

1. (2 points)

What is the difference between a law and a theory?

- (a) A law includes math and a theory does not include math.
- (b) A theory includes math and a law does not include math.
- (c) Both laws and theories predict fundamental chemical phenomena, but a theory offers an explanation for why.
- (d) Theories are always older than laws.
- (e) Laws require more supporting data than theories.

(c) (2 points)

Both laws and theories predict fundamental chemical phenomena, but a theory offers an explanation for why.

2. (2 points) How many mL are in a liter?

- (a) 0.001
- (b) 1
- (c) 10
- (d) 100
- (e) 1000

(e) (2 points)

1000 mL = 1 L

3. (2 points) You are buying a new area rug and want some extra cash to fund your passion for interior design. You measure the dimensions of your old rug as 6 ft long and 3.00 ft wide. You use the formula $A = lw$ to calculate the area of the rug. When you post the old rug on online how should you report the area? Remember, scientists live in your neighborhood!

- (a) 18 ft²
- (b) 18.0 ft²
- (c) 18.00 ft²
- (d) 2×10^1 ft²
- (e) 20. ft²

(d) (2 points)

6 ft has one sig. figs. and 3.00 feet has three sig figs. Using the multiplication/division rule our final answer must have 1 significant digit. To get one sig fig, we need to round 18 up to 20 and then represent 20 using scientific notation to arrive at 2×10^1 ft². We cannot stay with 20 because 20 has an ambiguous number of significant figures. If I wrote the answer as "20." the period means the 0 is significant and we have two sig. figs.

4. (2 points) You decide to share a box of Dots with a family member. You eat exactly half a box of dots (4 serving sizes). Shown below are the nutrition facts for a box of Dots.



Nutrition Facts	
Varied servings per container	
Serving size	8 Dots (29g)
Amount per serving	
Calories	100
% Daily Value	
Total Fat 0g	0%
Sodium 10mg	0%
Total Carbohydrate 24g	9%
Total Sugars 15g	
Includes 15g Added Sugars	30%
Protein 0g	
Not a significant source of saturated fat, trans fat, cholesterol, dietary fiber, vitamin D, calcium, iron and potassium.	

How many g of Dots do you consume by eating half the box (4 serving sizes) and knowing that one serving size is 8 Dots and that one Dot weighs 3.63 g?

- (a) 29.0 g
- (b) 58.0 g
- (c) 87.0 g
- (d) 116 g
- (e) 116.0 g

(d) (2 points)

$$m = 4 \text{ serving sizes} \times \frac{8 \text{ Dots}}{1 \text{ serving size}} \times \frac{3.625 \text{ g Dots}}{1 \text{ Dot}}$$

$$m = 116 \text{ g Dots}$$

5. (2 points) Adults under age 65 typically receive 15.0 μg of the influenza vaccine Fluzone. Adults 65 and older typically receive 60.0 μg of Fluzone. For adults 65 and older, the vial of Fluzone has a concentration of $\frac{0.0857 \text{ g Fluzone}}{1 \text{ L vaccine}}$. Calculate how many mL of vaccine are required to deliver the 60.0 μg of Fluzone to an adult who is over age 65.

- (a) 0.500 mL
- (b) 0.700 mL
- (c) 1.00 mL
- (d) 1.10 mL
- (e) 1.20 mL

(b) (2 points)

$$V = 60.0 \times 10^{-6} \text{ g Fluzone} \times \frac{1 \text{ L vaccine}}{0.0857 \text{ g Fluzone}} \times \frac{1000 \text{ mL vaccine}}{1 \text{ L vaccine}}$$

$$V = 0.700 \text{ mL}$$