

Speed, time, and distance.

Car was moving for 3 hours with the speed of 70 km/h. How far did it travel? In this kind of problems in math we always assume that the car (or any other moving object) is moving with the constant speed along the straight line. Of course, this is seldom case in the actual reality, and in physics you will be studying the laws of motion in a more profound way.

Let's denote the speed of the car v , the time during which the car was moving t , and the distance it travelled, S . These letters are usually used for speed, time and distance, but you can use any other letters as well.



$$S = v \times t = vt$$

If $v = 70\text{km}/h$ and $t = 3h$, then $S = 70 \frac{\text{km}}{h} \times 3h = 70\text{km}$. ($70 \frac{\text{km}}{h}$ means $\frac{70 \text{ km}}{1 \text{ hour}}$, kilometers per hour, also can be written as kmph).

This is simple. If we know two out of three parameters, we always can find the third one.

$$S = vt;$$

$$v = \frac{S}{t};$$

$$t = \frac{S}{v};$$

Examples:

- a. Train is moving at the speed of 50 m/h. How far will it travel in 120 minutes?

Solution:

$$120 \text{ minutes} = 2 \text{ hours}$$

$$50 \frac{m}{h} \cdot 2h = 100 \text{ m.}$$

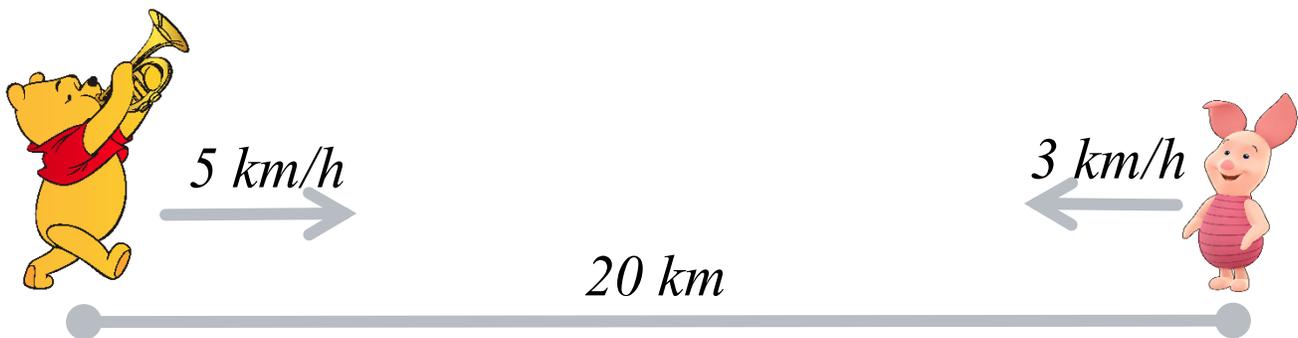
- b. Cyclist is traveling from Stony Brook to Port Jefferson. Distance between these two towns is 8 kilometers. The speed of the cyclist is 16 km/h. How much time does he need to go from S.B. to P.J.?

Solution:

$$8\text{km}: 16 \frac{\text{km}}{\text{h}} = 0.5 \text{ hour (or 30 minutes)}$$

Now let's take a look at the following problem:

Winnie-the-Pooh and Piglet start walking toward each other at the same time from their houses along the straight street. The Winnie's speed is 4 km/h, and Piglet is walking at the speed of 5 km/h. Distance between their houses is 20km. When and where they will meet?



How fast the distance between them will be shrinking? In one hour Winnie will walk 5 km and Piglet will walk 4 km, so distance between them will be

$$20\text{km} - 5\text{km} - 3\text{km} = 20 - (5 + 3) = 20 - 8 = 12\text{km}$$

Speed of this shrinking is 8 km/h, and they will meet exactly when the distance will shrink to zero.

$$20\text{km}: 8 \frac{\text{km}}{\text{h}} = 2.5 \text{ hour.}$$

They will meet in 2.5 hours. By this time Winnie will walk

$$2.5h \cdot 5 \frac{km}{h} = 12.5km, \text{ and Piglet will walk } 20 - 12.5 = 7.5km$$



12.5 km

7.5 km

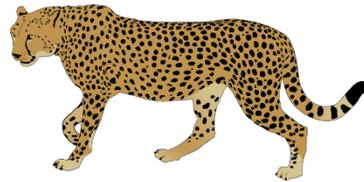


Homework.

- The speed of human, cheetah and snail is given below. How many **meters** will each of them travel in **1 hour**?



$$5 \frac{m}{h}$$



$$1 \frac{km}{min}$$

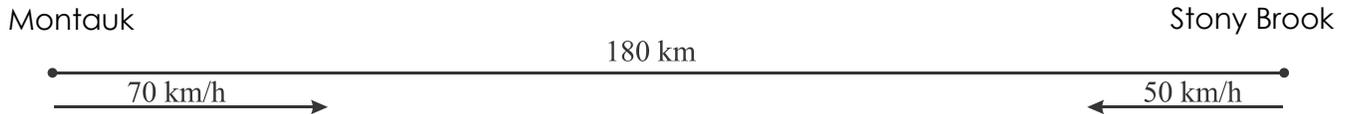
$$0.003 \frac{m}{min}$$



- Peter was walking for 15 minutes with the speed of 5km/h. How far did he go? (Hint: convert minutes to hours)
- The distance between the Earth and Mars is 55,757,930 km. How fast the spaceship should go to reach the red planet in 250 days?
- The speed of the boat going downstream the river is 19 km/h, and the speed of the same boat going upstream this river is 15 km/h. What is the speed of the river

stream and what is the speed of the boat in a still water on a lake?

5. Two cars start moving towards each other at the same time from the two villages, Stony Brook Village and Montauk. The distance between the villages is 180 km. The speed of the car that departed from Stony Brook is 50 km/h, the speed of the car that left from the Montauk is 70 km/h.



- a) In how many hours will they meet?
b) How far from Stony Brook they will meet?
6. Solve the following equations:
a) $3x-1=2x+8$ b) $7a=5(3a-4)$ c) $6z-15=z$
7. For the picture below, come up with the problem and solve it.

