Trig Honors
1.1 Notes
Day 2

1.1 Distance – Rate -Time Word Problems

Strategy for Solving a Word Problem:

1. Read the problem closely
2. Use a variable to represent unknown quantities
3. Draw a Diagram (if it helps you!)
4. Write an equation that relates the quantities
5. Solve and make sure your answer makes sense

Distance = rate x time

$d = \frac{5\text{mi}}{\text{hr}} \cdot 10\text{hrs}$

$d = 50\text{miles}$

Quantity = rate x time

$Q = \frac{5\text{ chocolates}}{\text{hr}} \cdot 7\text{hrs}$

$Q = 35\text{ chocolates}$

Let's Start Basic:

1. You are eating oreos at a rate of 5 oreos per hour for 8 hours. How many oreos did you eat?

$Q = rt$

$Q = \frac{5\text{oreos}}{\text{hr}} \cdot 8\text{ hrs} = 40\text{ oreos}$

2. You have been on a boat for 8 hours and have traveled 56 miles. How fast if your boat going?

$d = rt$ $\quad 56\text{mi} = r \cdot 8\text{ hrs}$

$r = 7\text{ mi/hr}$

3. You are biking for 30 miles at a rate of 8 miles per hour. How long have you been biking?

$d = rt$

$\frac{1\text{h}}{8\text{mi}} \cdot 30\text{mi} = \frac{8\text{ mi}}{\text{hr}} \cdot t \cdot \frac{1\text{hr}}{8\text{mi}}$

Let's take it up a Notch

$t = \frac{30}{8} = 3.75\text{hr}$

4. Mary is painting the rooms of her new house before she moves in. It takes her about 4 hours to paint one room. Her friend Kevin is going to help and it takes him about 3.5 hours to paint one room. Her house has 8 rooms so how long will it take them to finish painting?

$Q = rt$

$\uparrow$

total rooms = 8

	r	t	= Q
Mary	$\frac{1}{4}$	t	$\frac{1}{4}t$
Kevin	$\frac{1}{3.5}$	t	$\frac{1}{3.5}t$

$\frac{1}{4}t + \frac{1}{3.5}t = 8$

$28\left(\frac{1}{4}t + \frac{2}{7}t = 8\right)$

$7t + 8t = 224$

$15t = 224$

$t \approx 14.93$ hours

5. Mark and his brother David are fighting over a top airplane while playing in their yard. Mark grabs the plane and takes off running at a rate of 7.5 miles per hour. One minute after Mark starts running, David starts to chase him at a rate of 9mph. How long will it take David to reach Mark and how far will they have run?

$d = rt$

	r	t	d
Mark	7.5	t	$7.5t$
David	9	$t - \frac{1}{60}$	$9(t-\frac{1}{60})$

* be careful

$7.5t = 9(t - \frac{1}{60})$

$7.5t = 9t - 3/20$

$-\frac{2}{3} \cdot -1.5t = -\frac{3}{20} \cdot -\frac{2}{3}$

$t = \frac{1}{10}$ hr or 6 min

It would take David 5 min to catch David at .75 miles

$d = 7.5t$

$= 7.5(\frac{1}{10}) = .75$ miles

6. Heather rows a boat upstream then turns around and rows back downstream to her starting point. It takes her five total minutes to do this. The current is moving at a rate of 3 meters per second and Heather can paddle at a rate of 7 meters per second. How far down the river did she go before turning around?

$d = rt$

	r	t	d
upstream	4	t	$4t$
dow stre.	10	$300 - t$	$10(300-t)$

* Be careful w/ units!

she travels the same distance up as she does down, so...

$4t = 10(300-t)$

$4t = 3000 - 10t$

$14t = 3000$

$t = \frac{1500}{7}$ sec

$d = 4(\frac{1500}{7})$

$d = 857.14$ meters

7. James is also rowing a boat and he can row 320 meters against the current in the same amount of time it takes him to row 1120 meters with the current. James rows 9 meters per second. How fast is the current moving?

$d = rt$ x = rate of current

	r	t	d
against current	$9 - x$	$\frac{320}{9-x}$	320
with current	$9 + x$	$\frac{1120}{9+x}$	1120

CLUE: "same amount of time" set times =

$\frac{320}{9-x} = \frac{1120}{9+x}$

$320(9+x) = 1120(9-x)$

$2880 + 320x = 10080 - 1120x$

$1440x = 7200$

$x = 5$

The current is moving 5 m/s

8. You are on a plane ride northbound into the wind and it take 4 hours to fly to its destination. The flight home, with the wind takes 3 hours and 18 min. The wind speed is 40mph. What is the speed of the plane (without any wind).

$d=rt$ x = speed of plane

	r	t	d
against wind	$x-40$	4	$4(x-40)$
with wind	$x+40$	3.3	$3.3(x+40)$

$4(x-40)=3.3(x+40)$
$4x-160=3.3x+132$
$.7x=292$
$x=417.14$ mph

The speed of the plane without wind is 417.14 mph

MORE FOR PRACTICE:

9. Sue can paint a house by herself in 12 days. When Clyde helps, it takes only 4 days. How long would it take Clyde to paint the house by himself?

$Q=rt$
↑
one house (total)

	r	t	Q
Sue	$\frac{1}{12}$	4	$\frac{1}{12}(4)$
Clyde	$\frac{1}{x}$	4	$\frac{1}{x}(4)$

$\frac{1}{12}(4)+\frac{1}{x}(4)=1$
$3x\left(\frac{1}{3}+\frac{4}{x}=1\right)$
$x+12=3x$
$12=2x$
$x=6$

It would take Clyde 6 days by himself.

10. Two painters working together can paint a house in 3 hours. One painter can paint the same house by himself in 8 hours. How long would it take the 2nd painter to paint the house, working alone?

	r	t	Q
painter 1	$\frac{1}{8}$	3	$\frac{3}{8}$
Painter 2	$\frac{1}{x}$	3	$\frac{3}{x}$

$8x\left(\frac{3}{8}+\frac{3}{x}=1\right)$
$3x+24=8x$
$24=5x$
$x=4.8$

It would take the 2nd painter 4.8 hours alone

11. You are on a boat that travels 6 miles per hour upstream and 10 miles per hour downstream. You are on the boat five hours but cannot remember when the boat went halfway and turned around. Find the time it took the boat to go upstream and how far you traveled upstream.

	r	t	d
upstream	6	x	6x
downstream	10	5-x	10(5-x)

$6x = 10(5-x)$
$6x = 50 - 10x$
$16x = 50$
$x = 3.125$ hours

$d = 6x$
$d = 6(3.125)$
$d = 18.75$ miles

It took you 3.125 hours to go upstream 18.75mi

12. You are on a boat that goes 91 miles downstream in 7 hours but requires 12 hours to go 84 miles upstream. What is the speed of the boat in still water and what is the speed of the current?

	r	t	d
up	b-c	12	84 = 12(b-c)
down	b+c	7	91 = 7(b+c)

$12(b-c) = 84$ $\quad$ $7(b+c) = 91$
$b-c = 7$ $\quad$ $b+c = 13$

$b-c = 7$
$b+c = 13$
$2b = 20$
$b = 10$ mph
$c = 3$ mph

$d = rt$
$r = \frac{d}{t}$

b = speed of boat
c = speed of current

The speed of the boat would be 10mph in still water and the current would be