

Name: key

Date: _____

1. **(Wind/Current)** A plane flies 1060 miles with the wind in the same time it can go 790 miles against the wind. The speed of wind is 62 miles per hour. What is the speed of the plane?

$$\frac{1060}{r+62} = \frac{790}{r-62}$$

$$1060r - 65,720 = 790r + 48,980$$

$$270r = 114,700$$

$$r = 424.8$$

| | Distance (mi) | Average Speed (mi/h) <i>plane \pm wind</i> | Time (h) |
|--------------|---------------|--|---------------------|
| With Wind | 1060 | $r+62$ | $\frac{1060}{r+62}$ |
| Against Wind | 790 | $r-62$ | $\frac{790}{r-62}$ |

The plane is going 424.8 mi/h

2. **(Wind/Current)** On a river, a kayaker travels 2 mi upstream and 2 mi downstream in a total of 5 h. In still water, the kayaker can travel at an average speed of 3 mi/h. Based on this information, what is the average speed of the current of this river? What is the actual speed going upstream? Round to the nearest hundredth.

LCD = (3-c)(3+c)

$$\frac{2(3-c)(3+c)}{3-c} + \frac{2(3-c)(3+c)}{3+c} = 5$$

| | Distance (mi) | Average Speed (mi/h) <i>speed \pm current</i> | Time (h) |
|------------|---------------|---|-----------------|
| Upstream | 2 | $3-c$ | $\frac{2}{3-c}$ |
| Downstream | 2 | $3+c$ | $\frac{2}{3+c}$ |

The current is going 2.57 mi/h.
The speed upstream is $3-c$, so $3-2.57$ is 0.43 mi/h

$$6+2c + 6-2c = 5(9-c^2)$$

$$12 = 45-5c^2$$

$$-33 = -5c^2$$

$$\sqrt{c^2} = \sqrt{6.6}$$

$$c = 2.57$$

3. **(Work)** Natalie can finish a 500-piece puzzle in about 8 hours. When Natalie and Renzo work together, they can finish a 500-piece puzzle in about 4.5 hours. About how long will it take Renzo to finish a 500-piece puzzle if he works by himself?

$$\begin{array}{l} \text{Natalie's rate} \\ \times \text{ hours worked} \end{array} + \begin{array}{l} \text{Renzo's rate} \\ \times \text{ hours worked} \end{array} = \begin{array}{l} \text{1 complete} \\ \text{puzzle} \end{array}$$

$$\frac{4.5}{8} + \frac{4.5}{x} = 1 \quad \text{LCD} = 8x$$

$$\frac{\text{together}}{\text{alone}} + \frac{\text{together}}{\text{alone}} = 1$$

$$\begin{aligned} 4.5x + 36 &= 8x \\ 36 &= 3.5x \\ x &= 10.3 \end{aligned}$$

It will take Renzo 10.3 hours working alone.

4. **(Work)** Julien can lay mulch in a yard in 20 minutes. Together Julien and Remy can lay mulch the same yard in 11 minutes. How long will it take Remy to lay mulch in the yard when working alone?

$$\begin{array}{l} \text{Julien's rate} \\ \times \text{ min worked} \end{array} + \begin{array}{l} \text{Remy's rate} \\ \times \text{ min worked} \end{array} = \begin{array}{l} \text{1 complete} \\ \text{job} \end{array}$$

$$\frac{11}{20} + \frac{11}{x} = 1 \quad \text{LCD} = 20x$$

$$\begin{aligned} 11x + 220 &= 20x \\ 220 &= 9x \\ x &= 24.4 \end{aligned}$$

It will take Remy 24.4 minutes alone.