

Unit 3 Test Review: Moles and Math

big = bigger than 1
 small = smaller than 1

⊕ = positive exponent ⊖ = negative exponent

1. Fill in the chart.

Standard Notation		Scientific Notation (coefficient x 10 ^{exponent})
7,801,000,000	big	⊕ 7.801 × 10 ⁹
0.000020	small	⊖ 2.0 × 10 ⁻⁵
714,000	big	⊕ 7.14 × 10 ⁵
0.068	small	⊖ 6.8 × 10 ⁻²
Scientific Notation		Standard Notation
1.9620 × 10 ⁻⁷		0. <u>0000000</u> 19620
4.7 × 10 ¹		47
6.26 × 10 ¹²		6,260,000,000,000
7.026 × 10 ⁻²		0. <u>07026</u>

Complete problems 2-8 using your calculator and E button! Round your answers to two decimal places. Answer in scientific notation.

2. $\frac{1.7 \times 10^{-14}}{7.41 \times 10^{31}} = 2.29 \times 10^{-46}$

3. $1.74 \times 10^{-8} * \frac{1}{6.38 \times 10^{11}} = 2.73 \times 10^{-20}$

4. $9.17 \times 10^{10} * \frac{4.12 \times 10^{-3}}{7.67 \times 10^6} * \frac{8.67 \times 10^{15}}{3.09} = 1.38 \times 10^{17}$

5. What is the molar mass of zirconium? ^{#40} $\frac{91.22 \text{ g/mol}}{1 \text{ mol}}$ (from P.T.)
(mass of 1 mol)

6. Ariana made her aluminum sculpture out of 0.78 moles of aluminum. What is the mass of her sculpture?

$$0.78 \text{ mol} \times \frac{26.98 \text{ g}}{1 \text{ mol}} = 21.04 \text{ g Al}$$

unit substance

7. If you have a gas canister that contains 1.08×10^{23} atoms of neon,
a. How many moles of Ne do you have?

$$1.08 \times 10^{23} \text{ atoms} \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ atoms}} = 0.18 \text{ mol Ne}$$

b. What is the mass of the neon gas?

$$1.08 \times 10^{23} \text{ atoms} \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ atoms}} \times \frac{20.18 \text{ g}}{1 \text{ mol}} = 3.62 \text{ g Ne}$$

8. What is the molar mass of potassium? ^{#19} $\frac{39.10 \text{ g/mol}}{1 \text{ mol}} = \frac{39.10 \text{ g}}{1 \text{ mol}}$

9. A large iron nail has a mass of 12.87 g. How many atoms of iron are present in this sample?

$$12.87 \text{ g} \times \frac{1 \text{ mol}}{55.85 \text{ g}} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mol}} = 1.39 \times 10^{23} \text{ atoms Fe}$$

10. You have inherited an ugly silver bracelet from your great aunt that has a mass of 65.3 grams. How many moles of silver are in the bracelet?

$$65.3 \text{ g} \times \frac{1 \text{ mol}}{107.87 \text{ g}} = 0.61 \text{ g Ag}$$

11. Calculate how many atoms are in 2.38 moles of sulfur.

$$2.38 \text{ mol} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mol}} = 1.43 \times 10^{24} \text{ atoms S}$$

12. What is the molar mass of barium? ^{#56} $\underline{137.33 \text{ g/mol}}$ = $\frac{137.33 \text{ g}}{1 \text{ mol}}$

13. What is the molar mass of an element if a 5 moles sample of the element has a mass of 80 grams?
(HINT: Molar mass has units of grams **per** mole!)

$$80 \text{ g} / 5 \text{ mol} = 16 \text{ g/mol} \quad (\text{oxygen!})$$

↑ # on the P.T.

14. You are given a 3 mole sample of an unknown element. Your sample has a mass of 120 g.

a. What is the molar mass of your unknown element?

$$120 \text{ g} / 3 \text{ mol} = 40 \text{ g/mol} \quad \left(\frac{40 \text{ g}}{1 \text{ mol}} \right)$$

↓

b. What is the identity of this element? calcium