Algebra I: Skills Check –Dimensional Analysis

Name: _____ Date: _____

Dimensional Analysis: Solve each problem and make sure that every number has a unit. Place your answer in the blank provided.

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_____ 1. Eighty miles per hour is how many feet per second? (1 mi = 5,280 ft)

$\frac{80\text{mi}}{\text{hr}} \mid \frac{5280\text{ft}}{1\text{ mile}} \mid \frac{1\text{hr}}{60\text{ min}} \mid \frac{1\text{min}}{60\text{sec}}$ $\frac{422400}{3600} =$ 117.3 ft/sec

_____ 2. If a 3 day rafting trip covers a distance of 45 miles and you are expected to raft 6 hours each day, how many miles must you raft each hour? yes

$\frac{45\text{miles}}{3\text{ days}} \mid \frac{1\text{ day}}{6\text{ hours}} =$ 2.5 Mph

IF you got .4 as an answer, you need to flip your chart. You're in hours per mile instead of miles per hour.

_____ 3. A garden hose fills a swimming pool at a rate of 45 gallons per hour. If it takes 3 hours to fill up the swimming pool, what is the volume of the pool?

$\frac{45\text{ g}}{1\text{ hr}} \mid \frac{3\text{ hr}}{} =$ 135g

Unit Conversion Problems

Name: _____ Date: _____

1. A machine can manufacture 1800 pencils in 30 minutes. At this same rate, how many minutes will it take to manufacture 3000 pencils?

Final unit

$$\frac{3000 \text{ pencils}}{1800 \text{ pencils}} \cdot \frac{30 \text{ minutes}}{} = 50 \text{ minutes}$$

2. In 3 hours a car traveled 180 kilometer. At the same average rate, how many kilometers can the car travel in 5 hours.

Final

$$\frac{5 \text{ hours}}{3 \text{ hours}} \cdot \frac{180 \text{ Kilometers}}{} = 300 \text{ k}$$

3. Which expression could be used to change 8 kilometers per hour to meters per minute?

A. $\frac{8 \text{ km}}{\text{hr}} \cdot \frac{\text{km}}{1000 \text{ m}} \cdot \frac{\text{hr}}{60 \text{ min}}$

B. $\frac{8 \text{ km}}{\text{hr}} \cdot \frac{1000 \text{ m}}{\text{km}} \cdot \frac{60 \text{ min}}{\text{hr}}$

C. $\frac{8 \text{ km}}{\text{hr}} \cdot \frac{1000 \text{ m}}{\text{km}} \cdot \frac{\text{hr}}{60 \text{ min}}$ meters/min ✓

D. $\frac{8 \text{ km}}{\text{hr}} \cdot \frac{\text{km}}{1000 \text{ m}} \cdot \frac{60 \text{ min}}{\text{hr}}$

4. Expressed as meters per minute, 60 kilometers per hour is equivalent to

A. 3.6 m/minute B. 36 m/minute

C. 100 m/minute D. 1,000 m/minute

$$\frac{60 \text{k}}{1 \text{h}} \cdot \frac{1000 \text{m}}{1 \text{K}} \cdot \frac{1 \text{h}}{60 \text{m}} = \frac{60{,}000 \text{ m}}{60 \text{ min}}$$

5. There are 12 players on a basketball team. Before a game, both ankles of each player are taped. Each roll of tape will tape three ankles. Which product can be used to determine the number of rolls of tape needed to tape the players' ankles?

A. $12 \text{ players} \cdot \frac{1 \text{ player}}{2 \text{ ankles}} \cdot \frac{3 \text{ ankles}}{1 \text{ roll}}$

B. $12 \text{ players} \cdot 2 \text{ ankles} \cdot \frac{3 \text{ rolls}}{1 \text{ ankle}}$

C. $12 \text{ players} \cdot \frac{2 \text{ ankles}}{1 \text{ player}} \cdot \frac{1 \text{ roll}}{3 \text{ ankles}}$

D. $12 \text{ players} \cdot \frac{1 \text{ roll}}{3 \text{ ankles}}$

6. A car is traveling at 60 miles per hour. How many miles per minute is the car traveling?

A. 1 B. $\frac{1}{60}$ C. $\frac{1}{360}$ D. 3600

$$\frac{60 \text{ miles}}{60 \text{ min}} = \frac{1 \text{ mile}}{1 \text{ min}}$$

7. Which expression can be used to change 75 kilometers per hour to meters per minute?

A. $\frac{75 \text{ km}}{1 \text{ hr}} \times \frac{1 \text{ km}}{1{,}000 \text{ m}} \times \frac{1 \text{ hr}}{60 \text{ min}}$

B. $\frac{75 \text{ km}}{1 \text{ hr}} \times \frac{1 \text{ km}}{1{,}000 \text{ m}} \times \frac{60 \text{ min}}{1 \text{ hr}}$

C. $\frac{75 \text{ km}}{1 \text{ hr}} \times \frac{1{,}000 \text{ m}}{1 \text{ km}} \times \frac{1 \text{ hr}}{60 \text{ min}}$

D. $\frac{75 \text{ km}}{1 \text{ hr}} \times \frac{1{,}000 \text{ m}}{1 \text{ km}} \times \frac{60 \text{ min}}{1 \text{ hr}}$

Important Problems to Understand for Quiz 1

miles → feet → meters ✓
hours → minutes - sec

John Isner serves 140 miles per hour. How fast is that in meters per second? (Similar to Dimensional Analysis notes and Unit Conversions #2 back page)

$$\frac{140\text{ miles}}{\text{hour}} \cdot \frac{5280\text{ ft}}{1\text{ mile}} \cdot \frac{1\text{ meter}}{3.28\text{ ft}} \cdot \frac{1\text{ hr}}{60\text{ min}} \cdot \frac{1\text{ min}}{60\text{ sec}} = \frac{739200\text{ m}}{11808\text{ s}} = 62.6\ \frac{\text{met}}{\text{sec}}$$

A mango farm contains 1250 mango trees. Each tree produces an average of 160 mangoes during the summer. How many such mango farms are needed to produce 8,000,000 mangoes? (from notes)

$$\frac{8{,}000{,}000\text{ mangoes}}{1} \cdot \frac{1\text{ tree}}{160\text{ mangoes}} \cdot \frac{1\text{ farm}}{1250\text{ trees}} = \frac{8000{,}000}{200{,}000} = 40\text{ farms}$$

You're throwing a pizza party for 15 people and figure that each person will eat 4 slices. You call up the pizza place and learn that each pizza will cost you $14.78 and it will be cut into 12 slices. How much is the pizza going to cost you? You only have $70. Will you have enough money? (from dimensional analysis CW)

$$\frac{15\text{ people}}{1} \cdot \frac{4\text{ slices}}{1\text{ people}} \cdot \frac{1\text{ pizza}}{12\text{ slices}} \cdot \frac{\$14.78}{1\text{ pizza}} = \$73.90$$

Not enough money

Also look at the "dimensional analysis skills check" from Friday, and the Practice Problems. You notes and other homework/classwork should also be helpful.