Chapter 4: Organising animals and plants 1

Knowledge organiser

The heart

The heart is the organ that pumps blood around your body. It is made from **cardiac** muscle tissue, which is supplied with oxygen by the **coronary artery**.



Heart rate is controlled by a group of cells in the right atrium that generate electrical impulses, acting as a pacemaker. Artificial pacemakers can be used to control irregular heartbeats.

blood is a tissue
red blood cells – bind to oxygen and transport it around the body
plasma – transports substances and blood cells around the body
platelets – form blood clots to create barriers to infections
white blood cells – part of the immune system to defend the body against pathogens

Blood vessels

carries blood away from the heart	 thick, muscular, and elastic walls the walls can stretch and 	thick small lumen
(nigh pressure)	withstand high pressure • small lumen	wall thick layer of muscle and elastic fibres
carries blood <i>to</i> the heart (low pressure)	 have valves to stop blood flowing the wrong way thin walls large lumen 	relatively thin wall often has valves
 carries blood to tissues and cells connects arteries and veins 	 one cell thick – short diffusion distance for substances to move between the blood and tissues (e.g., oxygen into cells and carbon dioxide out) 	wall one tiny vessel cell thick lumen
c ((arries blood to the heart ow pressure) carries blood to tissues and cells connects arteries and veins	 small lumen small lumen have valves to stop blood flowing the wrong way thin walls large lumen one cell thick – short diffusion distance for substances to move between the blood and tissues (e.g., oxygen into cells and carbon dioxide out) very narrow lumen

Double circulatory system

The human circulatory system is described as a **double circulatory system** because blood passes through the heart twice for every circuit around the body:

- the right ventricle pumps blood to the lungs where gas exchange takes place
- the left ventricle pumps blood around the rest of the body.



Heart issues

Coronary heart disease is caused by a build up of fatty material in the coronary arteries, making them narrow, and reducing blood flow. Stents can be used to help keep the coronary arteries open.

Patients with heart failure often have to use artificial hearts before a donor heart becomes available for a heart transplant.

People with faulty heart **valves** may feel symptoms of breathlessness as valves do not fully open, making the heart less efficient. These can be replaced with biological valves (from animals), or mechanical valves (made from titanium and polymers).

Lungs

When breathing in, air moves

- 1 into the body through the mouth and nose
- 2 down the trachea
- 3 into the **bronchi**
- 4 through the **bronchioles**
- 5 into the **alveoli** (air sacs).

Oxygen then diffuses into the blood in the network of **capillaries** over the surface of the alveoli.





Make sure you can write a definition for

alveoli aorta artery atrium bro coronary double circulatory system p vein vena cav



or these	key terms.			
onchi plasma ⁄a ve	bronchiole platelet ntricle	capillary pulmonary	cardiac valve	

Chapter 4: Organising animals and plants 2

Knowledge organiser

Tissues in leaves



Stomata

Stomata are tiny openings in the undersides of leaves – this placement reduces water loss through evaporation.

They control gas exchange and water loss from leaves by:

- allowing diffusion of carbon dioxide into the plant for photosynthesis
- allowing diffusion of oxygen out of the plant.

Guard cells are used to open and close the stomata.





light intensity

temperature

	Because
	water evaporates faster in higher temperatures
	the drier the air, the steeper the concentration gradient of water molecules between the air and leaf
on	wind removes the water vapour quickly, maintaining a steeper concentration gradient
	stomata open wider to let more carbon dioxide into the leaf for photosynthesis

uard cells transpiration translocation	tion for these	e key terms.			
humidity wind speed phloem xylem	uard cells humidity	transpiration wind speed	transic phloem	ocation xylem	

Chapter 4: Organising animals and plants Retrieval questions

Learn the answers to the questions below then cover the answers column with a piece of paper and write as many as you can. Check and repeat.

	B4 questions		Answers	18	What is the function of the phloem?	Put p
0	Name the four main components of blood.	• • • •	red blood cells, white blood cells, plasma, platelets	19	What is the purpose of translocation?	aper he
2	What is the function of platelets?	Put pape	form blood clots – prevent the loss of blood and stop wounds becoming infected	20	Define the term transpiration.	re Pu
3	Why is the human circulatory system a double circulatory system?	r here Put	blood passes through the heart twice for every circuit around the body – deoxygenated blood is pumped from the right side of the heart to the lungs, and the oxygenated blood that returns is pumped from the left	4	What is the purpose of transpiration?	ut paper here
		paper	side of the heart to the body	22	Name four factors that affect the rate of transpiration.	Put
4	How does the structure of an artery relate to its function?	here	carries blood away from the heart under high pressure – has a small lumen and thick, elasticated walls that can stretch	23	What effect does temperature have on the rate of transpiration?	c paper he
5	How does the structure of a vein relate to its function?	Put paper	carries blood back to the heart at low pressure –doesn't need thick, elasticated walls, but has valves to prevent	24	What effect does humidity have on the rate of transpiration?	re Put
-	How doos the structure of a capillary relate to its	here	blood flowing the wrong way	25	Why does increased light intensity increase the rate of transpiration?	t paper
6	function?	Put	wall to provide a short diffusion distance	26	What is the function of the stomata?	. here
7	List the structures air passes through when breathing in.	paper he	mouth/nose → trachea → bronchi → bronchioles → alveoli	2	Where are most stomata found?	Put pa
8	What is the function of the red blood cells?	re	Bind to oxygen and transport it around the body	28	What is the advantage to the plant of having a	per her
9	What is the function of the white blood cells?	Put pa	Defend the body against pathogens	•	high number of stomata at this location?	Ē
10	What is the function of the plasma?	tper her	Transports blood cells and substances around the body			
٩	Why is a leaf an organ?	re Pu	there are many tissues inside the leaf that work together to perform photosynthesis			
Ð	How is the upper epidermis adapted for its function?	ut paper here	 single layer of transparent cells allow light to pass through cells secrete a waxy substance that makes leaves waterproof 			
B	How is the palisade mesophyll adapted for its function?	Put p	tightly packed cells with lots of chloroplasts to absorb as much light as possible for photosynthesis			
14	How is the spongy mesophyll adapted for its function?	aper he	air spaces increase the surface area and allow gases to diffuse quickly			
15	What is the function of the guard cells?	re	control the opening and closing of the stomata			
16	What is the function of the xylem?	Put pap	transport water and mineral ions from the roots to the rest of the plant			
ſ	Give three adaptations of the xylem.	ier here	 made of dead cells no end wall between cells walls strengthened by a chemical called lignin to withstand the pressure of the water 			

- transport dissolved sugars from the leaves to the rest of the plant
- transport dissolved sugars from the leaves to other parts of the plant for respiration, growth, and storage
- movement of water from the roots to the leaves through the xylem
- provide water to keep cells turgid
- provide water to cells for photosynthesis
- transport mineral ions to leaves
- temperature, light intensity, humidity, and wind speed
- higher temperatures increase the rate of transpiration
- higher levels of humidity decrease the rate of transpiration
- stomata open wider to let more carbon dioxide into the leaf for photosynthesis
- allow diffusion of gases into and out of the plant
- underside of leaves

reduces the amount of water loss through evaporation