Grade 9 Midyear Science Review ANSWERS

1. **Density Questions**
   a) **Find the density of a mysterious liquid with a mass of 4.5 grams and a volume of 16 ml.**
   The density is 0.28 g/mL

   b) **Find the mass of an unknown substance with a density of 7.8 g/ml and a volume of 24 ml.**
   The mass is 187.2 g

   c) **When a solid is placed in 105 ml of water in a graduated cylinder, the water level rises to 124 ml. If the density of this solid is 2.6 g/ml, what is the mass?**
   To find volume: 124 – 105 = 19 ml and density is 2.6 g/ml
   So the mass is 49.4 g

   d) **What is the volume of an item that has a density of 5.42 g/ml and a mass of 16.802 g?**
   The volume is 3.1 ml

   e) **Convert the following:**
   1 – 4500 ml = 4.5 L
   2- 0.65 L = 650 mL
   2 – 2.45 g = 2450 mg
   4 – 326.14 mg = 0.32614 g

2. **Particle Model**
   a) **What are the three phases that matter generally assumes?**
   The three phases that matter generally assumes is solid, liquid and gas.

   b) **Describe the movement and structure of particles in a solid.**
   The particles in a solid are very close to each other and are very organized.
   The particles in a solid have very little freedom to move around and they only vibrate in one spot.

   c) **Describe the movement and structure of particles in a liquid.**
   The particles in a liquid are also very close together and are fairly disorganized. They have more freedom to move than in solids and can slide over each other.

   d) **Describe the movement and structure of particles in a gas.**
   The particles in a gas are very far apart. There is lots of space between the particles in a gas and they have lots of freedom to move around.

3. **Concentration**
   a) **What is the mass of solute dissolved in 3200 mL of a 2 g/L solution?**
   The mass is 6.4 g (you must first convert 3200 mL into 3.2 L)

   b) **In a lab, 41 g of solute is placed in 250 ml of solvent to create a solution. What is the concentration of this solution?**
   The concentration is 0.164 g/mL or 164 g/L (both answers would be accepted).

c) **You have 65.3 g of solute and want to make a solution that is 20 g/L. What is the volume of water needed to make this solution?**
The volume of water needed is 3.265 L.

d) **A solution has a concentration of 8 g/L and a volume of 7 L. If the concentration of the solution is reduced by half (so the new concentration is 4 g/L), what will happen to the volume of the new solution?**
If the concentration is reduced by half, the volume will double (making it 14 L).

4) Tissues, Organs and Systems

a) **What is the relationship between cells, tissues, organs and systems?**
Cells are the basic unit of life. A tissue is a group of similar cells that have a common structure and function. Cells make up tissue. An organ is a structure composed of two or more tissue types performing one or more specific functions. A system is a group of organs and tissues working together to accomplish a common function.

5) Cell Division and DNA

a) **Give the three main reasons as to why cell division occurs.**
Cells divide for the following reasons:
- For growth
- For tissue repair
- For sexual reproduction

b) **Describe mitosis (with at least three characteristics)**
Mitosis occurs when cells divide for growth and tissue repair. The cell divides once and results in two daughter cells called diploid cells that are identical to the parent cell. The diploid cells have 23 pairs of chromosomes, or 46 chromosomes in total.

c) **Describe meiosis (with at least three characteristics)**
Meiosis occurs when cells divide for sexual reproduction. The cell divides twice and results in four daughter cells called haploid cells that have half the chromosomes of their parent cell. The haploid cells have 23 chromosomes.

d) **How many chromosomes does a diploid cell have?**
A diploid cell has 46 chromosomes.

e) **How many chromosomes does a haploid cell have?**
A haloid cell has 23 chromosomes.

f) **What is DNA?**
DNA is a molecule found inside the cell nucleus.

g) What is a gene?

A gene is a segment of DNA that contains the genetic information required to carry out a particular job.

h) What is a genome?

A genome is the complete set of genetic information of an individual or species.

i) What is genetic diversity?

Genetic diversity is achieved by all the possible genetic variations of a particular species.

6) Reproductive System

a) What is puberty?

Puberty is a time characterized by the changes that prepare the human body for the ability to reproduce. This stage generally occurs between the ages of 10 and 14 years old.

b) What are hormones?

Hormones are chemical messengers which are transported by the blood and control the activity of one or more organs.

c) Which hormones trigger puberty?

The hormones that trigger puberty are follicle-stimulating hormone (FSH) and luteinizing hormone (LH).

d) What are the female sex hormones?

The female sex hormones are estrogen and progesterone.

e) What are the male sex hormones?

The male sex hormone is testosterone.

f) What is oogenesis?

Oogenesis is the process of ovum production by meiosis.

g) What is spermatogenesis?

Spermatogenesis is the process of sperm production by meiosis.

h) What is menopause?

Menopause is the term used for a woman over 40 who has not menstruated for a year (apart from being pregnant or nursing). This physical change occurs when the ovarian and menstrual cycles come to an end. With the hormonal changes that occur, women may feel some discomfort such as hot flashes, mood swings and bone loss.

i) What is andropause?

Andropause is the term used for hormone levels and sperm production decreasing in older men. Andropause does not necessarily affect fertility in men.

j) Where is a female ovum fertilized?

A female ovum is fertilized by a male sperm in the fallopian tube.

7) Nutrition and digestion

a) Which nutrient is the body's main source of energy?

Carbohydrates are the body's main source of energy.

b) What are the 6 nutrients? Give an example of a food rich in each nutrient.

Carbohydrates (from pasta), Proteins (from steak), Fats (fromas ice cream), Water (from fruits) Minerals (from vegetables), and Vitamins (from fruits).

c) What are the building blocks of proteins? Carbohydrates? Fats?

The building blocks of proteins are amino acids. The building blocks of carbohydrates are glucose and the building blocks of fats are glycerol and fatty acids.

d) What factors does a person's daily energy requirements depend upon?

Factors such as activity level, age, gender, etc.

e) Give 2 examples of mechanical transformations that occur during the digestion process.

Chewing food in the mouth and churning of food in the stomach.

f) In which organ are nutrients absorbed?

Nutrients are absorbed in the small intestine.

g) Where does the absorption of water take place?

The absorption of water occurs in the large intestine.

h) What is the name of the muscle contraction that moved food down the esophagus to the stomach?

Peristalsis is the muscle contraction that moves food from the esophagus to the stomach.

i) Which digestive gland targets the breakdown of fats?

The liver, which produces bile breaks down fats.

j) Give 2 examples of chemical transformations that occur during the digestion process.
Saliva breaks down complex carbohydrates and stomach acid breaks down nutrients in the stomach.

k) What is important about the location of the first item on an ingredient list? What does this tell us about that ingredient?
It shows the ingredient with the highest percentage. Whatever there the most is of is listed first.
l) Indicate whether the statement is true or false.

F 1. The absorption of water and storage of undigested food occurs in the small intestine

T 2. Fats are an essential component of all diets.

F 3. The small intestine is shorter in length than the large intestine.

T 4. Nutrients are absorbed from the digestive tract to the blood.

T 5. Even a person who sleeps all day consumes energy.

F 6. Typical teenage girls and boys both require the same amount of energy in the form of food each day.

8) Respiration

a) What are the 6 main parts of the respiratory system?
The nose/mouth, the pharynx, the larynx, the trachea, the bronchi and the lungs.

b) What is the main goal of respiration?
The main goal is the intake ox oxygen (O_2) and the output of carbon dioxide (CO_2)

c) What happens during inhalation?
The muscles contract, the diaphragm lowers, the lung volume increases and air that is rich in oxygen flows into the lungs.

d) What happens during exhalation?
The muscles relax, the diaphragm rises, lung volume decreases, and air rich in carbon dioxide flows out of the lungs.

e) How does gas exchange occur in the lungs? Where exactly does this happen?
The gas exchange happens through diffusion, it occurs in the alveoli.

f) What is the name of the small blood vessels that carry the oxygenated blood away from the lungs?

Capillaries are the blood vessels.

9) Blood compatibility

a) Which blood type is known as the universal donor? Why?

The universal donor is O- because it can donate to everyone as it has no substances on its red blood cell.

b) Which blood type is known as the universal recipient? Why?

The universal recipient is AB+ because it can receive blood from everyone as it has all three substances/proteins on its red blood cell.

c) Can a person with blood type AB- donate to a person with a blood type of A-? Why or why not?

No because the person with A- blood does not have substance B on their blood and their body will recognize it as a foreign substance.

d) Can a person with blood type B+ donate to a person with a blood type of B-? Why or why not?

No because of the person with B+ blood has the presence of the Rh factor and the person with B- blood does not, and their body would recognize it as a foreign substance.

e) Which blood types would be able to donate to a person with O+ blood?

People with O- and O+ blood would be able to donate to someone with O+ blood.

f) Which blood types could donate to a person with A+ blood?

People with O-, O+, A- and A+ blood would be able to donate to someone with A+ blood.