

Warmup

① Simplify

$$4x^3 - 12x^2 + 4x - (14x^3 + 4x^2 - 10)$$

~~$$4x^3 - 12x^2 + 4x - 14x^3 - 4x^2 + 10$$~~

$$-10x^3 - 16x^2 + 4x + 10$$

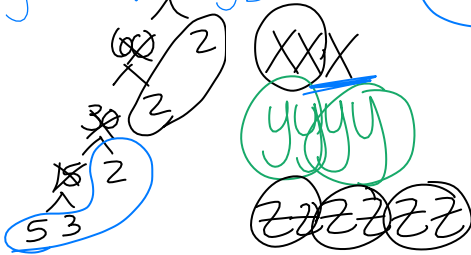
② Multiply

$$(\sqrt{3}-1)(3\sqrt{7}-\sqrt{3})$$

| | | |
|--------------|---------------|---------------|
| | $\sqrt{3}$ | -1 |
| $3x\sqrt{7}$ | $3x\sqrt{21}$ | $-3x\sqrt{7}$ |
| $-\sqrt{3}$ | $-1\sqrt{9}$ | $\sqrt{3}$ |

$$3x\sqrt{21} - 3x\sqrt{7} - 3 + \sqrt{3}$$

③ Simplify $-4x\sqrt{18x^3y^4z^6}$



$$-4x \cdot 2 \cdot x \cdot y \cdot y \cdot z \cdot z \cdot z \sqrt{30x}$$

$$-8x^2y^2z^3\sqrt{30x}$$

Module 0.9

Name: _____

Dimensional Analysis is the process of converting units. Use either the conversion factors that are given and/or some common conversion factors you may know to complete the problems below.

1.) A family pool holds 10,000 gallons of water. How many cubic meters is this? (264.2 gal = 1 cubic m)

$$\frac{10000 \text{ gal}}{1} \cdot \frac{1 \text{ m}^3}{264.2 \text{ gal}} = 37.9 \text{ m}^3$$

2.) The average American student is in class 330 minutes/day. How many hours/day is this?

$$\frac{330 \text{ mins}}{1 \text{ day}} \cdot \frac{1 \text{ hr}}{60 \text{ mins}} = 5.5 \text{ hrs/day}$$

3.) How many seconds are there in 1 year?

$$\frac{1 \text{ yr}}{1} \cdot \frac{365 \text{ days}}{1 \text{ yr}} \cdot \frac{24 \text{ hr}}{1 \text{ day}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} = 31,536,000 \text{ secs}$$

4.) Pepsi puts 355 ml of pop in a can. How many drops is this? (20 drops = 1 ml)

$$\frac{355 \text{ ml}}{1} \cdot \frac{20 \text{ drops}}{1 \text{ ml}} = 7100 \text{ drops}$$

5.) Sixty miles/ hour is how many ft/sec? (5,280 ft = 1 mi)

$$\frac{60 \text{ miles}}{1 \text{ hr}} \cdot \frac{5280 \text{ ft}}{1 \text{ mile}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = 88 \text{ ft/sec}$$

6.) The distance from Santa Maria to Los Alamos is 16.25 mi. What is the distance in km? (0.621 mi = 1 km)

$$\frac{16.25 \text{ miles}}{1} \cdot \frac{1 \text{ km}}{0.621 \text{ miles}} = 26.17 \text{ km}$$

7.) In the US a common speed limit is 55 miles per hour. Does this correspond to a European speed limit of

a) 40 km/h

b) 60 km/h

c) 80 km/h

$$\frac{55 \text{ miles}}{1 \text{ hr}} \cdot \frac{1 \text{ km}}{0.621 \text{ miles}} = 88 \text{ km/hr}$$

$$1 \text{ in} = 2.54 \text{ cm}$$

8) A typical student ruler is 12 inches long. How long would it be in centimeters?

$$\frac{12 \cancel{\text{ in}}}{1} \cdot \frac{2.54 \text{ cm}}{1 \cancel{\text{ in}}} = \boxed{30.48 \text{ cm}}$$

9) On the bottom of a food container, you can often read its capacity. One such container said 64 oz. Is it bigger than one that is 2.2L? If so, how much longer? If not, how much smaller?

~~1 L = 1000 ml~~ ~~1 gal = 4 qt~~ ~~1 qt = 2 pts~~ ~~1 pt = 2 cups~~ ~~1 cup = 8 oz~~

$$\frac{2.2 \cancel{\text{ L}}}{1} \cdot \frac{1.057 \cancel{\text{ qt}}}{1 \cancel{\text{ L}}} \cdot \frac{2 \cancel{\text{ pts}}}{1 \cancel{\text{ qt}}} \cdot \frac{2 \cancel{\text{ cups}}}{1 \cancel{\text{ pt}}} \cdot \frac{8 \text{ oz}}{1 \cancel{\text{ cup}}} = 74.41 \text{ oz}$$

2.2L bigger
10.41 oz bigger

132 lbs

10) Angela weighs 56 kg. Theresa weighs 128 lbs. Judie weighs 137 lbs and Elizabeth weighs 60 kg. Write the girls in order from lightest to heaviest.

$$\frac{56 \cancel{\text{ kg}}}{1} \cdot \frac{2.2 \text{ lbs}}{1 \cancel{\text{ kg}}} = 123.2$$

$$\frac{60 \cancel{\text{ kg}}}{1} \cdot \frac{2.2 \text{ lbs}}{1 \cancel{\text{ kg}}} = 132 \text{ lbs}$$

Angela, Theresa, Eliz, Judie
(light) (heavy)

11) You are driving a race car with Mr. Peanut in the passenger seat. Your current speed is 110 miles per hour. What is the speed in inches per second?

$$\frac{110 \cancel{\text{ miles}}}{1 \cancel{\text{ hr}}} \cdot \frac{5280 \cancel{\text{ ft}}}{1 \cancel{\text{ mile}}} \cdot \frac{12 \cancel{\text{ in}}}{1 \cancel{\text{ ft}}} \cdot \frac{1 \cancel{\text{ hr}}}{60 \cancel{\text{ mins}}} \cdot \frac{1 \cancel{\text{ min}}}{60 \cancel{\text{ secs}}} =$$

$$\boxed{1936 \text{ in/sec}}$$

1 mile = 5280 ft

1) 146 lbs into
a) kg b) grams