

Part 1: Numbers

1. Determine the number of sig figs in each of the following:

- | | | |
|--------------|----------------------|-------------------------|
| a. 52.60 g | e. 18 m | i. 3.42×10^6 s |
| b. 0.0046 cm | f. 52.0 h | j. 9012 rev. |
| c. 2 dogs | g. 1 molecule | k. 0.80 Hz |
| d. 5.002 mm | h. 5×10^2 L | l. 8600 mL |

2. Write the following number using the indicated number of sig figs: 520813592060

- | | |
|---------------|--------------|
| a. 15 sigfigs | c. 3 sigfigs |
| b. 10 sigfigs | d. 1 sigfig |

3. Do the following operations using the correct number of sig figs.

- | | |
|--|---|
| a. $362.0 \times 85 =$ | h. $3.506 \times 100 =$ |
| b. $8.25 \times 10^{-3} \div 16.01 =$ | i. $97 \times 125.62 =$ |
| c. $5.200 \times 10^4 \div 16.80 =$ | j. $36 \div 6.0 =$ |
| d. $15.2 + 9 =$ | k. $925.6 + 180 =$ |
| e. $5.20 + 0.009 =$ | l. $5.21 \times 10^3 + 1.3 \times 10^3 =$ |
| f. $3.270 \times 10^{-1} + 1.1 \times 10^{-1} =$ | m. $5.10 \times 10^{-3} + 2.1 \times 10^{-3} =$ |
| g. $86.2 + 1.1 \times 10^{-3} =$ | n. $7.8 \times 10^{-6} - 1 \times 10^{-7} =$ |

Part 2: Chemistry

1. Write the formulas for the following substances:

- | | |
|--------------------------|------------------------------------|
| a. dinitrogen pentoxide | h. carbon monofluoride trichloride |
| b. copper (II) sulphide | i. lithium oxide |
| c. chromium (IV) bromide | j. oxygen dibromide |
| d. copper (I) acetate | k. magnesium perchlorate |
| e. beryllium sulphite | l. sodium sulphate |
| f. iron (III) hydroxide | m. arsenic trichloride |
| g. cesium bicarbonate | n. ammonium dichromate |

2. Write the correct name for the following substances:

- | | |
|---|---------------------------------|
| a. FCl_3 | f. BaSO_4 |
| b. $\text{Ca}(\text{CH}_3\text{COO})_2$ | g. LiI |
| c. $\text{Li}_2\text{Cr}_2\text{O}_7$ | h. Sr_3P_2 |
| d. H_3PO_4 | i. $\text{Sc}_2(\text{SO}_4)_3$ |
| e. MnI_3 | j. WO_3 |

3. Define the term "mole".

4. Determine the molar mass of the following:

- | | |
|---------------------------------|---|
| a. CCl_4 | c. $\text{Ca}(\text{CH}_3\text{COO})_2$ |
| b. $(\text{NH}_4)_2\text{CO}_3$ | d. $\text{Li}_2\text{Cr}_2\text{O}_7$ |

5. Determine the mass of 2.42 mol of BaSO_4

6. Calculate the number of molecules in 1.52×10^{-2} g of CH_3OH

7. How many atoms of oxygen are in $5.46 \times 10^4 \text{ mol}$ of CO_2 ?
8. How many hydrogen atoms are in 58.0 g of LiAlH_4 ?
9. Write a balanced equation for the reaction between lead (II) nitrate and calcium iodide, then determine the mass of each product made if 2.72 mol of lead (II) nitrate reacts with an excess of calcium iodide.
10. In the above reaction, calculate the mass of each product if 5.68 g of calcium iodide reacts with an excess of lead (II) nitrate.
11. What mass of NH_3 is produced if 4.97 g of H_2 reacts with an excess of N_2 ?
12. Calculate the mass of each product when 6.28 g of CaCO_3 is heated to make CO_2 and CaO .
13. Determine the mass of each product when 5.62 g of $\text{Ca}(\text{CH}_3\text{COO})_2$ reacts with 12.42 g of AgNO_3 .
14. Calculate the mass of each product when 58 mL of 2.42 M AgNO_3 reacts with enough MgI_2 .
15. Determine the mass of each product when 51 mL of $1.42 \times 10^{-1} \text{ M}$ CuNO_3 reacts with 68 mL of $3.4 \times 10^{-1} \text{ M}$ ZnCl_2 .
16. Find the mass of each product when 0.52 g of Na_2CO_3 reacts with 55 mL of 2.4 M CaCl_2 .
17. Calculate the percentage composition by mass of each element in $(\text{NH}_4)_2\text{SO}_4$.
18. Determine the empirical formula of a substance found to contain 3.86 g of Na, 5.38 g of S, and 10.7 g of oxygen.

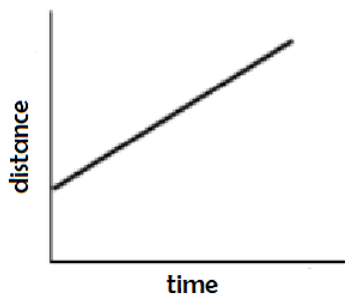
Part 3: Biology

1. Describe some differences between mitosis and meiosis.
2. Define, using examples, the terms:
 - genotype and phenotype
 - homozygous and heterozygous
 - haploid and diploid
3. What is the difference between codominance and incomplete dominance? Use examples.
4. Draw a Punnett square showing the possible offspring from a female with AB blood and a man heterozygous for type A blood.
5. What is a sex-linked trait?
6. Using baldness (an X-linked recessive trait) draw a cross of a female carrier and a normal "haired" male.

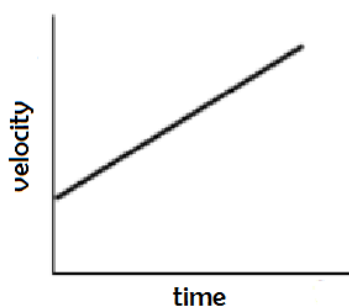
Part 4: Physics

1.) What information can be found from the graphs shown.

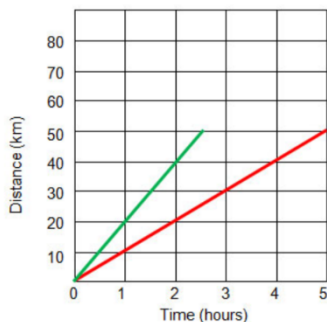
a.



b.



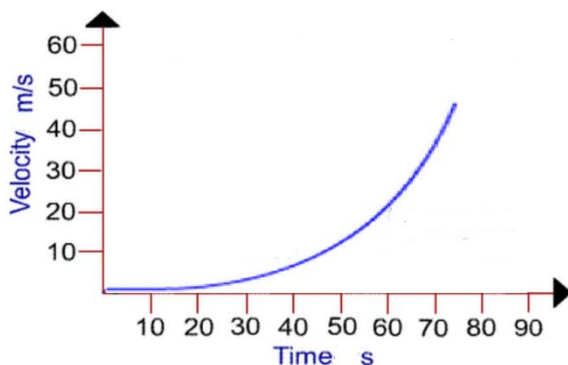
2.)



a. What does the straight line indicate?

b. Calculate the average velocity for both lines.

3.)



a. Determine the acceleration between 0 and 50. s.

b. Determine the acceleration at 63 s.

c. What is the average acceleration for the trip?

4.) Determine the velocity of a rock just prior to impact if it is dropped from a height of 165 m.

5.) Calculate the final velocity of a car that goes from $+23 \frac{m}{s}$ to a new velocity in 25 s if the rate of acceleration is $+0.20 \frac{m}{s^2}$.

6.) Calculate the force of gravity on a 15 kg rock on the Earth's surface.

7.) Calculate the force of gravity between two 10. kg masses if their masses are 15 m apart.

8.) Calculate the momentum of a 2.5 kg object falling at $5.0 \frac{m}{s}$.

9.) What is the momentum of a 2.5 kg bowling ball traveling at $+2.5 \frac{m}{s}$ if it hits a 1.5 kg mass and they both move off together?

10.) A force of $2.65 \times 10^4 N$ is needed to bring a car moving at $+48.0 \frac{m}{s}$ to a halt in 31.0 s. What is the mass of the car?

- 11.) An object is thrown from the ground into the air at an angle of 35° from the horizontal at a velocity of $+21.0 \frac{m}{s}$. How far will the object travel horizontally?
- 12.) An object uniformly accelerates at a rate of $+2.00 \frac{m}{s^2}$. While accelerating at this rate, the object is displaced $1524.6 m$ in a time of $35.0 s$. What velocity did this object reach in this time?
- 13.) An object accelerates uniformly from rest for $9.2 s$. If in this time the displacement of the object is $25.4 m$, what is the acceleration?
- 14.) An object accelerates uniformly from rest. If it travels $31.0 m$ and reaches a velocity of $+22.0 \frac{m}{s}$, how long was the object accelerating?
- 15.) An object initially at rest is uniformly accelerated to a velocity of $+12.6 \frac{m}{s}$ in $3.60 s$. If during this time the displacement of the object was $21.5 m$, what was the rate of acceleration?
- 16.) An object initially traveling at a velocity of $1.7 \frac{m}{s}$ accelerates uniformly at a rate of $+2.5 \frac{m}{s^2}$. During this time of acceleration, the displacement of the object is $27 m$. Find the final velocity.
- 17.) A rabbit is thrown horizontally from the top of a cliff at a velocity of $+25.0 \frac{m}{s}$. If the rabbit takes $3.40 s$ to reach the ground, how far from the base of the cliff did the rabbit hit the ground?
- 18.) While accelerating uniformly from rest, an object is displaced $15.5 m$ in $8.15 s$. What is the velocity at this time?
- 19.) Calculate the kinetic energy of a boulder weighing $50.0 N$ perched on the edge of a cliff $25.0 m$ high.
- 20.) A model airplane of mass $1.5 kg$ moves with a speed of $3.0 \frac{m}{s}$, $5.0 m$ above the ground. Calculate the potential energy of the plane.