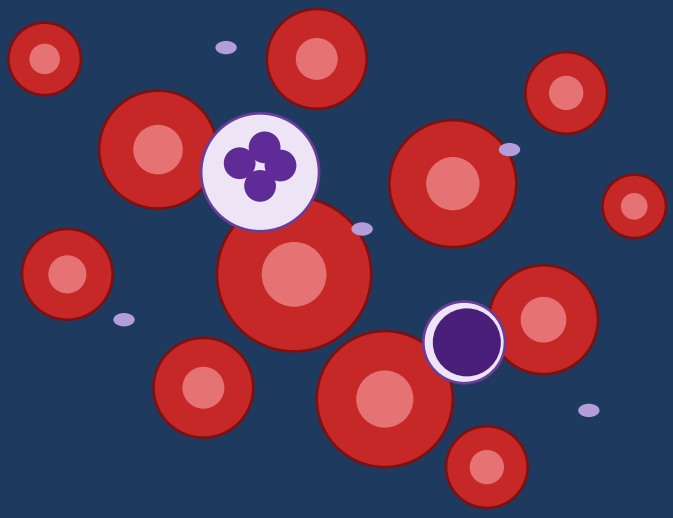
BIOLOGY

Blood and its Components

Questions

GCSE IGCSE Year 10–11



What's inside

Section A	Recall – multiple choice, gap fill, true/false, matching	**33 marks**
Section B	Topic questions – plasma, red & white cells, clotting, microscopy	**59 marks**
Section C	Exam-style questions (GCSE / IGCSE)	**50 marks**

Total: 142 marks

Name: _____ **Class:** _____

Date: _____ **Score:** _____ **/ 142**

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Section A – Recall

A1. Multiple choice – write the letter of the correct answer in the box. [12]

1. Which part of the blood makes up about 55% of its volume?
A Red blood cells **B** Plasma **C** Platelets **D** White blood cells ☐

2. Which of these is **not** dissolved in plasma?
A Urea **B** Glucose **C** Haemoglobin **D** Carbon dioxide ☐

3. What is the function of haemoglobin?
A Digests pathogens **B** Binds to oxygen **C** Forms clots **D** Makes antibodies ☐

4. Why do red blood cells have no nucleus?
A To divide faster **B** To make antibodies **C** More room for haemoglobin **D** To store glucose ☐

5. Which cell has a lobed nucleus?
A Phagocyte **B** Lymphocyte **C** Red blood cell **D** Platelet ☐

6. What do lymphocytes produce?
A Fibrin **B** Haemoglobin **C** Antibodies **D** Urea ☐

7. Platelets are best described as…
A Whole cells **B** Fragments of cells **C** Proteins **D** Hormones ☐

8. During clotting, which soluble protein is changed into fibrin?
A Haemoglobin **B** Antitoxin **C** Fibrinogen **D** Insulin ☐

9. Where are red blood cells made?
A Liver **B** Kidneys **C** Heart **D** Bone marrow ☐

10. The biconcave shape of a red blood cell increases its…
A Mass **B** Surface area to volume ratio **C** Number of nuclei **D** Lifespan ☐

11. What is the job of an antitoxin?
A Neutralises toxins **B** Engulfs bacteria **C** Carries oxygen **D** Clots blood ☐

12. A cell 10 µm wide appears 20 mm wide in a photo. The magnification is…
A × 2 **B** × 200 **C** × 2000 **D** × 20 000 ☐

A2. Fill in the gaps using words from the word bank. [10]

Word bank: plasma • haemoglobin • nucleus • antibodies • fibrin • platelets • phagocytes • oxygen • urea • biconcave

The liquid part of the blood is called _____ . It carries dissolved substances such as glucose, carbon dioxide and _____ . Red blood cells contain a red protein called _____ which joins with _____ in the lungs. Red blood cells have no _____ and are shaped like a _____ disc. White blood cells called _____ engulf pathogens, while lymphocytes make _____ . When the skin is cut, _____ help to form a clot made of threads of _____ .

A3. True or false? Write T or F. Correct any false statements. [6]

Statement	T / F	Correction (if false)
1. Plasma makes up about 55% of the blood.		
2. Platelets are whole cells with a nucleus.		
3. Lymphocytes engulf and digest pathogens.		
4. Oxyhaemoglobin forms in the lungs.		
5. Fibrin is soluble in plasma.		
6. Red blood cells are made in the bone marrow.		

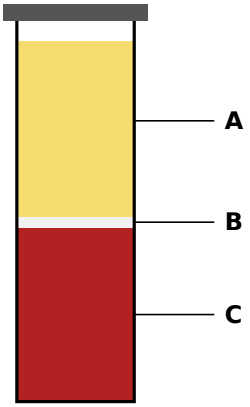
A4. Draw a line to match each component to its function. [5]

Red blood cell	Produces antibodies and antitoxins
Plasma	Fragment of a cell that helps blood clot
Phagocyte	Carries oxygen bound to haemoglobin
Lymphocyte	Liquid that transports dissolved substances
Platelet	Engulfs and digests pathogens

Section B – Topic questions

B1. Composition of blood and plasma

A sample of blood was spun in a centrifuge. The diagram shows the result.



Blood after spinning in a centrifuge

(a) Name the parts labelled **A**, **B** and **C**. **[3]**

A _____ B _____ C _____

(b) A blood sample contains 4.5 cm^3 of plasma in a total of 8.0 cm^3. Calculate the percentage of the sample that is plasma. Show your working. **[2]**

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(c) Plasma is about 90% water. Explain why this is important for its function. **[1]**

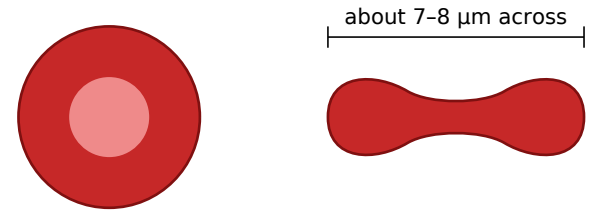
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(d) Complete the table to show where substances are transported from and to in the plasma. **[5]**

Substance	Carried from	Carried to
Glucose		All body cells
Carbon dioxide	Respiring cells	
Urea		
Insulin	Pancreas	
Fibrinogen		Stays in the blood

B2. Red blood cells

The diagram shows a red blood cell.



Face view
(pale centre = thinner)

Side view (biconcave)

(a) Name the shape of the red blood cell shown in the side view. **[1]**

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(b) Complete the word equations. **[2]**
In the lungs: haemoglobin + _____ → _____
In the tissues: oxyhaemoglobin → haemoglobin + oxygen

(c) Explain why having no nucleus is an advantage to a red blood cell. **[2]**

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.....

(d) Explain how the shape of a red blood cell helps it to take up oxygen quickly. **[2]**

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(e) Suggest one **disadvantage** of a red blood cell having no nucleus. **[1]**

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(f) Red blood cells are small and flexible. Explain why this is useful. **[1]**

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(g) A lack of iron in the diet can cause anaemia. Explain why a person with anaemia may get tired quickly during exercise. **[3]**

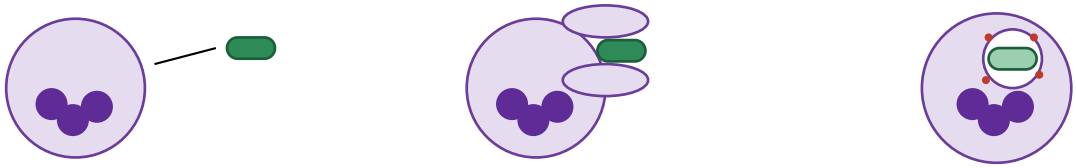
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B3. White blood cells

The diagram shows three stages in the action of one type of white blood cell.



Stage 1 **Stage 2** **Stage 3**

(a) Name this type of white blood cell and describe what is happening at each stage. **[3]**

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(b) Complete the table to compare the two types of white blood cell. **[4]**

	Phagocyte	Lymphocyte
Shape of nucleus		Large and round
Main function	Engulfs and digests pathogens	
Specific or non-specific?		

(c) Explain why antibodies made against the measles virus do not protect a person against the flu virus. **[2]**

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(d) Suggest why the number of white blood cells in the blood often rises during an infection. **[2]**

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(e) Explain how a vaccine can protect a person from a disease in the future. Use the term **memory cells** in your answer. **[3]**

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B4. Platelets and blood clotting

(a) The statements describe how a blood clot forms. They are in the wrong order. Number them 1–6 in the correct order. **[3]**

Fibrin forms a mesh of threads across the wound.	
The clot dries and hardens into a scab.	
Platelets stick to the damaged area and release chemicals.	
Skin and a blood vessel are damaged.	
Red blood cells get trapped in the mesh, forming a clot.	
Soluble fibrinogen is changed into insoluble fibrin.	

(b) Give **two** reasons why it is important for blood to clot quickly after a cut. **[2]**

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(c) Explain why it is important that fibrinogen stays soluble while it is in the blood. **[2]**

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(d) A person with haemophilia has a tooth removed. Suggest what problem they might have. **[1]**

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(e) A blood clot can form inside a coronary artery. Explain why this could cause a heart attack. **[2]**

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B5. Microscopy and data

(a) A lymphocyte has an actual diameter of 10 µm. In a photograph it is 20 mm wide. Calculate the magnification. **[2]**

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(b) A platelet is drawn 6 mm wide at a magnification of × 2000. Calculate its actual size in µm. **[2]**

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(c) A red blood cell 7 µm wide is viewed at × 400. How wide will the image be in mm? **[2]**

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(d) Convert 0.008 mm into micrometres (µm). **[1]**

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(e) The table shows the results of a blood test for a patient.

Component	Patient's result	Normal range
Red blood cells (millions per mm^3)	3.2	4.5 – 5.5
White blood cells (per mm^3)	15 000	4000 – 11 000
Platelets (per mm^3)	250 000	150 000 – 400 000

(i) Which component of the patient's blood is within the normal range? **[1]**

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(ii) Suggest a condition the patient may have, based on the red blood cell result. Give a reason. **[2]**

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(iii) Suggest what the white blood cell result shows. Explain your answer. **[2]**

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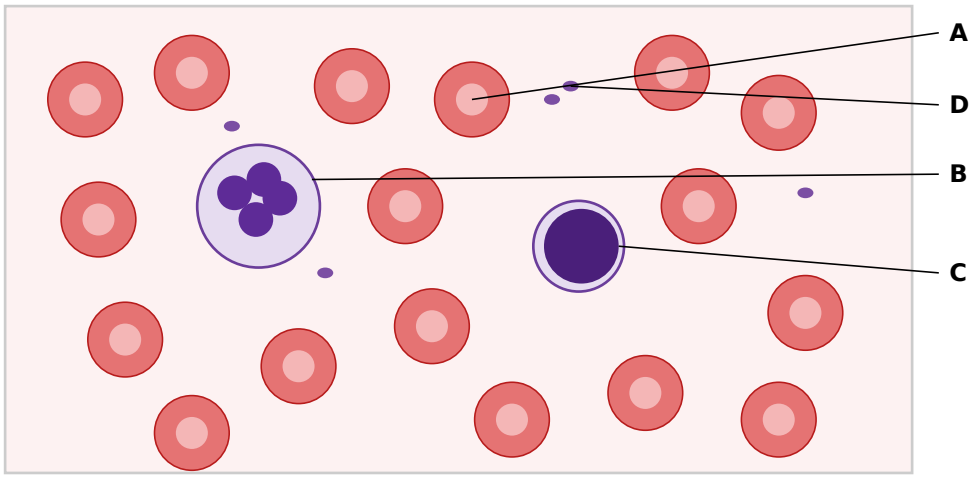
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Section C – Exam-style questions (GCSE / IGCSE)

Answer all questions. Total: 50 marks. Suggested time: 50 minutes.

Question 1

The diagram shows cells in a blood smear.



(a) Name the cells labelled **A**, **B**, **C** and **D**. **[4]**

A _____ B _____

C _____ D _____

(b) Give **one** way you can tell from the diagram that cell **B** is a white blood cell and not a red blood cell. **[1]**

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(c) Cell **D** is involved in blood clotting. Name the insoluble protein that forms during clotting. **[1]**

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Question 2

(a) Blood plasma transports many substances. Complete the table. **[3]**

Substance	Where it is carried from	Where it is carried to
Urea	Liver	
Carbon dioxide		Lungs
	Small intestine	All body cells

(b) Plasma also carries hormones. Name **one** hormone carried in the plasma. **[1]**

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Question 3

(a) Red blood cells are adapted to carry oxygen. Describe **two** adaptations of a red blood cell and explain how each one helps it to carry oxygen. **[4]**

(b) A student draws a red blood cell 28 mm in diameter. The actual diameter of the cell is 7 µm. Calculate the magnification of the drawing. Show your working. **[2]**

(c) Iron is needed to make haemoglobin. Explain why a person with too little iron in their diet may feel tired. **[3]**

Question 4

(a) Describe how a phagocyte destroys a bacterium. **[3]**

(b) Lymphocytes help to defend the body by producing antibodies and antitoxins. State the difference between the function of an antibody and an antitoxin. **[2]**

(c) After a person has had chickenpox once, they rarely catch it again. Explain why. **[3]**

Question 5

(a) Describe how a blood clot forms after the skin is cut. **[4]**

(b) Haemophilia is a condition in which blood does not clot properly. Suggest **two** problems a person with haemophilia might have. **[2]**

Question 6

Scientists measured the number of red blood cells in people living at different altitudes.

Altitude (m above sea level)	0	2000	4000	5500
Red blood cells (millions per mm^3)	5.0	5.5	6.1	6.8

(a) Describe the relationship shown in the table. **[1]**

(b) Calculate the percentage increase in red blood cells from 0 m to 4000 m. Give your answer to the nearest whole number. **[2]**

(c) Explain why the change in red blood cell number is an advantage to people living at high altitude. **[2]**

(d) Some athletes train at high altitude before a competition at sea level. Suggest why. **[2]**

Question 7 (extended response)

Blood is made of plasma, red blood cells, white blood cells and platelets. **[6]**
Describe the structure and function of **each** component of blood and explain how the structure of the cells is related to their function. *(Continue on lined paper if needed.)*