Big Chem Problem Set

PHYSICS SKILLS

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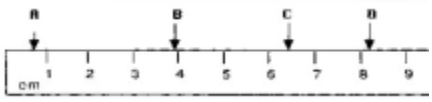
1. For each group of values listed below, write the items in order from largest to smallest. Then state whether the values represent distance, mass, or volume:
   (a) 10 km, 10 pm, 10 µm, 10 dm
   (b) 0.5 µL, 0.5 nL, 0.5 cL
   (c) 1.2 mm, 1.2 km, 1.2 cm
   (d) 3.5 cg, 3.5 g, 3.5 ng, 3.5 µg

2. Estimate the number of centimeters indicated by each of the arrows:



3. Convert the following to scientific notation:
   (a) 1,000,000
   (b) 0.14
   (c)70
   (d) 0.00789

4. Convert the following to common notation:
   (a) 3.00 E 8
   (b) 2.0 E 5
   (c) 1.26 E-6
   (d) 6.350 E-5

5. Perform the following calculations. Express your answer in scientific notation:
   (a) 2.1 E 3 + 2.1 E 2
   (b) 3.25 E 5 – 5.2 E 3
   (c) 8.7 E 6 + 3.1 E

6. Answer the questions below based on your understanding of errors:
   (a) The freezing point of water is 273.2 K, but it was measured at 250.1 K. What is the percentage error?
   (b) The mass of a penny is 2.67 g, but it was measured at 2.55 g. What is the percentage error?
   (c) The air pressure was 101.3 kPa, but the weatherman said it was 101.3 kPa. What is the percentage error?

7. Write the correct facor label setup to convert the measurements below:
   (a) 35 mg = g
   (b) 0.14 dL = µL
   (c) 832.5 nm = µm
   (d) 0.0003 L = pL

8. Show the correct factor label setup that can be used to convert the following:
   (a) If 3 lumps equals 1 clump and 10 clumps equals 1 pile, how many piles are 96 lumps?
   (b) If 1 byte equals 8 bits, 1 kilobyte equals 1,024 bytes, and 1 byte equals 2 nibbles, how many kilobytes is 36 nibbles? How many bits is 48 nibbles?
   (c) Water has a density of 1 g/mL. This means, for water, 1 g = 1 mL. 1 kg = 1,000 g. And, 1 cm^3 = 1 mL. Find the number of milliliters (mL) in 1.6 kg of water, and find the number of kilograms (kg) in 75 mL of water.

9. Rearrange the following equations to solve for x:

   a) $\frac{3x}{y} = \frac{6g}{b}$

   b) $\frac{2x^2}{3} = dg$

   c) PV =nRT, solve for T

   d) $d = \frac{t}{x}$

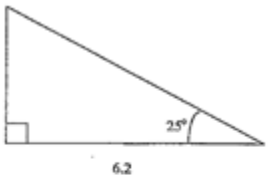
   e) $\frac{2\sqrt{x}}{c} = y$

   f) $F_g = G\frac{m_1 m_2}{r^2}$ for r

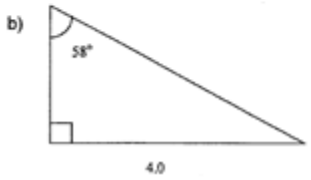
10. If c is the measure of the hypotenuse of a right triangle, find each missing measure. Round answers to the nearest hundredth.
a = 3, b = 4, c = ?
b = 12, c = 13, a = ?
a = 6, c = 10, b = ?
a = 6, c = 12, b = ?

11. Solve for all sides and angles.

a)



b)



12. Solve for each:
(a) r in: $A = p + prt$
(b) t in: $A = p + p^2rt$
(c) l in: $V = lwh$
(d) w in: $v = lw^2h$
(e) d_1 in: $A = \frac{1}{2} d_1d_2$
(f) m in: $y = mx + b$
(g) a in: $p=(100a)/t$
(h) x in: $y = (kx)/z$
(i) r in: $v = pr^2h$

13. What would be the resulting displacement if a snail crawls 2.0 m north and then 3.0 m east? What is the snail's direction from the starting point? *Ans: 3.6 m and 56.3° E of N*

14. A boat can travel 2.30 m/s in still water. If the boat heads directly across a river with a current of 1.50 m/s.
(a) What is the overall velocity of the boat?
(b) At what angle compared to straight across is the boat traveling?
(c) How from fromit's point of origin is the boat after 8.0 seconds?
(d) At what upstream angle (compared to straight across) must the boat travel in order to the other bank directly opposite its starting point?
Ans: (a) 2.75 m/s (b) 33.1° (c) 22m (d) 40.7°

15. How far East has a person walked if he travels 350 m in a direction 25° E of N?
Ans: 148m.

16. Find the magnitude and direction from the horizontal of a 40.0 N upward force and 17.0 N horizontal force to the right.
Ans: 43.5 N at 67°

17. A boat travels east at 13 km/hr when a tide is flowing north at 1.2 m/s. Find the actual velocity and heading of the boat.
Ans: 3.8 m/s at 18.4° N of E

18. A person that swims at 3.2 m/s swims straight across a river with a current of 1.4 m/s. What is the resulting velocity of the swimmer (across and downstream)? At what angle compared to straight across is the swimmer moving?
Ans: 3.5 m/s at 23.6°