

## Measurement HW - 1 Answers

1. In your own words, describe the differences between qualitative and quantitative measures.

Give an example of each that does not pertain to your teacher's mass.

A quantitative measurement requires numbers and units.

A qualitative measure is just a description.

Example of quantitative: 22.4 Liters of helium gas; Example of qualitative: helium gas is colorless.

2. Explain the difference between the vocabulary words accurate and precise.

Accurate measures are close to the actual values, they are close to correct. Precise measurements are all close together; they could be accurate, or they could be close together and inaccurate.

Precise measurements that are inaccurate show students measured correctly with tools that are not accurate.

3. Put these chemical symbols in density order, with the lowest density element at the top:

platinum, mercury, lead, titanium, niobium, and silver

symbol	name	density g/cm <sup>3</sup>
Pt	platinum	21.450
Hg	mercury	13.546
Pb	lead	11.350
Ag	silver	10.500
Nb	niobium	8.570
Ti	titanium	4.454

4. Write one short paragraph about something that you like, to help me get to know you a little better. This question is not graded, but will help us "bond" academically (which is a chemistry vocabulary word for another day!)

This is my 15th year teaching chem at Vestal. I love my wife Janet and I love my 2 kids. Sophia is a college senior and smart as they come, Charley is smart too, but he's in the 10th grade at UE. I love my job, I love the band U2, I love chocolate chip cookies, I hate your cell phone, I go out with my friends every Thursday night and I swim a lot to stay healthy body and mind.

I also love movies, mostly older ones without CGI. I read a lot of books and I am very nostalgic, romantic, and happy.

1. A piece of unknown metal is determined to have a volume of 84.6 mL and a total mass of 752.94 grams. Determine which metal it could be. Write a formula first, use units!!! Watch out for SF!

$$\text{Density} = \frac{\text{mass}}{\text{volume}} = \frac{752.94 \text{ g}}{84.6 \text{ mL}} = 8.90 \text{ g/mL} = 8.90 \text{ g/cm}^3$$

This metal must be nickel (look at table S on your reference table for this info).

2. Convert 114°C to Kelvin.  $K = C + 273$        $K = 114 + 273$        $K = 387K$

3. Convert 28.0°C Kelvin also.  $K = C + 273$        $K = 28.0 + 273$        $K = 301K$

1. Convert 370. Kelvin to centigrade.  $K = C + 273$        $370 = C + 273$        $C = 97.^{\circ}C$

2. Convert 239 K to °C also.  $K = C + 273$        $239 = C + 273$        $C = -34.^{\circ}C$

How many SF in each of the measurements below? Write the number, or UN for UNLIMITED SF in each bo

10 grams 1 SF	20. mL 3 SF	30.0 Qts 3 SF	40.1 grams 3 SF
50.01 kg 4 SF	0.80 meters 2 SF	1.09 atm 3 SF	70.0 grams/cm <sup>3</sup> 3 SF
60.00 grams 4 SF	400 miles 1 SF	6.02 x 10 <sup>23</sup> atoms 3 SF	The quotient of 3.45 grams and 6.003 cm <sup>3</sup> 3 SF
3.00 x 10 <sup>-22</sup> moles of H <sup>+1</sup> 3 SF	The product of 333.45 miles and 6.30 hours 3 SF	The sum of 34.5 grams and 20. grams 3 SF	The difference between 88.3°C and 36.3°C 3 SF

Measurement HW #3 Answers

$(4.0 \times 10^4) \times (6.0 \times 10^5) =$  $24 \times 10^9 = 2.4 \times 10^{10}$	$(4.8 \times 10^3) - (2.2 \times 10^2) =$ $(4.8 \times 10^3) - (0.22 \times 10^3) =$ $4.58 \times 10^3$ $4.6 \times 10^3$	$(1.4 \times 10^{-5}) \times (5.67 \times 10^{-6}) =$  $7.938 \times 10^{-11}$ $7.9 \times 10^{-11}$
$(6.0 \times 10^{15}) \div (4.0 \times 10^4) =$  $1.5 \times 10^{11}$	$(3.40 \times 10^{-3}) + (2.1 \times 10^{-2}) =$ $(3.4 \times 10^{-3}) + (21.0 \times 10^{-3}) =$ $24.4 \times 10^{-3}$ $2.4 \times 10^{-2}$	$(5.60 \times 10^{12}) \times (7.102 \times 10^4) =$  $39.7712 \times 10^{16}$ $3.98 \times 10^{17}$
$(2.456 \times 10^7) + (6.034 \times 10^8) =$ $(2.456 \times 10^5) + (6034 \times 10^5) =$ $6036.456 \times 10^5$ $6.036 \times 10^8$	$(3.04 \times 10^5) \div (9.89 \times 10^2) =$  $0.30738119... \times 10^3$ $3.07 \times 10^2$	

You have measured the mass of carbon to be 849.9 g but the actual mass is 860.0 grams. What was your percent error? Explain why your answer is positive or negative.

$$\%E = \frac{MV-AV}{AV} = \frac{849.9 \text{ g} - 860.0 \text{ g}}{860.0 \text{ g}} = -0.0117441 \times 100\% = -1.174\%$$

Measurement HW #4 Answers

1. You measure your height to be 66.4 inches, but your teacher wants you to convert that using dimensional analysis into your height in MILES. (this is a small number) Use units I gave you - stay off of the internet!

$$\frac{66.4 \cancel{\text{ inches}}}{1} \times \frac{1 \cancel{\text{ foot}}}{12 \cancel{\text{ inches}}} \times \frac{1 \cancel{\text{ mile}}}{5280 \cancel{\text{ feet}}} = \frac{66.4}{63360} = 1.05 \times 10^{-3} \text{ miles}$$

2. You watched the women's marathon Olympic race and realized your true calling. You too want to run 26.2 miles at once, and get to wear the cute wreath on your head when you win. Convert that distance to millimeters using proper sig figs.

$$\frac{26.2 \cancel{\text{ miles}}}{1} \times \frac{5280 \cancel{\text{ ft}}}{1 \cancel{\text{ mile}}} \times \frac{12 \cancel{\text{ in}}}{1 \cancel{\text{ ft}}} \times \frac{2.54 \cancel{\text{ cm}}}{1 \cancel{\text{ in}}} \times \frac{10 \cancel{\text{ mm}}}{1 \cancel{\text{ cm}}} = 4.23 \times 10^7 \text{ mm}$$

3. A large hole was dug by a person with a bull dozer. It filled up with 379,300 gallons of rain over the past year. How many milliliters of water is that? (0.946 Liters = 1 quart)

$$\frac{379,300 \cancel{\text{ gal}}}{1} \times \frac{4 \cancel{\text{ Qt}}}{1 \cancel{\text{ gallon}}} \times \frac{0.946 \cancel{\text{ L}}}{1 \cancel{\text{ Qt}}} \times \frac{1000 \cancel{\text{ mL}}}{1 \cancel{\text{ L}}} = 1.435 \times 10^9 \text{ mL}$$