

### Formula

Let

D = distance (mi)

R = rate (mph)

T = time (hr)

Distance = rate(time)

$$D = R \times T$$

It is helpful to draw a sketch.

\*\*If the question were to find the distance of each car traveled . . . substitute 4 in the expressions  $56x$  and  $60x$ .

### Converting minutes to hours:

Example: Convert 20 minutes to  $x$  hours

$$\frac{60 \text{ min}}{1 \text{ hr}} = \frac{20 \text{ min}}{x \text{ hr}}$$

$$\text{Or } = 20 \text{ min} \cdot \left( \frac{1 \text{ hr}}{60 \text{ min}} \right) = \frac{1}{3} \text{ hr}$$

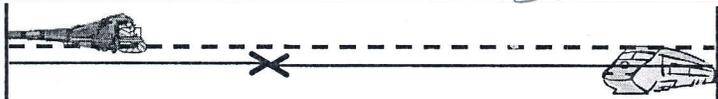
$$\frac{60x \text{ hr min}}{60 \text{ hr min}} = \frac{20 \text{ min hr}}{60 \text{ hr min}}$$

$$x = \frac{1}{3}$$

**Answer:** 20 minutes =  $\frac{1}{3}$  hr

**Example 2.** A passenger train and a freight train start at the same time from stations that are 405 miles apart and travel toward each other. The rate of the passenger train is twice the rate of the freight train. In 3 hours, the trains pass each other. Find the rate of each train.

	Rate	Time	=	Distance
Passenger Train	$2x$	3	=	$6x$
Freight Train	$x$	3	=	$3x$



**Answer:** The rate of the passenger train is 45 mph and the freight train is 90 mph.

$$6x + 3x = 405$$

$$\frac{9x}{9} = \frac{405}{9}$$

$$x = 45$$

$$45(2) = 90$$

**Example 1:** Two cars start from the same point at the same time and travel in opposite directions. The slow car travels at 56 miles per hour and the fast car travels at 60 miles per hour. In how many hours will the cars be 464 miles apart?

	Rate	Time	=	Distance
Slow car	56	$x$	=	$56x$
Fast car	60	$x$	=	$60x$



**Answer:** In 4 hours the cars will be 464 miles apart.

$$56x + 60x = 464$$

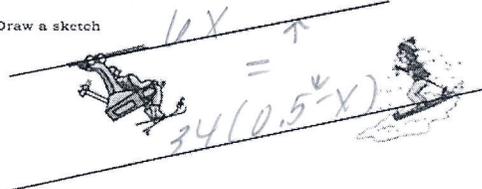
$$\frac{116x}{116} = \frac{464}{116}$$

$$x = 4$$

**Example 3.** A ski lift carried Caitlin up a slope at the rate of 6 km/hr, and she skied back down parallel to the lift at 34 km/hr. The round trip took 30 minutes. How far did she ski?

	Rate	Time hr	=	Distance
Up	6	$x$	=	$6x$
Down	34	$0.5 - x$	=	$34(0.5 - x)$

Draw a sketch



**Answer:** Caitlin skied a distance of 2.55 km.

$$6x = 34(0.5 - x)$$

$$6x = 17 - 34x$$

$$\frac{40x}{40} = \frac{17}{40}$$

$$x = 0.425 \text{ hr}$$

$$6(0.425) = 2.55$$