

Name: _____

Review for Midyear Exam (2016) ANSWERS

Cells and Genetics

1. Which cells in the human body normally have a diploid number of chromosomes in their nuclei?

- a) all cells
- b) only cells produced by mitosis
- c) only cells produced by meiosis
- d) only reproductive cells

2. The diploid chromosome number in humans is...

- a) 23
- b) 46
- b) 48
- d) 92

3. The following is a portion of a DNA strand: CCG ATT TGC ACG. The complimentary DNA strand would be :

- a) CCG ATT TGC ACG
- b) GGC TAA ACG TGC
- c) GGC UAA UCG UGC
- d) CCG TAU UCG UGC

4. Crossing over of chromosomes is most likely to occur during:

- a) meiosis
- b) mitosis
- c) cell death
- d) fertilization

5. DNA is made up of _____ types of nucleotides

- a) 1
- b) 2
- c) 3
- d) 4

6. Why do cells divide?

1. ___To make new cells (growth) _____

2. ___To repair tissues _____

7. Give 3 differences between the processes of Mitosis and Meiosis. (Other options: diploid/haploid, # of divisions)

a. ___Cells produced by mitosis have 46 chromosomes, cells produced by meiosis have 23 chromosomes

b. ___Mitosis results in 2 daughter cells, meiosis results in 4 daughter cells _____

c. ___Mitosis is used for growth and repair of tissues, meiosis is used only to produces reproductive cells (gametes). _____

8. Identify the processes as Meiosis or Mitosis

- a) Produces identical cells _____Mitosis_____
- b) Used for sexual reproduction _____Meiosis_____
- c) Has 2 cell divisions _____Meiosis_____
- d) Contains 46 chromosomes (human cell) _____Mitosis_____
- e) Produces gametes _____Meiosis_____
- f) Produces 4 daughter cells _____Meiosis_____
- g) Contains half the genetic material of parent cell _____Meiosis_____
- h) Used for growth and repair of cells and tissues _____Mitosis_____

9. What do the letters GMO mean? _____Genetically Modified Organism _____

10. Give 2 methods to create a GMO:

1- _____Insert genes of another organism to make the first organism more resilient (ex: making wheat grow shorter so it is not killed by high winds) _____

2- _____Change the genes of an organism so it will not be effected by pesticides, herbicides etc. _____

Nutrition & Digestion

1. Fill in the table

	Protein	Carbohydrates	Fats
Function	Growth and Repair 3 rd source of Energy	1 st source of Energy	2 nd source of Energy
Examples of it	Meats and Alternatives Tofu	Pastas and Grains Fruits and Vegetables	Milk and Dairy Meat and Oils
Number of grams needed per day	2 grams/KG of body weight	Approx 500 g	Approx 75 g
What you multiply to get from grams (g) into kJ	X 17kJ/g	X 17 kJ/g	X 37 kJ/g
The amount of kJ needed per day	34 kJ per KG of body weight	8500 kJ	2775 kJ

2. What 4 nutrients are responsible for regulating metabolism?

Vitamins	Minerals	Water	Fibre
----------	----------	-------	-------

3. Calculate the kJ intake of the cookies:

15 g of carbohydrates

8 g of fat

3 g of protein

$$15 \text{ g} \times 17 \text{ kJ/g} = 255 \text{ kJ}$$

$$8 \text{ g} \times 37 \text{ kJ/g} = 296 \text{ kJ}$$

$$3 \text{ g} \times 17 \text{ kJ/g} = 51 \text{ kJ}$$

255kJ + 296kJ + 51kJ = 602 kJ in the cookie

4. Give the definitions of the following terms:

Chemical breakdown or change	A breakdown or change that results in a chemical change, the new substance is chemically different from the original
Metabolism	The rate at which the body breaks down and uses nutrients Nutrients + Oxygen → Carbon Dioxide + Energy + cellular waste
Physical breakdown or change	A breakdown or change that only effects the physical appearance of a substance, it remains chemically unchanged (is still the same substance)
Gland	An organ or group of cells that produces secretions
Enzyme	A secretion produced by a gland that helps with the chemical digestion of nutrients
Peristalsis	The sequential contractions of muscles
Absorption	The taking up of nutrients from the digestive system into the body (circulatory system)

5. What is the passageway food follows when it is digested and give the mechanical breakdown that occurs at each place?

Location	Mechanical Breakdown
Mouth	Chewing
Pharynx	Swallowing/Peristalsis
Esophagus	Peristalsis
Stomach	Mixing and Churning
Sm. Intestine	Peristalsis
Lg. Intestine	Peristalsis and Absorption

6. What are the 5 glands of the digestive system and what enzyme do they release?

Gland	Enzyme
Salivary	Salivary Amylase
Stomach Glands	Hydrochloric Acid Gastric Juices Pepsin
Intestinal Glands (Sm. Intestines)	Intestinal Amylase Intestinal Juices Lipase
Liver	Bile
Pancreas	Insulin Trypsin

7. Write all the chemical breakdowns chicken will go through to bring it to its simplest form so absorption of the nutrient can occur. Include the locations of the chemical breakdown and the enzyme involved.

Chicken = Protein → Amino Acids

The gastric glands of the stomach release pepsin, which reacts with the hydrochloric acid also found in the stomach to begin breaking the bonds between the amino acids. The intestinal juices and the trypsin secreted by the pancreas into the small intestine finish breaking the bonds between the amino acids

8. Write all the chemical breakdown pasta will go through to bring it to its simplest form so absorption of the nutrient can occur. Include the locations of the chemical breakdown and the enzyme involved.

Pasta = Carbohydrate → Glucose (Simple Sugars)

Salivary amylase (saliva) starts breaking down the long glucose chains in the mouth. Hydrochloric acid and Intestinal amylase will complete the breakdown in the small intestines. Insulin secreted by the pancreas into the small intestines will help to regulate the process.

9. Write all the chemical breakdown butter will go through to bring it to its simplest form so absorption of the nutrient can occur. Include the locations of the chemical breakdown and the enzyme involved.

Butter = Fat → Glycerol and Fatty Acids

Lipase secreted by the small intestine and the pancreas break the fatty acids apart from the glycerol backbone in the small intestine.

10. Where does the absorption of all the simple nutrients occur? Why can it occur there?

Absorption occurs in the small intestine. It can occur here because the nutrients are in a simple enough form to pass (diffuse) through the cell membrane of the cells lining the small intestine.

11. Where does the absorption of water, vitamins and minerals occur?

In the large intestine

12. Explain the reason constipation occurs and give possible solutions.

Not enough water or fiber in a person's diet or waste moving too slowly through the large intestine. This can be solved by increasing the intake of water and foods rich in fiber and increase physical activity.

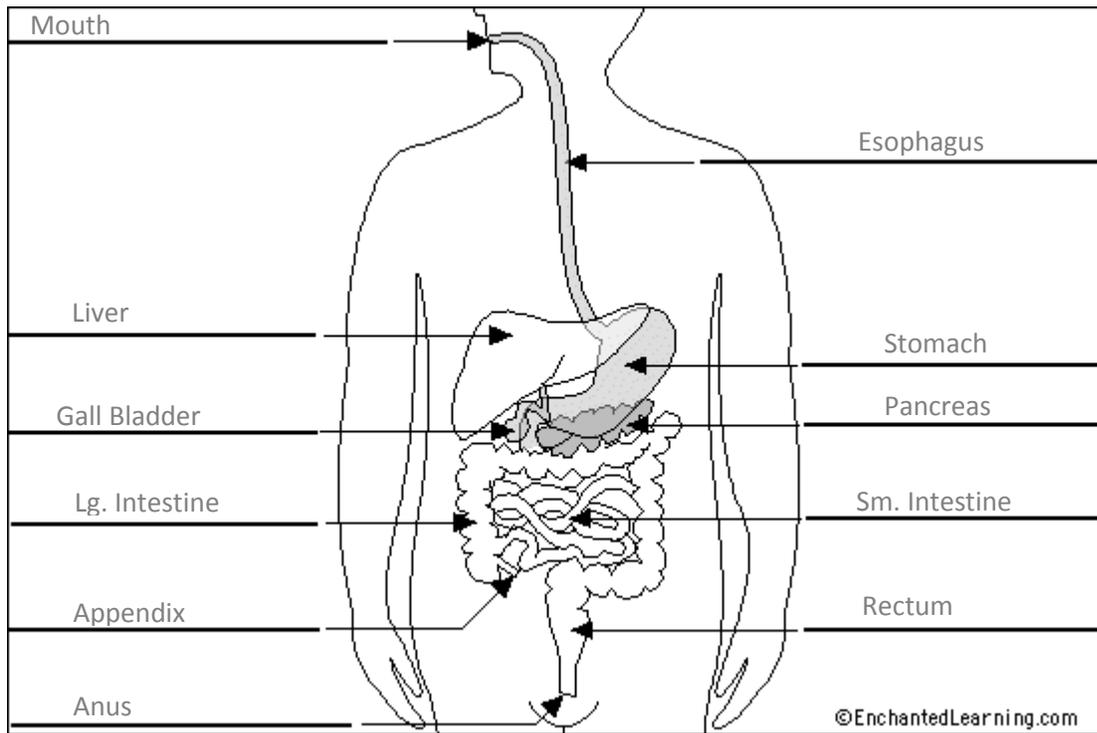
13. Explain the reason diarrhea occurs and give possible solutions.

Not enough water being absorbed by the large intestines or the waste moving too quickly through the large intestine. This can be solved by monitoring and reducing the intake of water and fiber-rich foods, limiting physical activity and eating foods that take longer to digest, such as complex carbohydrates.

14. What is the function of the digestive system?

To break down food in simple nutrients so that it can be used by the body and to eliminate the waste products and excess substances.

15. Fill in passageway on the diagram.



16. Complete the following table concerning the digestive system:

Part	Mechanical Transformation	Chemical Transformation	Gland
Mouth	Chewing and Moistening	Salivary Amylase begins breaking down Carbohydrates	Salivary Glands
Pharynx	Swallowing (Peristalsis)	X	X
Esophagus	Peristalsis	X	X
Stomach	Mixing and Churning	Begin the breakdown of protein into amino acid	Stomach Glands
Sm. Intestine	Peristalsis	Complete the breakdown of protein into amino acids and the breakdown of carbohydrates in simple sugars (glucose). Breakdown fats into fatty acids and glycerol	Intestinal Glands
Lg. Intestine	Peristalsis	X	X

Organization of, Properties of, and Changes to Matter

1. State whether the following are examples of chemical (c) or physical (p) changes:

- a- Ice melting P d- Mixing salt and water P g- Toasting bread C
 b- A bike rusting C e- Making Jell-O P h- Separating a compound C
 c- A fire occurring C f- Water evaporating P i- Making a compound C

2. What reactions (signs) tell you a chemical change occurred?

- A change in colour A precipitate is formed
 A gas is produced A light is emitted and/or heat is released or absorbed

3. Fill in the table

Give the 4 pure substances	Give their definition	Give an example	Use symbols to show an example
Atom	Smallest unit that makes up matter	1 atom of hydrogen	○
Element	A substance found on the periodic table	Hydrogen	○
Molecule	2 or more atoms bonded together	H ₂	○○
Compound	2 or more atoms of different substances bonded together	H ₂ O	○●○

4. Explain what a decomposition reaction is. Give an example, and two reactions (signs) that tell you something was decomposed.

A chemical reaction where a substance is broken down into 2 or more substances.

Example: Water → Hydrogen + Oxygen (2 H₂O → 2H₂ + 2O)

The remaining product has a lower mass than the initial substance, a gas is released, a colour change is observed

5. Explain what a synthesis reaction is. Give an example and explain two reactions (signs) that tell you a something new was produced.

A chemical reaction where 2 or more reactants combine to form a new product.

Example: Hydrogen + Oxygen → Water (2H₂ + O₂ → 2H₂O)

The new product has a greater mass than either of the initial substances, a colour change is observed, a precipitate is formed.

6. Give the 6 types of properties and two examples of each.

Physical Property: colour, density Chemical Property: Conductivity, pH

Physical Characteristic Property: melting point, density Physical Non-characteristic Property: mass, volume

Chemical Characteristic Property: DNA, conductivity
 Chemical Non-characteristic Property: transparency, lustre

7. What is the definition of density and what is the density of water?

Density is the amount of matter (mass) in a given volume of a substance. The density of water is 1.00 g/mL

8. How are the following properties determined (measured/calculated)?

	Mass	Volume	Density
Regular solid	Place on the balance	L x W x H	Mass of the solid ÷ Vol. of the solid
Irregular solid	Place on the balance	Volume (water) displacement	M ÷ V
Liquid	-Mass a container (grad. cylinder) -Add the liquid -Mass the container+liquid	Read the volume off the grad. cylinder	M ÷ V

9. Fill in the table.

	Test to ID	Reaction Observed
Carbon dioxide	Limewater	Limewater becomes cloudy
Oxygen	Glowing Splint	Splint re-ignites
Hydrogen	Burning Splint	“Pop”

10. Fill in the table for what reaction will be observed.

	RLP	BLP	CCP	Conductivity
Saltwater	Stays red	Stays blue	Turns pink	Light flashes
Distilled water	Stays red	Stays blue	Turns Pink	No light
Alcohol	Stays red	Stays blue	Stays blue	No light
Acid	Stays red	Turns red	Turns pink	Light flashes
Base	Turns blue	Stays blue	Turns pink	Light flashes

11. What are the definitions of the following?

Malleability ____ Ability of a substance to bend or flex when pressure is applied __

Luster ____ The way light reflects of a surface, how shiny a substance is _____

12. From a scale of 0-14 give the range of an acid, a base and a neutral solution.

Acid: 1-6 Base: 8-14 Neutral: 7

13. Which of the following are not characteristic properties of water?

- a) boils at 100°C b) dissolves sugar c) has a pH of 7 d) freezes at 0°C
e) volume of 25mL f) is transparent g) density of 1g/mL h) tasteless

____ B, E, F, H _____

14. Which of the following best describes the behaviour of the particles (use particle model)?

- The bonds in a solid become stronger when phased into a liquid
- The more the temperature increases, the more the particles vibrate in a liquid
- The change from gas to solid allows the particles to stay as far away from each other as possible
- An increase in temperature will cause the bonds of a liquid to weaken

15. Select the best definition of a characteristic property:

1. A property of a solid, liquid or gas, which is unique to that substance.
2. A property of a metal and nonmetal that describes where on the period table the element appears.
3. A property that is not unique to individual substances.
4. A property of any object or living thing, such as mass and colour.

16. Match the gas with the appropriate test:

- | | |
|--------------------|--|
| i- Hydrogen | A. Turns limewater cloudy |
| ii- Carbon dioxide | B. Causes a flaming splint to pop |
| iii- Oxygen | C. Causes a glowing splint to re-light |
- a) i -A, ii-B, iii-C b) i-C, ii-A, iii-B
c) i-B, ii-C, iii-A d) i-B, ii-A, iii-C

17. Bobby needs to find the density of a solid. Use the table below he created after conducting his experiment to find the objects mass and volume (by water displacement).

Mass	Volume Water	Volume Water + Solid
12.32 g	12.0 mL	16.8 mL

How could Bobby solve for the density of the solid? (show all work)

$$\text{Volume of Solid: } 16.8 \text{ mL} - 12.0 \text{ mL} = 4.8 \text{ mL}$$

$$\text{Density} = \text{Mass} \div \text{Volume} = 12.32 \text{ g} \div 4.8 \text{ mL} = 2.57 \text{ g/mL}$$

Density: 2.57 g/mL

18. Match the following mechanical property with its definition:

- | | |
|-----------------|---|
| A. Hardness | 1. Regains its initial shape after being subjected to a force |
| B. Elasticity | 2. Flattens or bends without breaking |
| C. Malleability | 3. Resists physical impact |
| D. Resilience | 4. Resists penetration |

A. 4 B. 1 C. 2 D. 3

19. Decomposition is the transformation of complex molecules into simpler molecules or into atoms. What is the reverse process known as?

Reverse process: _____Synthesis_____

20. When 2 clear liquids are mixed together and result in a yellow solid was produced. What type of change took place? Solids can be produced in a chemical reaction with liquids. What do we call this solid?

a) Type of change? _____Chemical_____

b) Justification _____A solid was formed _____

c) Name of solid? _____Precipitate_____

Respiratory System and Fluids

1. Which gas, referred to as an oxidizing agent makes the combustion of nutrients possible?

_____Oxygen_____

2. During inhalation, in which direction does the diaphragm move?

_____Down (it lowers)_____

3. True or False

a) The volume of the rib cage increases during exhalation ___F___

b) Air pressure in the lungs decreases during inhalation ___T___

4. List three functions of the nasal cavities:

_____Warm the air_____

_____Filter the air_____

_____Humidify (moisten) the air_____

5. What body parts are shared by the digestive system **and** the respiratory system?

_____Mouth and pharynx_____

6. What defense do we have against foreign particles like pollen, dust and pollution?

The nasal hairs, mucus and cilia in the trachea to keep them from reaching the lungs.

7. Give the definition of a fluid. What substances are fluids?

A fluid has no definite form and has the ability to flow in all directions. Liquids and gasses are fluids.

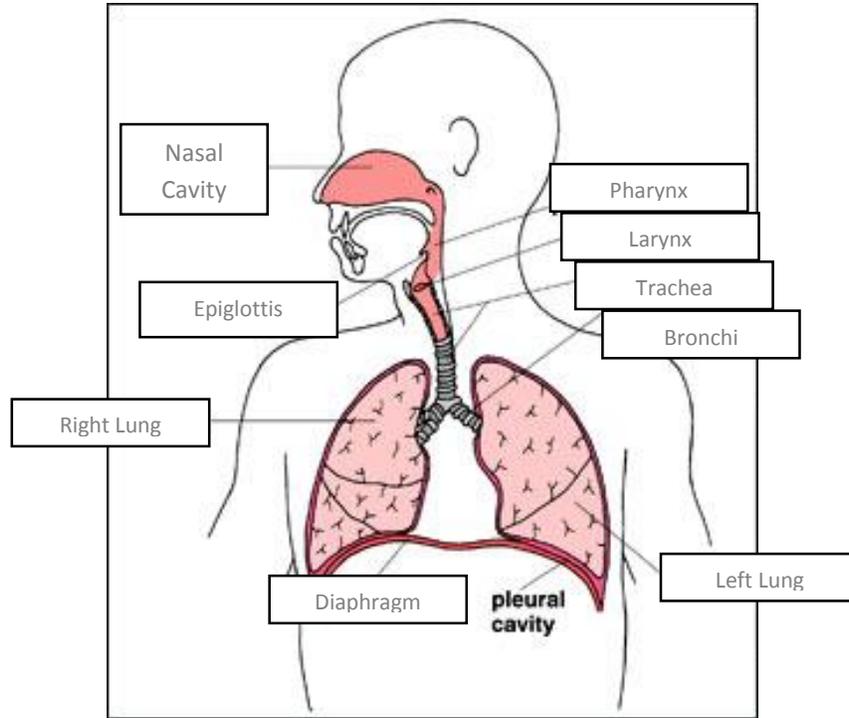
8. What fluids are incompressible? Explain incompressibility is using the particle theory of matter.

Liquids are incompressible; this is because the molecules are already too close together to have the volume reduced.

9. What fluids are compressible? Explain compressibility using the particle theory of matter.

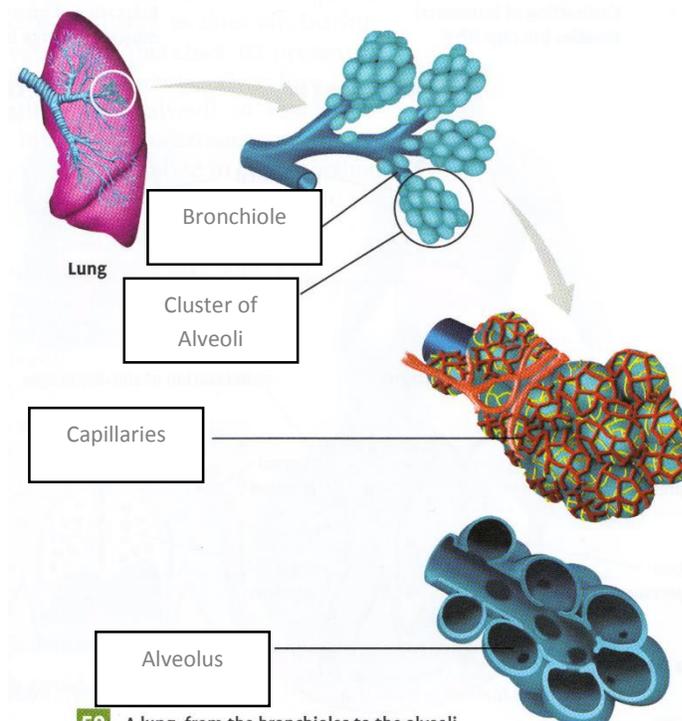
Gasses are compressible; this is because the molecules have enough space between them that the volume of the substance can be reduced, or compressed.

10. Label the diagram below:



11. Below is a diagram of a lung and its components. Label the diagram using the following words:

- | | |
|--------------------|------------|
| Cluster of Alveoli | Alveolus |
| Capillaries | Bronchiole |



12. Place the following statements below in the order that they occur during inspiration:

- a. the molecule enters the alveolus
- b. the molecule crosses the trachea
- c. the molecule crosses the pharynx
- d. the molecule enters a bronchiole
- e. the molecule enters the nasal cavity
- f. the molecule crosses the larynx
- g. the molecule enters one of the bronchi

 E → C → F → B → G → D → A

13. In order for inspiration to occur, does the air pressure inside the lungs have to be higher or lower than surrounding air pressure? Why?

It needs to be lower because the air will move from the area of high pressure to lower pressure.

14. Explain why a gas is considered a fluid?

A fluid takes the shape of its container and has the ability to flow in all directions; both of these things are true for a gas.

15. Explain why a liquid is considered an incompressible fluid?

A liquid takes the shape of its container and has the ability to flow but it is considered an incompressible fluid because a liquid has a definite volume.

16. At a birthday party you fill balloons with helium and they all rise to the ceiling. The next morning the balloons were still floating but had fallen quite a bit. By nighttime the balloons had fallen to the floor and the volume has decreased greatly.

What term describes why the balloons have fallen down? Diffusion

Why was the helium able to escape?

The balloon is a semi-permeable membrane and the molecules of helium are small enough to slowly pass through.

Explain in detail, why the volume of the balloon decreases. As the volume of helium decreases there is less and less pressure being applied to the balloon from the inside. This results in the balloon decreasing in volume as there is less pressure keeping the balloon inflated.

17. a) What is the respiration formula? $\text{Nutrients} + \text{O}_2 \rightarrow \text{CO}_2 + \text{Energy} + \text{Waste}$

b) Where does this reaction occur and why does it occur there? It occurs in the cells because that is where the nutrients and oxygen are able to combine and it is the cells that need the energy.

18. What is the waste product of respiration, where is it produced and why is it produced there?

Carbon dioxide is the waste product, it is produced in the cells because this is where cellular respiration takes place.

Circulatory and Lymphatic Systems

1. Give three differences between arterial and venous blood?

- 1 ___ Arterial blood is bright red, venous blood is dark red _____
- 2 ___ Arterial blood is rich in oxygen, venous blood is rich in carbon dioxide _____
- 3 ___ Arterial blood is found in the arteries and venous blood is found in the veins _____

2. Fill in the table

Blood component	Function(s)
Plasma	Liquid component of blood, contains the suspended blood cells and platelets, carry the nutrients
Red Blood Cells	Bind oxygen and carry it to the cells, bind CO ₂ and carry it to the lungs
White Blood Cells	Engulf and digest dead and damaged cell, old red blood cells and microorganisms
Platelets	Clotting

3. What is the largest artery?

The aorta

4. What is the function of the systemic and pulmonary circulation?

The function of system circulation is to take oxygenated blood to the body's cells and collect the carbon dioxide from cellular respiration.

The function of pulmonary circulation is to take the deoxygenated blood to the lungs and exchange the carbon dioxide for oxygen to take to the body's cells.

5. What type of blood vessel allows for diffusion? Where does diffusion occur?

Capillaries allow for diffusion to occur. This occurs everywhere in the body at the cellular level because every single cell needs oxygen for cellular respiration and produces carbon dioxide as a waste product to be removed.

6. Fill in the table.

Passageway	Type of Blood	Type of Circulation
Left ventricle	Oxygenated	Systemic
Aorta	Oxygenated	Systemic
Arteries	Oxygenated	Systemic
Arterioles	Oxygenated	Systemic
Capillaries	Oxygenated to Deoxygenated (Gas exchange)	Systemic
Venules	Deoxygenated	Systemic
Veins	Deoxygenated	Systemic
Vena Cava	Deoxygenated	Systemic
Right Atrium	Deoxygenated	Systemic
Right Ventricle	Deoxygenated	Pulmonary
Pulmonary Artery	Deoxygenated	Pulmonary
Lungs	Deoxygenated to Oxygenated (Gas exchange)	Pulmonary
Pulmonary Veins	Oxygenated	Pulmonary
Left Atrium	Oxygenated	Pulmonary

7. Explain what blood pressure and pulse measures.

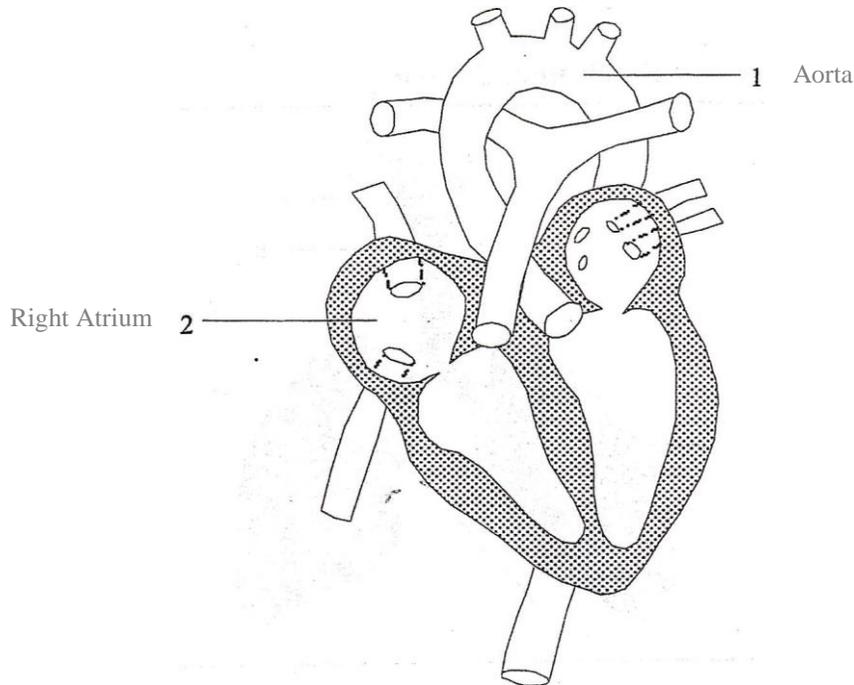
Blood pressure measures the force with which the blood is pushing against the arterial walls.

Pulse measures the number of times the heart beats (contract and relaxes) within a certain period of time, usually in 1 minute.

8. What is the minimum of a high blood pressure reading? Explain why a person will have a high blood pressure result. What are things that a person does that might cause them to have high blood pressure?

A systolic pressure of greater than 120 and/or a diastolic pressure of greater than 80 is considered to be high. A person might have high blood pressure due to narrowing of the arteries, which means the arteries will be under greater pressure as the blood moves through. High blood pressure can be caused by poor diet (ex: a diet high in saturated fats) or lack of physical activity. Situations of high stress or anxiety have also been linked to high blood pressure.

9. Fill in the diagram.



10. What is the function of the circulatory system?

To bring nutrients and oxygen to the cells of the body and collect cellular waste and carbon dioxide to be removed from the body.

11. Give 3 differences between white blood cells and red blood cells

1. ____ Red blood cells are much smaller than white blood cells _____
2. ____ There are more red blood cells in the blood than white blood cells _____
3. ____ Red blood cells are responsible for transporting gases (O_2 and CO_2), white blood cells are responsible for defending the body against microorganisms _____

12. What makes blood red? ____ Hemoglobin _____

13. Describe what happens when an antigen enters the body:

The presence of an antigen will trigger an immune response by the body. White blood cells will begin to produce antibodies to destroy the antigens. If the body has been exposed to this antibody before, the production of antibodies will be faster and more effective. If it is an antigen that the body has not yet encountered, the production of antibodies will take longer. In this case a person will experience symptoms and would be considered to be "sick".

14. Define the following terms:

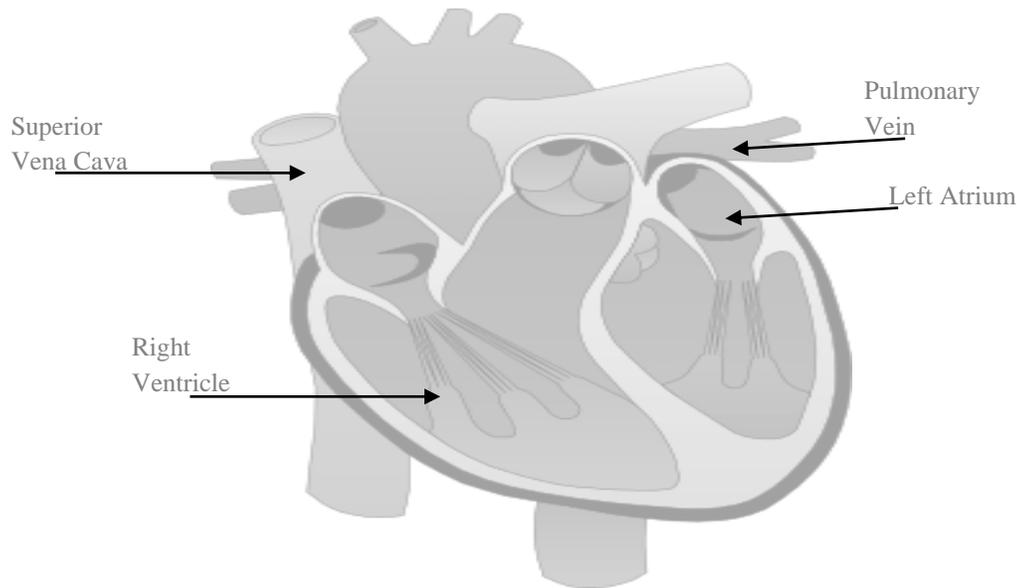
Term	Definition
Antigen	Viruses, bacteria, abnormal cells or other substances that produce an immune reaction
Antibody	Substance produced by certain white blood cells that can neutralize specific antigens.
Vaccine	A prepared substance designed to provide immunity from a particular antigen. It is often made from weakened or killed form of the microbe, which stimulates the body's immune system to recognize the agent as a threat, destroy it, and keep a record of it, so that the immune system can more easily recognize and destroy it in the future
Immunity	An organism's resistance to an infection or disease
Blood transfusion	The process of receiving blood products into one's own blood intravenously. Used to replace lost components of blood
Diffusion	The movement of molecules from an area of high concentration to one of lower concentration
Semi permeable membrane	A membrane that allows certain substances to pass through, while restricting others.

15. Complete the chart

Blood vessel	Description and Function
Pulmonary Artery	Transports the blood from the right ventricle to the lungs
Pulmonary Vein	Transports the blood from the lungs to the left atrium
Aorta	Transports the blood away from the heart, leaving the left ventricle for distribution to the body's cells. It is the biggest artery in the body
Vena Cava	Transports the blood from the body into the heart, entering the right atrium. The vena cave are the largest veins of the body.
Arteries	Blood vessels that carry blood away from the heart.
Veins	Blood vessels that return blood to the heart.

16. On the heart diagram put in the following parts:

right ventricle, pulmonary vein, superior vena cava and left atrium



17. Give the description and function of the parts mentioned in question 16.

Part of the Heart	Description and Function
right ventricle	The lower chamber on the right side of the heart. Deoxygenated blood enters from the right atrium and leaves by the pulmonary artery.
pulmonary vein	Transports the blood from the lungs to the left atrium
superior vena cava	Transports the blood from the upper portion of the body into the heart, entering the right atrium.
left atrium	The upper chamber on the left side of the heart. Oxygenated blood enter from the lung by the pulmonary veins and exits into the left ventricle.

18. Where are the following structures located (relative to the heart) and what are their functions:

Structure:	Function:
Pulmonary Artery	Located at the top of the heart, carries the deoxygenated blood to the lungs
Aorta	Located at the top of the heart, carries oxygenated blood to the other blood vessels to bring to the body's cells
Inferior Vena Cava	Located at the right side of the heart, brings deoxygenated blood from the lower portion of the body to the right atrium.

19. Describe the pathway of **Pulmonary Circulation**.

____ Begins at the right ventricle → pulmonary artery → lungs (gas exchange: CO₂ out of the blood, O₂ into the blood) → pulmonary vein → left atrium _____

20. Describe the pathway of **Systemic Circulation**. _____ Begins at the left ventricle → aorta → arteries → arterioles → capillaries (gas exchange: O₂ out of the blood, CO₂ into the blood) → venules → veins → vena cava → right atrium _____

21. How do the digestive and circulatory systems work together to achieve **cellular respiration**?

____ The digestive system breaks down food into simple nutrients that can diffuse into the blood to be transported to all of the body's cells. The circulatory system bring the oxygen that enters the body through the respiratory system to the body's cells and collects the carbon dioxide to return to the lungs to be exhaled. Cellular respiration requires both nutrients and oxygen to produce energy that can be used by the cells. This is how the two systems work together in order for cellular respiration to be possible. _____

22. What can happen when there is a blockage in the circulatory system? _____ A blockage in the circulatory system means the blood cannot pass properly to the body's cells, the lungs and the heart. This can result in a serious medical condition such as a heart attack, stroke or damage to the blood vessels such as an aneurism. _____
