Transport of Substances

Name: _____ **Class:** _____ **Date:** _____

Read and Learn

Blood transports substances around the body. The heart pumps blood through blood vessels, connecting exchange surfaces, body cells, and organs that remove wastes.

Oxygen enters the blood in the lungs. Most oxygen binds to **haemoglobin** inside red blood cells. In body tissues, oxygen is released and diffuses into cells for aerobic respiration.

Digested **nutrients**, such as glucose and amino acids, are absorbed from the small intestine into the blood. They travel dissolved in **plasma** and pass from capillaries into the surrounding tissues to reach cells.

Carbon dioxide, produced during cellular respiration, enters the blood and travels to the lungs to be breathed out. Most is transported as bicarbonate ions in plasma. **Urea**, made in the liver from the breakdown of excess amino acids, travels dissolved in plasma to the kidneys for removal in urine.

Blood component	Main role
Red blood cells	Transport oxygen using haemoglobin.
White blood cells	Defend the body against pathogens.
Platelets	Help blood clot, reducing blood loss.
Plasma	Transports blood cells, dissolved substances, and heat.

Homeostasis is the maintenance of relatively stable internal conditions. Blood transport supports homeostasis by delivering needed substances, carrying wastes to removal organs, and distributing heat. Transporting carbon dioxide to the lungs also helps regulate blood pH.

Multiple Choice

Circle the correct answer.

1. How is most oxygen transported in blood?

A. Dissolved in platelets
B. Bound to haemoglobin in red blood cells
C. Inside white blood cells
D. As glucose in plasma

2. Which blood component transports dissolved glucose and urea?

A. Plasma
B. Platelets
C. Haemoglobin
D. White blood cells

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3. Where is carbon dioxide carried for removal from the body?

A. The small intestine
B. The heart
C. The lungs
D. The muscles

4. Which statement best describes homeostasis?

A. Keeping every internal condition completely unchanged
B. Increasing body temperature continuously
C. Removing all substances from the blood
D. Maintaining relatively stable internal conditions

Match the Blood Component

Write the correct letter beside each component.

Blood component	Answer	Function
Red blood cells	_____	A. Defend against pathogens
White blood cells	_____	B. Transport dissolved substances and heat
Platelets	_____	C. Transport oxygen
Plasma	_____	D. Help blood clot

Complete the Sentences

Word bank: capillaries • haemoglobin • kidneys • small intestine

1. Most oxygen binds to _____ inside red blood cells.
2. Glucose and amino acids are absorbed into the blood from the _____.
3. Substances are exchanged between blood and surrounding tissues through the thin walls of _____.
4. Urea is transported to the _____ for removal in urine.

Trace the Journey

Complete each pathway using the words provided.

1. Oxygen

Words: body cells • lungs • red blood cells

_____ → oxygen binds to haemoglobin in _____ → oxygen is released and reaches _____

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2. Urea

Words: kidneys • liver • plasma

Made in the _____ → transported dissolved in _____ → removed from blood by the _____

True or False?

Write **T** or **F**. Correct each false statement.

1. White blood cells are the main carriers of oxygen. _____

2. Blood carries useful substances to cells and carries wastes away. _____

3. Urea is made in the kidneys. _____

Apply Your Understanding

1. During exercise, muscle cells need more oxygen and glucose and produce more carbon dioxide. Explain how increased blood flow helps meet these needs.

2. A person has fewer healthy red blood cells than normal. Explain why they may become tired more easily during exercise.

3. Explain two ways blood transport helps maintain homeostasis.

Compare Oxygen and Carbon Dioxide Transport

Complete the table.

Feature	Oxygen	Carbon dioxide
Where does it enter the blood?		
Where is it transported to?		
How is most of it carried in the blood?		

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Identify the Blood Component

Choose from: **red blood cells • white blood cells • platelets • plasma**

1. A cut stops bleeding as a clot forms.

Component involved: _____

2. The body responds to bacteria entering through a wound.

Component involved: _____

3. Dissolved amino acids travel from the small intestine toward body tissues.

Component involved: _____

4. Oxygen travels from the lungs toward an exercising muscle.

Component involved: _____

Correct the Science

A student writes:

"Red blood cells carry glucose to the lungs. White blood cells transport oxygen. Urea is made in the kidneys and carried to the liver."

Identify and correct **three errors**.

1. _____

2. _____

3. _____

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Transport of Substances — Complete Answer Key

Multiple Choice

1. **B** — Bound to haemoglobin in red blood cells.
2. **A** — Plasma.
3. **C** — The lungs.
4. **D** — Maintaining relatively stable internal conditions.

Match the Blood Component

Blood component	Answer	Function
Red blood cells	**C**	Transport oxygen
White blood cells	**A**	Defend against pathogens
Platelets	**D**	Help blood clot
Plasma	**B**	Transport dissolved substances and heat

Complete the Sentences

1. **haemoglobin**
2. **small intestine**
3. **capillaries**
4. **kidneys**

Trace the Journey

Oxygen:

Lungs → red blood cells → body cells

Oxygen enters the blood in the lungs, binds to haemoglobin in red blood cells, and is released near body cells.

Urea:

Liver → plasma → kidneys

Urea is made in the liver, transported dissolved in plasma, and removed from the blood by the kidneys.

True or False?

1. **False.** Red blood cells are the main carriers of oxygen.
2. **True.**
3. **False.** Urea is made in the liver and removed from the blood by the kidneys.

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Apply Your Understanding

1. How does increased blood flow support exercising muscles?

It delivers more oxygen and glucose per unit time for respiration and carries carbon dioxide away more quickly.

2. Why might someone with fewer healthy red blood cells tire more easily?

Their blood has a reduced capacity to transport oxygen. Less oxygen may reach working muscles, limiting aerobic respiration and the supply of usable energy.

3. Explain two ways blood transport supports homeostasis.

Accept any two:

- Carries carbon dioxide to the lungs, helping regulate blood pH.
- Carries urea to the kidneys, preventing its accumulation.
- Distributes heat and transports it toward the skin for heat loss.
- Delivers oxygen and nutrients needed for normal cell function.
- Carries water and dissolved ions to organs involved in regulating their balance.

Compare Oxygen and Carbon Dioxide Transport

Feature	Oxygen	Carbon dioxide
Where does it enter the blood?	In the lungs	In body tissues, from respiring cells
Where is it transported to?	Body tissues and cells	The lungs
How is most of it carried?	Bound to haemoglobin in red blood cells	As bicarbonate ions in plasma

Identify the Blood Component

1. Clot formation: **Platelets**
2. Defence against bacteria: **White blood cells**
3. Transport of dissolved amino acids: **Plasma**
4. Transport of oxygen: **Red blood cells**

Correct the Science

1. Glucose transport: Glucose is transported **dissolved in plasma** from the small intestine toward body tissues, where cells use it.

2. Oxygen transport: Most oxygen is carried by **haemoglobin in red blood cells**, rather than by white blood cells.

3. Urea production and transport: Urea is made in the **liver** and transported in plasma to the **kidneys** for removal in urine.

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