1. Mistletoe is a green plant that can often be seen growing high in a tree in winter.

Mistletoe can make its own food but very slowly.

Therefore, it needs to take some food from the tree that it grows on. The tree does not benefit.

Complete these sentences about how the mistletoe feeds.

Use words from the list.

chlorophyll	**leaf**	**phloem**	**photosynthesis**
respiration	**starch**	**sunlight**	**xylem**

Mistletoe can make some food by ..... .

This is because it contains the green chemical ..... which traps energy

from ..... .

The energy is used by the mistletoe to make sugars.

The mistletoe also gets some sugars from the ..... tissue of the tree.

[4]

2(a). Some people have a condition called varicose veins in their legs.

The veins swell up because the valves are not working properly.

What is the role of the valves in veins?

---

[1]

(b). Varicose veins are more common in pregnant females.

During pregnancy, the baby can push on the main veins bringing blood back from the mother's legs.

Give **one** reason why this could lead to varicose veins in the legs.

---------- **[1]**

(c). The data in **Table 21.1** shows the results from a study on varicose veins.

Table 21.1

Age group	Number of people with varicose veins	Percentage of people with varicose veins who are male (%)
< 25	1256	46.0
25–29	2403	32.5
30–34	4304	26.5
35–39	5387	27.7
40–44	5630	29.6
45–49	5713	34.5
50–54	5297	37.9
55–59	4625	41.6
60–64	3400	46.1
65–69	2271	40.6
70+	3438	33.3

i. Calculate the number of **males** in the study with varicose veins who were younger than 25 years old.

Number of males = ... **[2]**

ii. Which conclusions based on the data in **Table 21.1** are **true** and which are **false**?

Tick (✓) **one** box in each row.

Conclusion	**True**	**False**
More females than males develop varicose veins.		
Varicose veins are more common in people under the age of 25.		
The age range 50–54 has the greatest number of cases of varicose veins.		
There are more than double the number of people with varicose veins in the age range 55–59 compared to 65–69.		

[2]

(d). The results of the study were published in a peer review journal.

Give **one** reason why peer review is important.

---

[1]

3(a). A chick can develop inside an egg.

A hen's egg is covered in an eggshell that lets gases through.

Why is it important that the eggshell lets gases through?

---

[1]

(b). The size of a large hen's egg is approximately 40 mm.
The size of a bee's egg is 0.4 mm

How many orders of magnitude are there between the hen's egg and the bee's egg?

Orders of magnitude = ... **[1]**

4. Which word describes the loss of water vapour from the leaves of the plant?

A Circulation
B Respiration
C Translocation
D Transpiration

Your answer ☐ **[1]**

5. What is transported by red blood cells?

A Antibodies
B Glucose
C Hormones
D Oxygen

Your answer ☐ **[1]**

6. Which blood vessel transports blood from the lungs to the heart?

A Aorta
B Pulmonary artery
C Pulmonary vein
D Vena cava

Your answer ☐ **[1]**

7. Mole rats spend most of their time burrowing underground in tunnels.

The tunnels may have only 5% oxygen in the air compared with 21% above ground.

Complete the sentences below to show how the mole rats have adapted to live in the tunnels.

Mole rats have a low respiration rate. This means they need less ..... gas from the air.

This gas can be picked up from low levels in the air by the chemical inside their red blood cells called ..... .

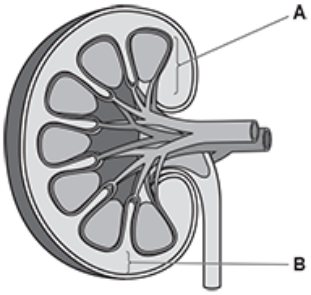
Mole rats also have few pain receptors in their tissues.

This means that any ..... acid produced by anaerobic respiration does not hurt.

Scientists think that mole rats have evolved these features by the process of ....

[4]

8. The diagram shows a section through a kidney.



i. Name the region labelled **A**.

..... **[1]**

ii. Name the region labelled **B**.

..... **[1]**

iii. Which type of blood vessel brings blood to the kidney?
Put a (ring) around the correct word.

artery **capillary** **vein**

[1]

9. Small insects feed by taking fluid from the phloem of plants.
They use the contents of this fluid for respiration.

What will the small insects take from phloem to use in respiration?

A Amino acids
B Fatty acids
C Mineral ions
D Sugars

Your answer ☐ **[1]**

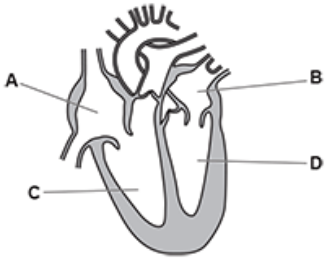
10. In transpiration, water is lost from a plant.

Which part of a plant loses water to the surroundings?

A Guard cells
B Root hair cells
C Stomata
D Xylem

Your answer ☐ **[1]**

11. Which chamber in the human heart contracts with the **greatest** force?



Your answer ☐ **[1]**

12. Which row shows where valves in the heart are found?

	Between the atria and ventricles	Between the ventricles and arteries	In the capillaries
A	no	no	no
B	yes	yes	yes
C	no	no	yes
D	yes	yes	no

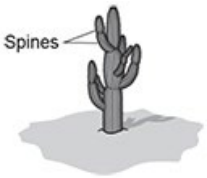
Your answer ☐ **[1]**

13. Which of these structures is found in the xylem?

A Cytoplasm
B Mitochondria
C Sieve pores in the end walls
D Waterproof substance called lignin

Your answer ☐ **[1]**

14. The cactus is found in the desert. It has very small leaves called spines.

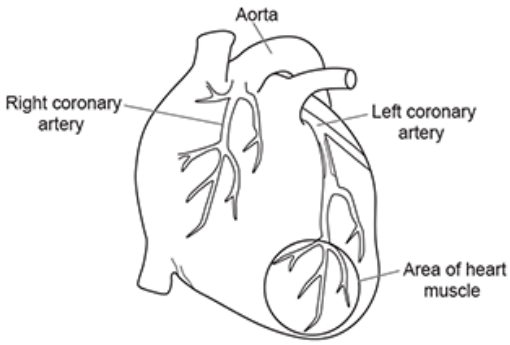


Why are spines an advantage to the cactus?

A They slow down the rate of respiration.
B They slow down the rate of transpiration.
C They stop the plant photosynthesising.
D They stop translocation in the cactus.

Your answer ☐ **[1]**

15. The diagram shows the heart of a person who has heart disease.



Complete each sentence below about the diagram. Use words from the list.

attack	**carbon dioxide**	**fat**	**fibre**
infection	**nitrogen**	**oxygen**	**water**

Heart disease is caused by ..... blocking the blood vessels that supply the heart muscle.

This means that the area of heart muscle circled in the diagram will not get enough glucose or ..... for respiration.

This may cause it to stop beating. This is called a heart ..... .

[3]

16(a).

Fig. 17.1 shows a section through a human heart.

Fig. 17.1

i. On **Fig. 17.1** draw an arrow to identify one valve. Label the arrow **V**.

[1]

ii. On **Fig. 17.1** draw a second arrow to identify one atrium. Label this arrow **A**.

[1]

iii. The left ventricle has more muscle than the right ventricle.

Explain why.

_____

_____

_____

[2]

(b). The heart circulates blood around the body three times every minute.

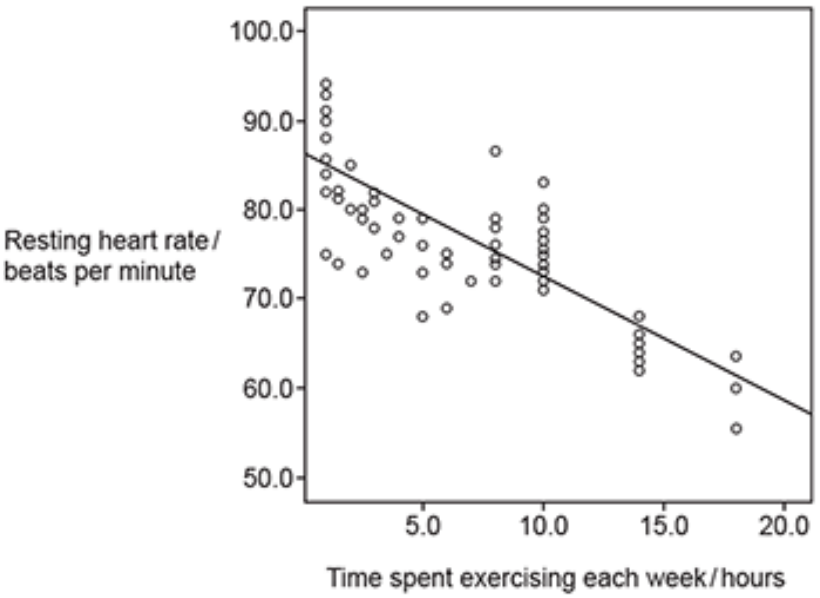
Calculate how many times blood will circulate around the body in **one** hour.

Number of times..... **[2]**

(c). A scientist compares the time spent exercising each week with the resting heart rates of a number of individuals.

Fig. 17.2 shows their results.

Fig. 17.2



Write down **one** conclusion the scientist can make from the data.

_____

[1]

(d). A student writes some notes about veins:

Veins are large blood vessels that carry blood towards the heart.
They have a smooth lining and a narrow lumen.

The student has made **one** mistake in their notes.
Identify the mistake they have made.

_____

_____**[1]**

(e). The human circulatory system is described as a double circulatory system.
Explain why.

_____

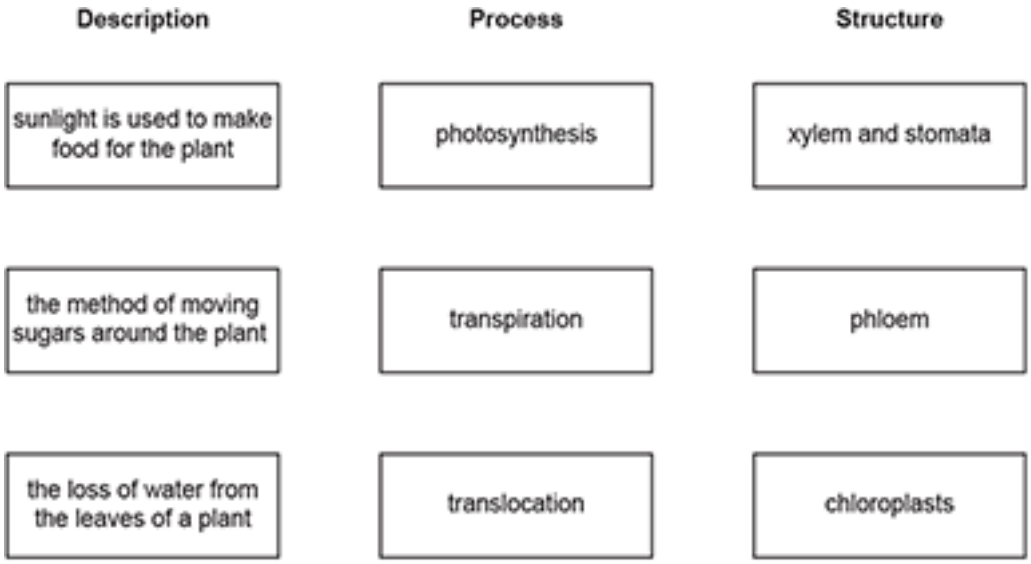
_____

_____**[2]**

17. Photosynthesis, transpiration and translocation are three processes occurring in plants.

Draw **three** lines to connect each **description** to its correct **process**.

Then draw **three** lines to connect each **process** to the **structure** where that process takes place.



[4]

18. The diagram shows a red blood cell from a person who has sickle cell anaemia.
This condition results in red blood cells that are sickle shaped.

People with sickle cell anaemia can feel tired.
Which statement about sickle cells explains why?

A They contain a nucleus.
B They have a smaller surface area.
C They have more haemoglobin.
D They leave capillaries and enter tissues.

Your answer ☐ **[1]**

19. Which blood vessels have valves along their length?

A Arteries and capillaries
B Arteries, veins and capillaries
C Capillaries
D Veins

Your answer ☐ **[1]**

END OF QUESTION PAPER