

Name: _____

KEY

Date: _____

HW Pre-Calculus 11 6.5 Applications of Rational Functions

1. Jason can fill a water tank in 4 min using a large hose. He takes 6 min using a smaller hose. How long will he take if he uses both hoses?

$$\frac{x}{4} + \frac{x}{6} = 1$$

$$4x + 6x = 24$$

$$x = 24/10$$

2.4 hours

2. Andrew can deliver 500 handbills in 2h. Amos can deliver the same number in 3h. How long will they take to deliver 500 handbills if they work together?

$$\frac{x}{4} + \frac{x}{3} = 1$$

$$x = \frac{12}{7}$$

$$3x + 4x = 12$$

$$7x = 12$$

$$x = 1\frac{5}{7} \text{ hours.}$$

3. Mario can take inventory at the store in 30min. His partner, Carmen, can take inventory in 20min. If they work together, how long will the inventory take?

$$\frac{x}{30} + \frac{x}{20} = 1$$

$$x = 12 \text{ min} //$$

$$20x + 30x = 600$$

$$50x = 600$$

4. Together David and Larry can finish a job in 9 hours. It would take David 15 hours to do the job by himself. How long would it take Larry to do the job?

$$\frac{9}{15} + \frac{9}{L} = 1$$

$$\frac{9}{L} = \frac{6}{15}$$

$$\frac{9}{L} = 1 - \frac{9}{15}$$

$$L = \frac{9 \cdot 15}{6} = \frac{45}{2} = 22.5 \text{ hours}$$

5. On a highway between Vancouver to Kelowna, the speed limit is 90km/hr and the distance is 390km. Most cars take about 4 hours and 20minutes. Some marks travel faster than 90km/hr and some slower, taking either more or less time respectively.

- a. If someone travels at 120km/hr, how much time will they save? At what speed



$$t = \frac{390 \text{ km}}{120 \text{ km/hr}}$$

$$= 3.25 \text{ hr} = 3 \text{ hr } 15 \text{ min}$$

They save 1 hr and 5 min //

- b. At what speed does it take to make the trip in 4 hours?

$$s = \frac{D}{t} = \frac{390}{4}$$

$$= 97.5 \text{ km/hr}$$

$$\begin{array}{r} 97.5 \\ 4 \overline{) 390} \\ \underline{36} \\ 30 \\ \underline{28} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

6. The average cost "A" dollars, of printing the school agenda is given by the equation: $A = \frac{2500 + 1.25n}{n}$,

where "n" is the number printed.

a. Determine the average cost when 500 agendas are printed

$$A = \frac{2500 + 1.25(500)}{500} = \frac{500(5 + 1.25)}{500} = \$6.25 //$$

b. Determine the number of agendas that are printed when the average cost is \$8.00?

$$8 = \frac{2500 + 1.25n}{n} \quad 6.75n = 2500$$

$$8n = 2500 + 1.25n \quad n = \frac{2500}{6.75} = 370.370 //$$

7. On the way from Vancouver to Seattle, the speed limit is 110km/h. Since the distance between the cities is approximately 230km, a trip between the two cities is about 2.1hours (Excluding border wait time). Cars travelling faster can reach their destination within 2.1 hours.

a. Let "s" represent the change in speed compared with 110km/h. Let "t" represent the change in time compared with 2.1hrs. Write "t" as a function of "s"



$$t = \frac{230\text{km}}{110 + s} - \frac{230}{110}$$

← THIS EQUATION WILL GIVE A NEGATIVE VALUE TO WHICH THE TIME SAVED BY GOING 'S' km/hr faster.

b. How much time will you save driving at 125km/h?

$$t = \frac{230}{125} - \frac{230}{110}$$

$$= 1.84 - 2.1 = -0.26 \text{ hr} \leftarrow \text{you save 15.6 min} //$$

c. At what speed does it take to save 10min?

$$\frac{1}{6} = \frac{230}{x} - \frac{230}{110}$$

$$\frac{1}{6} + \frac{230}{110} = \frac{230}{x}$$

$$2.257 = \frac{230}{x}$$

$$x = 101.88 \text{ km/hr.}$$

8. A group of hikers need to travel 80km from Camp A to Camp B and then 128km from Camp B to Camp C. It takes two days more to travel from B to C than from A to B. The average speed from A to B is also 3km more than the average speed from B to C. What was the average speed of travel from Camp A to B?

	S	T	D
AB	S+3	t	80
BC	S	t+48	128

TIME TO TRAVEL AB + 48 = TIME TO TRAVEL BC

$$\frac{80}{S+3} + 48 = \frac{128}{S}$$

$$80S + 48(S)(S+3) = 128(S+3)$$

$$80S + 48S^2 + 144S = 128S + 384$$

$$48S^2 + 96S - 384 = 0$$

$$S^2 + 2S - 8 = 0$$



$$\begin{array}{r} 2 \\ 48 \end{array} \begin{array}{r} 2 \\ 128 \end{array}$$

$$\begin{array}{r} \times 3 \\ \times 3 \\ \hline 4 \end{array} \begin{array}{r} \times 3 \\ \times 3 \\ \hline 384 \end{array}$$

$$\begin{array}{r} 13 \\ 444 \\ -128 \\ \hline 16 \end{array}$$

The Avg sp. From A to B
 is $s+3 = 2+3$
 $= 5 \text{ km/hr}$

$$\begin{cases} (s+4)(s-2) = 0 \\ s \neq -4 \quad \sqrt{s=2} \end{cases}$$

9. An airplane flies 900km with a tailwind and then returns the same distance against the wind. The round trip last 7 hours. If the airplane's speed in still air is 280km/hr, what is the speed of the wind?

	S	T	D
→	$280+x$	$\frac{900}{280+x}$	900
←	$280-x$	$\frac{900}{280-x}$	900



Sum Times Add to 7h.

$$\frac{900}{280+x} + \frac{900}{280-x} = 7$$

$$900(280-x) + 900(280+x) = 7(280-x)(280+x)$$

$$9(280) - 900/x + 280(280) + 280/x = 7(280^2 - x^2)$$

$$1800(280) = 7(280)^2 - 7x^2$$

$$7x^2 = 7(280)^2 - 1800(280)$$

$$x^2 = 280^2 - 1800(40)$$

$$x^2 = 78400 - 72000$$

$$x^2 = 6400$$

$$\boxed{x = 80 \text{ km/h}}$$