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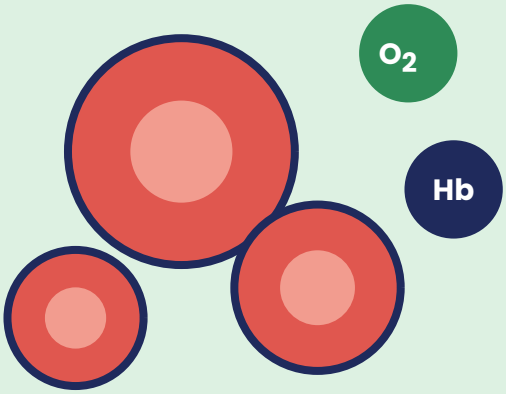
Year 10–11 • GCSE & IGCSE Biology

Blood and its Components



Mark Scheme – Teacher Copy

Answers, marking points and guidance for the Blood and its Components worksheet.

Plasma | Red cells | White cells | Platelets | Clotting | Microscopy

KEY IDEAS IN THIS WORKSHEET

YEAR 10–11

Name: _____ Class: _____

Date set: _____ Date due: _____

What's inside

Section A	Recall	**33 marks**
Section B	Topic questions	**59 marks**
Section C	Exam-style questions (GCSE / IGCSE)	**46 marks**

Marking notes

- (1) = one mark for each marking point.
- / separates alternative answers.
- Allow error carried forward in calculations.
- Accept any correct, clearly expressed alternative.

Total marks

138

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Blood and its Components Worksheet – Mark Scheme

Total: 138 marks. (1) = one mark. Accept any scientifically correct alternative wording.

Section A – Recall

Q	Answer	Mark	Guidance
A1	1 B 2 C 3 B 4 C 5 A 6 C 7 B 8 C 9 D 10 B 11 A 12 C	12	1 mark each
A2	plasma, urea, haemoglobin, oxygen, nucleus, biconcave, phagocytes, antibodies, platelets, fibrin	10	1 mark each, in this order
A3	1 T; 2 F – fragments of cells, no nucleus; 3 F – phagocytes engulf (lymphocytes make antibodies); 4 T; 5 F – fibrin is insoluble (fibrinogen is soluble); 6 T	6	1 mark each; false statements need the correction
A4	red blood cell – carries oxygen bound to haemoglobin; plasma – transports dissolved substances; phagocyte – engulfs and digests pathogens; lymphocyte – antibodies and antitoxins; platelet – fragment that helps blood clot	5	1 mark each
	Section A total	**33**	

Section B – Topic questions

Q	Answer	Mark	Guidance
B1(a)	A plasma; B white blood cells and platelets; C red blood cells	3	
B1(b)	4.5 ÷ 8.0 × 100 (1); = 56.25% / 56% (1)	2	
B1(c)	substances dissolve in water so they can be transported	1	
B1(d)	glucose from the small intestine; CO_2 to the lungs; urea from the liver to the kidneys (both needed); insulin to the liver / target organs / body cells; fibrinogen from the liver	5	1 mark per row
B2(a)	biconcave (disc)	1	
B2(b)	oxygen (1); oxyhaemoglobin (1)	2	
B2(c)	more space for haemoglobin (1); so more oxygen can be carried (1)	2	
B2(d)	large surface area (to volume ratio) (1); faster diffusion of oxygen / thin so short diffusion distance (1)	2	
B2(e)	cannot divide / repair itself / make proteins, so has a short lifespan (about 120 days)	1	
B2(f)	can squeeze through narrow capillaries, close to body cells	1	
B2(g)	less haemoglobin / fewer red cells (1); less oxygen carried to muscles (1); less aerobic respiration so less energy released / more lactic acid (1)	3	
B3(a)	phagocyte named (1); any two stages described: moves towards / is attracted to the pathogen; engulfs it; digests it with enzymes (in a vacuole) (2)	3	
B3(b)	phagocyte nucleus lobed (1); lymphocyte makes antibodies / antitoxins (1); phagocyte non-specific (1); lymphocyte specific (1)	4	
B3(c)	antibodies are specific / only fit one antigen (1); the flu virus has different antigens (1)	2	
B3(d)	more white blood cells are made (1); to destroy / engulf the extra pathogens or make antibodies (1)	2	
B3(e)	vaccine contains dead / weakened pathogen or its antigens (1); lymphocytes make antibodies and memory cells (1); if the real pathogen enters, memory cells make antibodies quickly / in large amounts before illness (1)	3	
B4(a)	correct order from top: 4, 6, 2, 1, 5, 3	3	all correct 3; 4–5 in correct place 2; 2–3 in correct place 1
B4(b)	any two: stops blood loss; stops pathogens entering; forms a scab while the skin heals	2	

Q	Answer	Mark	Guidance
B4(c)	if insoluble it would form clots inside vessels (1); blocking blood flow (1)	2	
B4(d)	bleeds for a long time / heavy blood loss	1	
B4(e)	clot blocks blood flow to the heart muscle (1); heart muscle gets no oxygen / glucose so cannot respire and dies (1)	2	
B5(a)	20 mm = 20 000 µm (1); 20 000 ÷ 10 = × 2000 (1)	2	
B5(b)	6 mm = 6000 µm (1); 6000 ÷ 2000 = 3 µm (1)	2	
B5(c)	7 × 400 = 2800 µm (1); = 2.8 mm (1)	2	
B5(d)	8 µm	1	
B5(e)	(i) platelets (1); (ii) anaemia (1); red cell count is below the normal range (1); (iii) an infection (1); white cell count is above normal, so more cells are fighting pathogens (1)	5	
	Section B total	**59**	

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

Q	Answer	Mark	Guidance
1(a)	A red blood cell; B phagocyte (white blood cell with lobed nucleus); C lymphocyte; D platelet	4	1 mark each
1(b)	B has a nucleus / is larger / has a lobed nucleus / no pale biconcave centre	1	
1(c)	fibrin	1	
2(a)	urea → kidneys; carbon dioxide from respiring cells / tissues; glucose (or amino acids) for row 3	3	1 mark per row
2(b)	any one: insulin / adrenaline / glucagon / ADH / oestrogen / testosterone	1	
3(a)	any two pairs (1 for feature + 1 for explanation): haemoglobin – binds oxygen; no nucleus – more room for haemoglobin; biconcave – large surface area for diffusion; thin – short diffusion distance; flexible – squeezes through capillaries	4	
3(b)	28 mm = 28 000 µm (1); 28 000 ÷ 7 = × 4000 (1)	2	
3(c)	less haemoglobin made / fewer red cells (1); less oxygen carried to cells (1); less aerobic respiration so less energy released (1)	3	
4(a)	phagocyte moves to / is attracted to the bacterium (1); engulfs / surrounds it (1); digests it with enzymes (1)	3	
4(b)	antibody binds to antigens on the pathogen / helps destroy the pathogen (1); antitoxin neutralises toxins made by bacteria (1)	2	
4(c)	memory cells (lymphocytes) remain after the first infection (1); they recognise the same antigen if the virus returns (1); antibodies are produced faster and in larger amounts, so pathogens are destroyed before symptoms (1)	3	
5(a)	platelets stick at the wound / release chemicals (1); soluble fibrinogen changed to insoluble fibrin (1); fibrin forms a mesh of threads (1); traps red blood cells / platelets to form a clot / scab (1)	4	
5(b)	any two: bleeds for longer / excessive blood loss; bruises easily; internal bleeding (e.g. into joints); greater risk of infection through wounds	2	
6(a)	as altitude increases, the number of red blood cells increases	1	
6(b)	(6.1 – 5.0) ÷ 5.0 × 100 (1); = 22% (1)	2	
6(c)	less oxygen in the air at altitude (1); more red cells / haemoglobin so more oxygen absorbed and carried to cells for respiration (1)	2	

Q	Answer	Mark	Guidance
6(d)	the body makes more red blood cells (1); at sea level more oxygen is delivered to muscles, so more aerobic respiration / better performance / less fatigue (1)	2	
7	Level 3 (5–6): all four components, structure clearly linked to function for each cell type. Level 2 (3–4): most components with function; some structure–function links. Level 1 (1–2): some components named with simple functions. Indicative content: plasma – liquid, mostly water, transports glucose, CO_2, urea, hormones, heat; red blood cells – biconcave, no nucleus, haemoglobin, carry O_2 as oxyhaemoglobin, large surface area for diffusion; phagocytes – lobed nucleus, flexible membrane to engulf, enzymes digest pathogens; lymphocytes – large nucleus, make specific antibodies and antitoxins, memory cells; platelets – cell fragments, no nucleus, release chemicals, fibrinogen → fibrin mesh, clot	6	levels of response
	Section C total	**46**	

Worksheet total: 138

Grade guide Whole worksheet (138 marks): 111–138 Excellent (80%+) • 83–110 Good (60–79%) • 55–82 Working towards (40–59%) • under 55 Revisit the topic and try again.