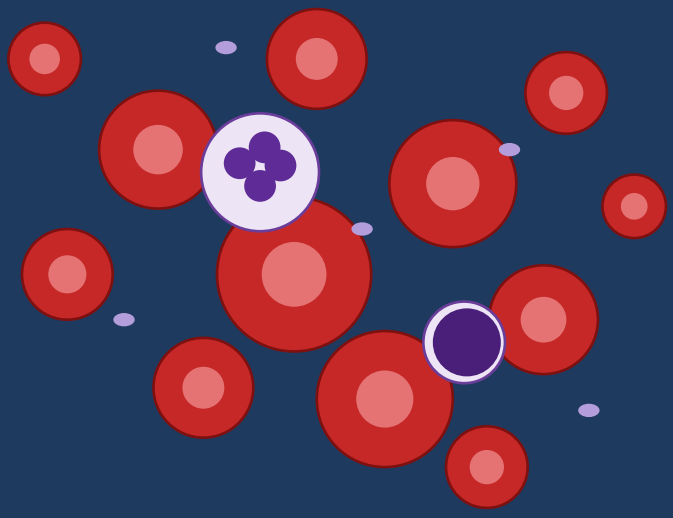
BIOLOGY

Blood and its Components

Mark Scheme

GCSE IGCSE Year 10–11



What's inside

Section A	Answers to recall questions	**33 marks**
Section B	Mark points for topic questions	**59 marks**
Section C	Exam-style mark scheme + levels for the 6-mark question	**50 marks**

Total: 142 marks

Use with the matching Questions file. Accept any answer that is scientifically correct and worded differently. Brackets (1) show where each mark is awarded.

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Mark scheme

Section A

Q	Answer	Mark
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
A2	plasma, urea, haemoglobin, oxygen, nucleus, biconcave, phagocytes, antibodies, platelets, fibrin (1 each)	10
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
A4	Red blood cell – carries oxygen; plasma – transports dissolved substances; phagocyte – engulfs and digests pathogens; lymphocyte – antibodies and antitoxins; platelet – helps blood clot	5
	Section A total	**33**

Section B

Q	Answer	Mark
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 small intestine; CO_2 to lungs; urea from liver to kidneys (both needed); insulin to liver / target organs / body cells; fibrinogen from liver	5
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 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 and any two stages described: moves towards / attracted to pathogen; engulfs it; digests it with enzymes (in a vacuole)	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); flu virus has different antigens (1)	2
B3(d)	more white blood cells 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 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 (all correct 3; 4–5 in correct place 2; 2–3 in correct place 1)	3
B4(b)	any two: stops blood loss; stops pathogens entering; forms scab while skin heals	2
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

Q	Answer	Mark
B4(e)	clot blocks blood flow to 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

Q	Answer	Mark
1(a)	A red blood cell; B phagocyte (white blood cell with lobed nucleus); C lymphocyte; D platelet	4
1(b)	B has a nucleus / is larger / lobed nucleus / not biconcave pale centre	1
1(c)	fibrin	1
2(a)	Urea → kidneys; carbon dioxide from respiring cells/tissues; glucose (or amino acids) for row 3	3
2(b)	insulin / adrenaline / glucagon / ADH / oestrogen / testosterone (any one)	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/attracted to bacterium (1); engulfs it / surrounds it (1); digests it with enzymes (1)	3
4(b)	antibody binds to antigens on the pathogen / helps destroy pathogen (1); antitoxin neutralises toxins made by bacteria (1)	2
4(c)	memory cells (lymphocytes) remain after first infection (1); recognise the same antigen if virus returns (1); antibodies produced faster and in larger amounts, so pathogens destroyed before symptoms (1)	3
5(a)	platelets stick at wound / release chemicals (1); soluble fibrinogen changed to insoluble fibrin (1); fibrin forms mesh of threads (1); traps red blood cells / platelets to form 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
6(d)	body makes more red blood cells (1); at sea level more oxygen delivered to muscles so more aerobic respiration / better performance / less fatigue (1)	2

Q	Answer	Mark
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; RBC – biconcave, no nucleus, haemoglobin, carries O_2 as oxyhaemoglobin, large SA for diffusion; phagocyte – lobed nucleus, flexible membrane to engulf, enzymes digest pathogens; lymphocyte – large nucleus, makes specific antibodies and antitoxins, memory cells; platelets – cell fragments, no nucleus, release chemicals, fibrinogen → fibrin mesh, clot	6
	Section C total	**50**

Grade guide (approx.): Whole worksheet (142 marks): 114+ Excellent (80%+) • 85–113 Good • 57–84 Working towards • under 57 Revisit the topic and try again.