distance}{speed} = \frac{d}{s}$$

$$distance = speed \times time = st$$

EXAMPLE

1. What is the average speed if a man drives 3 hours at 60 $\frac{km}{hr}$ and the next 6 hours at 50 $\frac{km}{hr}$?

Solution:

$$Average\ Speed = \frac{total\ distance}{total\ time}$$

Based on the problem, we know that the total time = 3 hours + 6 hours = 9 hours. To get the total distance traveled, we rearranged the speed formula:

$$distance = speed \times time$$

$$d_1 = 60\ \frac{km}{hr} \times 3\ hours = 180\ km$$

$$d_2 = 50\ \frac{km}{hr} \times 6\ hours = 300\ km$$

$$total\ distance = 180\ km + 300\ km$$

Thus,

$$Average\ Speed = \frac{480\ km}{9\ hr} = 53.33\ \frac{km}{hr}$$

2. A car during its journey travels 30 minutes at a speed of 40 $\frac{km}{hr}$, another 45 minutes at a speed of 60 $\frac{km}{hr}$ and 2 hours at a speed of 70 $\frac{km}{hr}$. Find its average speed (approximately).

Solution:

Convert the given time to hrs, to have a uniform unit

$$30\ minutes \times \frac{1\ hr}{60\ minutes} = 0.5\ hour$$

$$45\ minutes \times \frac{1\ hr}{60\ minutes} = 0.75\ hour$$

Thus, the total time:

$$total\ time = 2\ hrs + 0.5\ hr + 0.75\ hr = 3.25\ hrs$$

To get the total distance travelled

$$distance = speed \times time$$

$$d_1 = 40\ \frac{km}{hr} \times 0.5\ hours = 40\ km$$

$$d_2 = 60\ \frac{km}{hr} \times 0.75\ hours = 45\ km$$

$$d_3 = 70\ \frac{km}{hr} \times 2\ hours = 140\ km$$

$$total\ distance = 40\ km + 45\ km + 140\ km = 225\ km$$

Thus, the average speed is

$$Average\ Speed = \frac{225\ km}{3.25\ hr} = 69.23\ \frac{km}{hr}$$

3. A person travels at a speed of $60\frac{km}{hr}$. Then how many meters can he travel in 5 minutes?

Solution:

The distance covered in 1 hour or 60 minutes is 60 km

$$60\ km \times \frac{1000\ m}{1\ km} = 60\ 000\ m$$

Then the distance covered in 1 minutes is

$$= \frac{60\ 000\ meters}{60} = 1000\ m$$

So, the person can cover 5000 meters of distance in 5 minutes.

4. A golf cart is driven at its top speed of 27.0 km/hr for 10.0 minutes. In meters, how far did the golf cart travel?

Solution:

The first step to solve this problem is to change the units of the speed and time so that the answer will be in meters, since this is what the question asks for. The speed is:

$$s = 27.0\ km/hr$$

$$s = 27.0\frac{km}{hr} \times \frac{1000\ m}{1\ km} \times \frac{1\ hr}{60\ min} \times \frac{1\ min}{60\ s}$$

$$s = 7.50\frac{m}{s}$$

Converting the units, the speed is 7.50 m/s the time the cart travelled for was:

$$t = 10.0\ min$$

$$t = 10.0\ min \times \frac{60s}{1\ min} = 600\ s$$

The speed of the cart and the time of travel are given, so the distance travelled can be found using the formula:

$$d = st$$

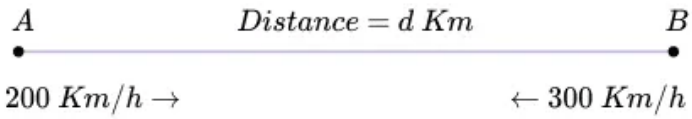
$$d = \left(7.50\ \frac{m}{s}\right)(600\ s)$$

$$d = 4500\ m$$

The golf cart travelled 4500 m, which is equal to 4.50 km.

5. A train goes from Station A to station B at a speed of 200 km/hr. While returning, the train has a better engine. It is faster by 100 km/hr than the old engine. What is the train's average speed for the round trip?

Solution:



Let the distance between stations = d km
Speed from A to B = 200 km/hr
Speed from B to A = 200 km/hr + 100 km/hr = 300 km/hr

From the speed formula:

$$Time = \frac{distance}{speed}$$

$$Time\ from\ A\ to\ B = t_{AB} = \frac{d}{200}$$

$$Time\ form\ B\ to\ A = t_{BA} = \frac{d}{300}$$

$$Total\ time = t_{AB} + t_{BA} = \frac{d}{200} + \frac{d}{300}$$

$$= \frac{300d + 200\,d}{200 \times 300} = \frac{500d}{200 \times 300}\ hours$$

Let us calculate the average speed now.

$$Total\ distance = AB + BA = d + d = 2d$$

$$Average\ Speed = \frac{Total\ Distance}{Total\ time}$$

$$= \frac{2d}{\frac{500}{200 \times 300}}$$

$$= \frac{2d \times 200 \times 300}{500d}$$

$$= \frac{400 \times 3}{5} = 240\ \frac{km}{hr}$$

$$Average\ Speed = 240\ \frac{km}{hr}$$

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