

Unit 4 - Using Equations to Solve Word Problems

Uniform Motion Section 7.11 Pages 376-377	Distance Formula (distance triangle) $D = ST$ Solving for Speed and Time Using Distance Charts to Solve Word problems Activity: Study Information & Inquire; Pg 376 1-3 Classwork: Pg 377 - 1, 3, 5, 7, 9, 12, 17, 19, 21, 23, 24, 26 Homework: Pg 377 - 2, 4, 6, 8, 10, 13, 14, 15, 18, 20, 22, 25, 27, 28; handout sheet. Each section may include homework handouts.
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$$D = rt$$

$$D = vt$$

The Distance Triangle



this triangle is used for "rearranging"
the distance formula for the
quantity we are trying to find.

$$D = rt$$

$$r = \frac{D}{t}$$

$$t = \frac{D}{r}$$

Inquiry: From the textbook -- Page 376 # 1 - 3 (Hint: Open your texts)

Given

CG : $r = 30 \text{ km/hr}$
 $t = x$

a) $D = rt$
 $D = 30x$

F : $r = 40 \text{ km/hr}$
 $t = x - 1$

b) " $x - 1$ "
c) $D = 40(x - 1)$

1. dist CG = dist NF

2. $30x = 40(x - 1)$

$$\Rightarrow 30x = 40x - 40$$

$$\Rightarrow 30x - 40x = -40$$

$$-10x = -40$$

$$\therefore x = +4$$

3. a) 4 hours

(cost guard's time was x)

b) $x - 1$ is the frigate's
time

$$\Rightarrow 3 \text{ hours.}$$



Calculate the distance travelled.

1. 3 h at 60 km/h

$$\begin{aligned}
 D &= r t \\
 &= (60)(3) \\
 &= 180 \text{ km}
 \end{aligned}$$

Note: the time unit
must be the same

units are necessary!

How long does each trip take?

5. 40 km at 80 km/h

$$\begin{aligned}
 t &= \frac{D}{r} \\
 &= \frac{40}{80} = \frac{1}{2} \text{ hr}
 \end{aligned}$$

The "distance" units
have to be
the same

Calculate each speed. "r"

9. 300 km in 3 h

$$\begin{aligned}
 r &= \frac{D}{t} \\
 &= \frac{300 \text{ km}}{3 \text{ hr}} \\
 &= 100 \text{ km/hr}
 \end{aligned}$$

3. $\frac{1}{2}$ h at 90 km/h

$$\begin{aligned}
 D &= r t \\
 &= (90)\left(\frac{1}{2}\right) \\
 &= 45 \text{ km}
 \end{aligned}$$

7. 20 km at 100 km/h

$$\begin{aligned}
 t &= \frac{D}{r} \\
 &= \frac{20}{100} = \frac{1}{5} \text{ hr} \\
 &\quad (= 12 \text{ min})
 \end{aligned}$$

12. 40 km in $\frac{1}{2}$ h

$$\begin{aligned}
 r &= \frac{D}{t} \\
 &= \frac{40}{\frac{1}{2}} \\
 &= 40 \times \frac{2}{1} = 80 \text{ km/hr}
 \end{aligned}$$

Copy and complete the table.

Distance Triangle

	Distance (km)	Rate (km/h)	Time (h)
17.	$D = rt$ $= 90(x+1)$	90	$x+1$
19.	200	x	$t = \frac{D}{r}$ $= \frac{200}{x}$
21.	$D = rt$ $= rt$	r	t
23.	D	$r = \frac{D}{t}$ $= \frac{D}{t}$	t



24. Sailing times A cruise ship left Halifax for Bermuda at 20 km/h. A private boat left for Bermuda 1 h later and travelled at 25 km/h. After how long did the private boat overtake the cruise ship?

Let x be the time for the Cruise ship

	D	r	t	$D = rt$
Cruise Ship	D	20	x	$20x$
Private boat	D	25	$x-1$	$25(x-1)$

Since " $D = D$ "

$$20x = 25(x-1)$$

$$20x = 25x - 25$$

$$-5x = -25$$

$$\therefore x = 5$$

← Cruise ship time

\therefore It took 4 hours

for the Private Boat to catch the cruise ship

26. Driving times Two friends, Elsa in Winnipeg and Gina in Edmonton, decided to meet on the Trans-Canada Highway. The distance from Edmonton to Winnipeg is 1360 km. They both left home at 08:00, Winnipeg time. Elsa drove at 80 km/h, and Gina drove at 90 km/h.

a) Make a table showing the total distance driven by each person by 09:00, 10:00, and so on, Winnipeg time. Use the table to find how many hours the friends drove until they met.

b) Find the number of hours they drove by writing and solving an equation.

c) Which problem solving method do you prefer? Explain.

a)

	9	10	11	12	1	2	3	4	5	6
Elsa $D_r(t)$	80	160	240	320	400	480	560	640		
Gina $D_r(t)$	90	180	270	360	450	540	630	720		
Total	170	340	510	680	850	1020	1190	1360		

\therefore They meet at 4 pm
(after 8 hours)

b)

	D	r	t	<u>want</u>
Elsa	$80t$	80 km/hr	t	
Gina	$90t$	90 km/hr	t	
Total	1360			

Let x be the distance

$$80t + 90t = 1360$$

$$170t = 1360$$

$$t = \frac{1360}{170} = 8$$