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- Blood Vessels & Blood
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Diet



Animals need to eat to get energy. There are 7 nutrients which animals need and if they get it in the correct quantities then it is a _____ diet. The 3 nutrients needed in the largest quantity are carbohydrates, _____ and _____. _____ are organic substances and _____ are inorganic. Organic means it contains carbon and hydrogen. These are needed in small amounts. A _____ disease is when you do not eat enough of a particular nutrient. If you lack _____ which is found in _____ then you can get scurvy. If you lack _____ found in animal foods then you can get _____ which means you have soft bones. A lack of _____ means you could get anaemia which affects your _____ and your ability to transport oxygen. When people take in way more energy than they consume then they can become _____. _____ is caused by not eating a balanced diet. Two extremes examples of malnutrition are _____ and _____.

BIZARRE BIOLOGY : Negative calorie foods do not exist. Even celery gives a little energy to your body.

Questions

1. Why is fibre important in your diet? (1)
2. List the three nutrients in the order of energy that they contain. (1)

Score /18



Extension

Why can we not digest cellulose which makes up fibre?

Knowledge Boss

Created by lanebiologytutor.com

Consider how you could calculate how much energy is in a type of food.

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vitamin C haemoglobin vitamins obese iron malnutrition vitamin D balanced fats
rickets marasmus citrus fruits proteins kwashiorkor deficiency minerals

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Diet



Balanced

Fats

Proteins

Vitamins

Minerals

Deficiency

Vitamin C

Citrus fruits

Vitamin D

Rickets

Iron

Haemoglobin

Obese

Malnutrition

Kwashiorkor

marasmus

1.

- Helps food move along alimentary canal/small/large intestine
- Helps prevent constipation

2.

Most first:

fats

carbohydrates

proteins

Extension:

Humans do not have the enzyme cellulase to break down cellulose

Knowledge Boss:

Dry the food. Get a standard quantity like 1g and burn it in something surrounded by a certain volume of water. Measure how much the temperature of the water increases.

Digestion Part 1

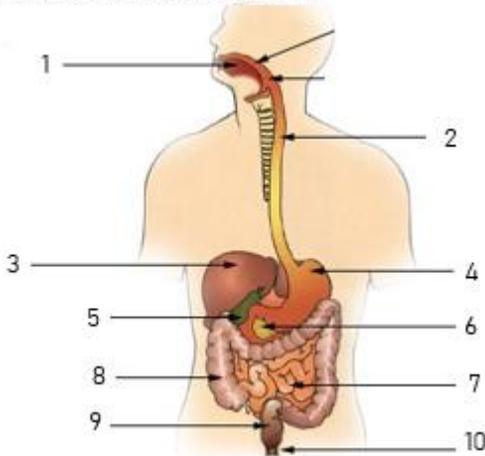
_____ is taking in food into the alimentary canal. Breaking down large _____ molecules into small _____ molecules is called _____. Those small molecules passing into the blood is called _____. The undigested food material which is removed from the body is called _____. This process is called _____ which is not to be confused with _____ which is the removal of metabolic waste (made by cells) from the body. There are two types of digestion: _____ which is done by the teeth and _____ which churns up the food but there is no _____ change. And chemical digestion which is done by _____ and involves a chemical change.

BIZARRE BIOLOGY Our large brains use so much energy it means our intestinal tract which also uses lots of energy has been reduced in length through evolution. This is the Expensive Tissue hypothesis.

Questions

1. Label the structures.

Organs of the Digestive System



2. What is chemical digestion? (2)

Score /24



Extension

Consider why proteins, fats and carbohydrates need to be broken down?

Knowledge Boss

Created by lanebiologytutor.com

Why if you chew bread in your mouth for a while it will start to taste sweet?

Digestion Part 1

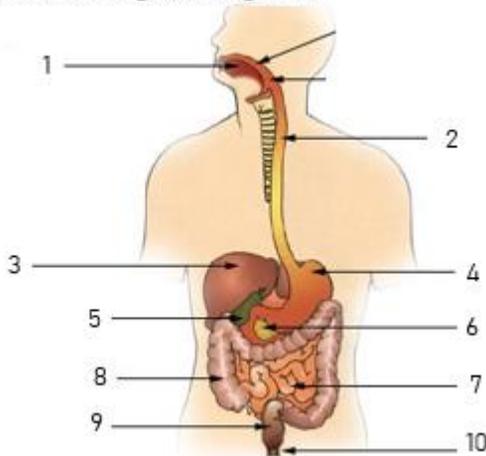
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mechanical	egestion	enzymes	insoluble	absorption	faeces
chemical	stomach	soluble	ingestion	excretion	digestion

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Digestion Part 1

Ingestion	Egestion
Insoluble	Excretion
Soluble	Mechanical
Digestion	Stomach
Absorption	Chemical
Faeces	enzymes

1.

1. mouth
2. oesophagus
3. liver
4. stomach
5. gall bladder
6. pancreas
7. small intestine
8. large intestine
9. rectum
10. anus

2.

- Large molecules are broken down into smaller
- via chemical reactions
- enzymes are involved

Extension:

They are too large biological molecules to pass through the walls of the small intestine into the blood and are also insoluble. They must be broken down into smaller, soluble molecules.

Knowledge Boss:

Yes. Bread contains starch because the flour comes from plant cells. Amylase in the saliva breaks down the starch into glucose which tastes sweet.

Digestion Part 2



Chemical digestion is carried out by _____ made in the mouth, stomach and pancreas. The enzymes from the _____ are released into the small intestine and break down large insoluble food molecules into small soluble molecules to be absorbed into the _____.

The stomach produces _____ which lowers the pH to around pH 1-2. This is to kill any harmful microorganisms which may be in the food. The small intestine absorbs _____ and water and the large intestine just absorbs _____. The undigested food is stored in the rectum as _____ and is egested.

The liver produces _____ which is stored in the _____ and released into the small intestine. It _____ fats making them soluble so the enzyme _____ can break them down. The pancreas produces all three enzymes and pancreatic juice which is _____ into the duodenum part of the small intestine. The small intestine are covered in _____ to increase surface area and the _____ increase it even more.

BIZARRE BIOLOGY : Our digestive system is around 8 metres long and 6m is the small intestine.

Questions

1.

Enzyme	Where produced	Substrate	Final product
	salivary gland pancreas		
protease			amino acids
		fats and oils (lipids)	

2. What adaptations does a villus have for efficient absorption? (3)

Score /25



Extension

Why is the pancreatic juice alkaline?

Knowledge Boss

Created by lanebiologytutor.com

Consider what would be the consequences if our digestive system were shorter.

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lipase	water	pancreas	villi	gall bladder	enzymes	hydrochloric acid
microvilli	faeces	blood	alkaline	bile	food	emulsifies

BIZARRE BIOLOGY : Our digestive system is around 8 metres long and 6m is the small intestine.

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Why is the pancreatic juice alkaline?

Knowledge Boss

Consider what would be the consequences if our digestive system were shorter.

Digestion Part 2



Enzymes	Bile
Pancreas	Gall bladder
Blood	Emulsifies
Hydrochloric acid	Lipase
Food	Alkaline
Water	Villi
Faeces	Microvilli

(1 mark per box)

Enzyme	Where produced	Substrate	Final product
amylase	salivary gland pancreas	starch	glucose
protease	Stomach pancreas	protein	amino acids
lipase	pancreas	fats and oils (lipids)	Fatty acids and glycerol

- 2.
- Large surface area
 - Good blood supply/large network of capillaries
 - Lacteal to absorb lipid molecules

Extension

To neutralise the acidic food from the stomach. If not the low pH through the small intestine would destroy the tissues.

Knowledge Boss

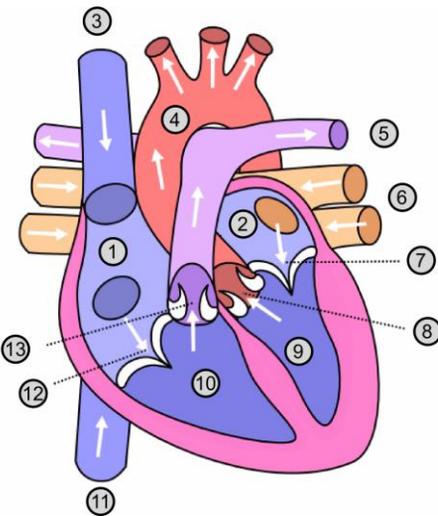
Less nutrients would be absorbed into the blood. More nutrients would be lost in faeces. We would have to eat more food/more regularly to obtain the same energy

The Heart

The circulatory system in mammals contain blood vessels acting as the _____ and the heart acting as the _____. Making blood always travel in one direction is the _____ and the _____. It is a _____ circulatory system because blood goes to the heart and then to the _____ and then back to the heart before going to the rest of the _____. The left side of the heart pumps _____ blood and the right side pumps _____ blood. The heart rhythmically contracts in a _____ way. The two atria contract at the same time and push blood into the _____. Then the ventricles contract pushing blood _____ of the heart while the atria _____.

BIZARRE BIOLOGY: If your heart was out of your body and able to contract with its normal force it could spurt blood 11 metres out of the aorta.

Questions



Q1. Label the numbers with the structures (10)

- 1.
- 2.
- 3+11.
- 4.
- 5.
- 6.
- 7+12.
- 8+13.
- 9.
- 10.

Q2. What is the advantage of a double circulatory system (1)

Extension

Why is the left side of the heart thicker than the right side?

Score /24



Knowledge Boss

The left and right side of the heart is separated by the septum. Why is this important?

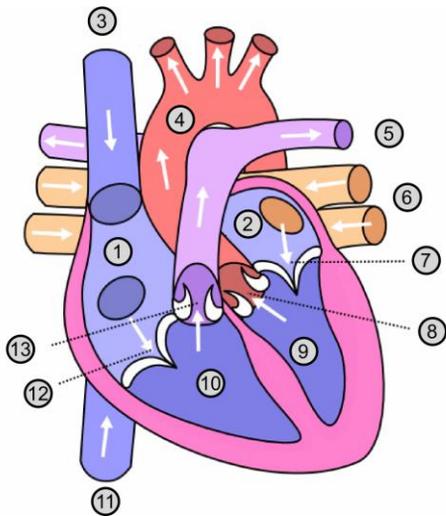
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body valves pump tubes coordinated pressure relax
 double lungs out oxygenated ventricles deoxygenated

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The Heart



Tubes	Oxygenated
Pump	Deoxygenated
Pressure	Coordinated
Valves	Ventricles
Double	Out
Lungs	Relax
Body	

Q1.

1. Right atrium
2. Left atrium
- 3+11. vena cava
4. Aorta
5. Pulmonary artery
6. Pulmonary vein
- 7+12. Atrio ventricular valves or mitral valve (7) and tricuspid valve (12)
- 8+13. Semilunar valves or aortic valve (8) and pulmonary valve (13)
9. Left ventricle
10. Right ventricle

Q2.

- Produce higher pressure from the heart (rather from the lungs) to go around the body
- Less pressure in the capillaries of the lungs which could get damaged by high pressure

Extension

To contract with more force to generate a higher pressure so blood leaving the aorta has enough pressure/push to go around the body.

Knowledge Boss

The right and left sides of the heart are separated to prevent blood without oxygen from mixing with blood that has oxygen.

Blood vessels and blood

Blood Vessels

_____ are the largest blood vessels and carry blood away from the _____. As these divide further into smaller ones they become _____ which connect into even smaller vessels called _____. These form an extensive network supplying _____ blood to the cells and _____. The capillaries connect up to _____ and then to _____ which all eventually join towards the vena cava. Veins are unique in that they have _____ which prevents the backflow of blood.

Blood Composition

Around 55% of blood is the liquid component called _____ which mostly contains _____. The most common cell type are the red blood cells which carry oxygen because of their _____. The white blood cells fight _____ and help control the immune response. _____ are fragments of cells which are involved with blood clotting when blood vessels are damaged.

BIZARRE BIOLOGY : If it was possible to put all your blood vessels in your body in a line it would wrap around the world 4 times. There are 4-6 million red blood cells in 1ml of blood.

Questions

1. Name 3 substances transported in the blood plasma. (3)
2. Explain two adaptations of red blood cells which make them efficient for carrying oxygen. (2)

Score / 19



Extension

Why do veins have large lumens?

Knowledge Boss

What problem would arise if a person had insufficient platelets in their blood?

Blood vessels and blood

Blood Vessels

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haemoglobin	tissues	plasma	arteries	platelets	venules	capillaries
heart	infections	veins	arterioles	water	oxygenated	valves

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Knowledge Boss

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Blood vessels and blood



Arteries

Heart

Arterioles

Capillaries

Oxygenated

Tissues

Venules

Veins

Valves

Plasma

Water

Haemoglobin

Infections

platelets

1.

Water, salts, ions, carbon dioxide, urea, hormones, food molecules, antibodies

2.

- Bi-concave shape increase surface area to volume ratio
- No nucleus so cell has more room to fit more haemoglobin molecules

Extension

As there is less pressure in the veins, having a larger lumen means it does not restrict the flow of blood as much/allows blood to pass through more easily.

Knowledge Boss

If a person cuts them self then the blood clot will not work so well and they may continue to bleed.

Respiration



Respiration is one of the 7 _____ processes. It is a process which happens inside all cells and specifically inside the _____ of human cells. Respiration releases energy from the chemical bonds in food molecules such as _____. A cell needs energy to be able to make _____ cells, create new chemical bonds in protein synthesis, contracting muscles, active transport of _____ across cell membranes and producing heat to keep body temperature constant. Aerobic respiration requires _____ and anaerobic respiration does not. Most of the time in plant and animal cells aerobic respiration is sufficient but when a person _____ they do not have enough oxygen for the _____ and begin anaerobic respiration. Anaerobic respiration produces _____ which builds up inside the cells and the blood. This is harmful to cells and is transported to the _____ to be broken down as well as inside the muscle cells. When enough oxygen is present the lactic acid is converted back into _____. The additional oxygen needed to do this is called the _____ and is the reason a person continues to breathe heavily for a while after exercise.

BIZARRE BIOLOGY: The record for holding breath under water for a human is 11.5 minutes. Sperm whales are able to hold their breath for 90 minutes.

Questions

1. Write the word equation for aerobic respiration (1)
2. Write balanced chemical equation for aerobic respiration (1)
3. Write the word equation for anaerobic respiration in humans (you do not need to know the chemical equation) (1)

Extension

Write the word equation for anaerobic respiration in yeast cells.

Score /15



Knowledge Boss

Explain why bread dough rises and also why baked bread does not contain ethanol (alcohol).

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muscles new oxygen debt life liver molecules glucose (2X)
lactic acid mitochondria oxygen exercises

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Knowledge Boss

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Respiration



Life

Mitochondria

Glucose

New

Molecules

Oxygen

Exercises

Muscles

Lactic acid

Liver

Glucose

Oxygen debt

1.

oxygen + glucose \longrightarrow water + carbon dioxide (+ energy)

2.

$6\text{O}_2 + \text{C}_6\text{H}_{12}\text{O}_6 \longrightarrow 6\text{H}_2\text{O} + 6\text{CO}_2$ (+ energy)

3.

glucose \longrightarrow lactic acid (+ some energy)

Extension

Glucose \longrightarrow carbon dioxide + ethanol (+ energy)

Knowledge Boss

Bread rises because of the carbon dioxide produced. It does not contain ethanol when baked because the ethanol evaporates with the heat of the oven. So dough is a little bit alcoholic

Sourced Images

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File:Diagram of the digestive system-VOID.png

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File:Heart numlabels.png

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