

8th Grade Assignment – Week #25

Group Assignments:

For Tuesday and Thursday:

- Work on problems #1-3 on *Proportions & Dimensional Analysis* **Group Sheet #3**
- Look at *Proportions & Dimensional Analysis* **Practice Sheet #5**, and choose the more difficult ones to do in your group work. (The rest of the problems should be done individually.)
- **Puzzle! A Very Large Hotel**
On the first day of August, only one room in a hotel was full. On the second day, two rooms were full. On the third day, four rooms were full. And on the fourth day, eight rooms were full. So it continued, doubling the number of full rooms, until, on the last day of August, the hotel was exactly full.
 - a) How many rooms are there in the hotel?
 - b) On what day did the hotel become half full?

Individual Work

- As much as you can, do the problems on *Proportions & Dimensional Analysis* **Practice Sheet #5**.
- *Flashcards*. Keep working on the measurement flashcards from Week #23.

Proportions & Dimensional Analysis – Group Sheet #3

Are there too many people in the world?

Note: You are not allowed to use the *Conversion Table* for this worksheet. Instead, the following estimations will help you:

- The diameter of the Earth is 7920 miles.
- Approximately 70.8% of the Earth is covered with water.
- Approximately 32% of the Earth's land area is "wasteland" (i.e., too rocky, dry, cold, or barren to grow anything). The rest we will consider to be "fertile land" (i.e., farmland, pasture, forest).
- The Grand Canyon has a volume very close to 1000 cubic miles.
- An average person's arm span is about 4'9".
- You may use a rough estimate of 7 billion for the world's population.
- 5280 feet = 1 mile
- 640 acres = 1 square mile

1) *One-dimensional.* If all the people in the world were to join hands to form a line, then how long would that line be? How many times around the equator would this line of people stretch?

2) *Three-dimensional.* If we took all the people in the world, and put each person in a box that has a floor area of 2000 square feet and eight-foot high ceilings, then what would be the volume of all these boxes added together? How many times bigger than the volume of the Grand Canyon would this be?

3) *Two-dimensional.* How many acres of "fertile land" are there per household? (Assume that everyone is in a four-person household.)

Proportions & Dimensional Analysis – Practice Sheet #5

- 1) **Unit Conversions**
 - a) 400 yd \approx _____ km
 - b) 3 cups \approx _____ mL
 - c) 50 g \approx _____ oz
 - d) 780 cm \approx _____ ft
 - e) 3'9" \approx _____ mm
 - f) $12 \frac{\text{m}}{\text{s}} =$ _____ $\frac{\text{km}}{\text{h}}$
 - g) 40 mph \approx _____ $\frac{\text{m}}{\text{s}}$
 - h) $10 \frac{\text{ft}}{\text{sec}} =$ _____ mph

- 2) Calculate the following. Use the *Conversion Table* only to check your answer. (Hint: 1" \approx 2.54cm, 1m \approx 3.28')

 - a) 1 ft² = _____ in²
 - b) 1 m² = _____ cm²
 - c) 1 in² \approx _____ cm²
 - d) 1 cm² \approx _____ in²
 - e) 1 m² \approx _____ ft²
 - f) 1 ft² \approx _____ m²
 - g) 1 in³ \approx _____ cm³
 - h) 1 m³ \approx _____ ft³

- 3) Use the exchange rates from the previous homework sheet. Use the *Chain Method*, if helpful.
 - a) \$600 = _____ pesos
 - b) 8560 pesos = \$_____
 - c) \$80 = ¥_____ (yen)
 - d) ¥1,000,000 = \$_____
 - e) \$50 = £_____ (pounds)
 - f) £50 = \$_____
 - g) ¥50000 = £_____
 - h) 5300 pesos = ¥_____

- 4) A machine can pump 500ℓ of water in 25 minutes. How much can it pump in 3 hours?

- 5) Mary can tune-up 26 bikes in one 8-hour day.
 - a) How many bikes can she tune-up in a 40-hour week?
 - b) How many bikes can she completely tune-up in five hours?
 - c) How long does it take her to tune-up 80 bikes?

- 6) Jane's car has a fuel efficiency of 34 mpg. What is this in km/ℓ?

- 7) Which is traveling faster, a plane flying at 720 km/h or one flying at 240 m/s?

- 8) The speed of light is approximately 186,000 mi/sec.
 - a) What is this in mph?
 - b) How far does light travel in 3 minutes?

- 9) A snail is moving at a rate of an inch every 20 seconds.
 - a) What is the speed of the snail in inches per second?
 - b) What is the speed of the snail in feet per hour?
 - c) What is the speed of the snail in miles per hour?
 - d) How far does the snail go in 45 minutes?
 - e) How long does it take the snail to go 27 feet?

- 10) What is the density (in g/cm³) of a cube that weighs 1.6 kg and has edges that are 5.3cm long?

- 11) A concrete block measures 30cm by 15cm by 20cm. What does the block weigh (in kg) if the density of concrete is 2.1 g/cm³?

- 12) What is the volume (in cubic inches) of three pounds of gold?

- 13) An empty container weighs 250g and has a capacity of 1750 cm³. What is the total weight (in kg) of the container when it is filled...
 - a) with water?
 - b) with oil? (The density of oil is \approx 0.87g/cm³.)
 - c) with Mercury?