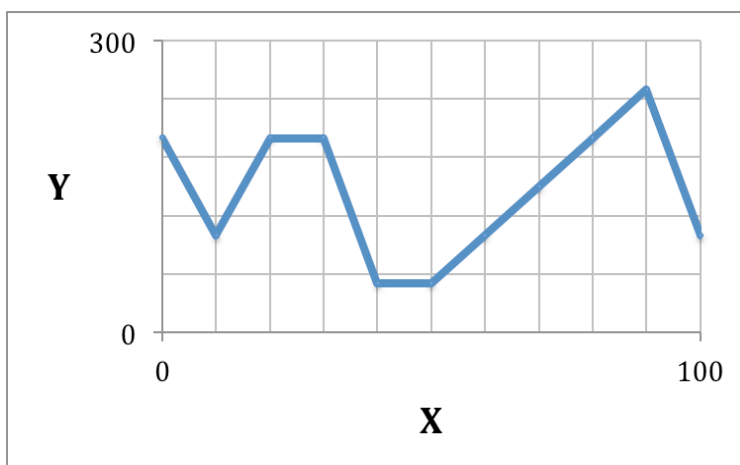*No calculators are permitted on this exam.*
You may use a Periodic Table of the Elements.

Basic mathematical skills

1. What is the sum of the following numbers: 2.34×10^4, $550. \times 10^2$, 0.20×10^3, 1.23×10^{-1}.

2. Find the value of the expression below to the correct number of significant figures.
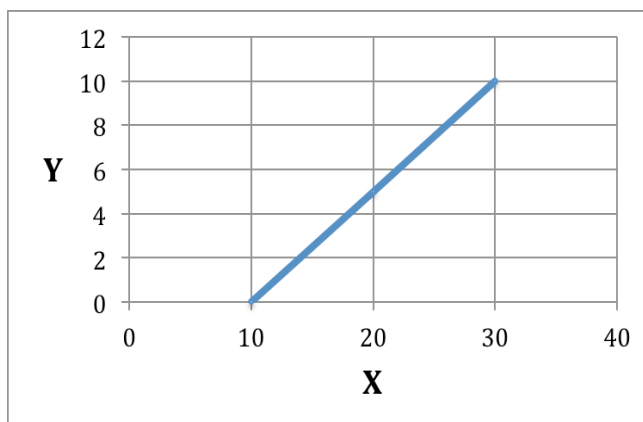
$$\frac{(6.00 \times 10^3)(4.00 \times 10^{-4})}{(8.00 \times 10^{-2})}$$

3. A mixture of marbles contains 8 green, 11 red, and 6 blue marbles. What is the percentage of red marbles in the mixture?

4. For the algebraic equation: $A \cdot B = C \cdot D$ where $D = \dfrac{X}{Y}$, solve for the value of Y.

5. The density of a substance is defined to be $d = \dfrac{m}{V}$. What is the volume of 5.0 g of a substance with a density of 2.0 g/mL?

6. The density of a substance is defined to be $d = \dfrac{m}{V}$. What is the mass of 10.0 mL of a substance with a density of 0.795 g/mL?

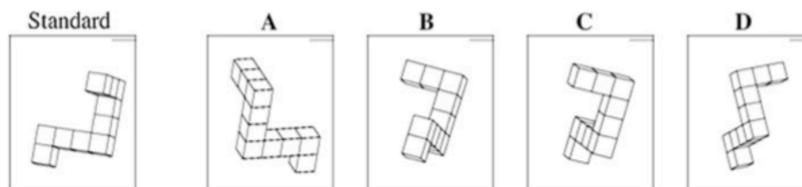7. The graph shows how the Y varies with X. What are the values of Y when X is 30 and 60?

8. What is the value of x in following equation, if a = 2, b = 5 and c = -4? $3a + 2b - 4c = 2x$

9. Solve the following equation for x. $8x - 4b = 4x + c$

10. If $a = b \cdot c$, where **b** is a constant and $d = c \cdot e$, where **d** is a constant, how will **a** change when **e** decreases?

11. Write algebraic equations that describe the following two conditions.
    There are 8 times more yellow marbles (Y) than red marbles (R).
    There are 14 more orange marbles (O) than red marbles (R).

12. A rabbit will eat 7 carrots in 5 days. Assuming sufficient carrots are available and the rate of consumption remains constant, how many days will it take the rabbit to eat 30 carrots?

13. What is the equation of the line depicted in the graph below?

14. Which of the representations (A-D) is consistent with the "Standard" after it is rotated?

15. There are 45,000 marbles in a collection and 12% of them are blue. How many marbles are blue?

Basic Chemistry skills

1. Consider the chemical formula: $Ba_3(PO_4)_2$.
   a) How many total atoms are represented?
   b) How many atoms of O are there for every Ba atom?

2. If barium sulfate is $BaSO_4$, potassium phosphate is K_3PO_4, and barium phosphate is $Ba_3(PO_4)_2$, what is the formula for potassium sulfate.

3. Balance the chemical reaction below using the smallest integers.
$$CH_4 + O_2 \rightarrow CO_2 + H_2O$$

4. How many electrons and protons are found in the ion Mg^{2+}?

5. Draw the Lewis Dot Structure for the Na and Cl atoms.

6. To the nearest tenth of a gram, what is the mass of 0.25 moles of He atoms?

7. What is meant by the Laws of *Conservation of Energy* and *Conservation of Matter*?

8. To the nearest gram (g), what is the molar mass of SiH_2ClF?

9. What is the difference between an element, a compound, and a mixture?