



Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Key words

1. red blood cells → d. carry oxygen, using the red pigment hemoglobin
2. white blood cells → c. fight germs and make antibodies
3. platelets → e. start the clot that stops bleeding
4. plasma → b. the pale yellow liquid part of blood, about 90% water
5. pulmonary artery → g. carries deoxygenated blood from the heart to the lungs
6. sphygmomanometer → a. measures blood pressure

K • 3

Each carries 0.5 mark.

2 Label the diagram

- | | |
|-----------------------|-----------------------------------|
| 1. superior vena cava | 6. left ventricle |
| 2. pulmonary artery | 7. right ventricle |
| 3. tricuspid valve | 8. aorta |
| 4. inferior vena cava | 9. left auricle |
| 5. right auricle | 10. bicuspid valve (mitral valve) |

K • 5

Each carries 0.5 mark.

3 Multiple choice

- i. c. anemia

K • 1

Too little hemoglobin (or too few red cells) means the blood carries too little oxygen: anemia.

- ii. b. The pressure produced in the left ventricle is passed on to the artery.

U • 1

When the left ventricle squeezes, it pushes blood into the aorta, and that pressure travels along the arteries. The arteries don't contract with the heart (they stretch), and the blood doesn't get thicker.

- iii. d. AB negative

A • 1

Clumping with anti-A and anti-B means both antigens A and B are present: group AB. No clumping with anti-D means no Rh factor: **negative**. So Rohit is **AB negative**. (There is no "O" antiserum: there is no O antigen, and group O is simply the absence of A and B.)

- iv. c. a lack of platelets

A • 1

Platelets plug the wound and start the clot. (Bleeding that won't stop can also be caused by a missing clotting protein, as in hemophilia; but of these options, platelets is right.)

- v. c. high uric acid

U • 1

Red meat (and, a little, legumes) are rich in purines, which become uric acid. Painful, swollen joints after such meals are a sign of high uric acid (gout).

4 Very short answers

- a. MARKING SCHEME

K • 1

✓ About 120/80 mmHg written.

- b. MARKING SCHEME

K • 1

✓ Red blood cells and platelets (both needed).

- c. MARKING SCHEME

U • 1

✓ Plasma with the fibrinogen removed (or used up in a clot).



5 Short answers

a. MARKING SCHEME

U • 2

- ✓ The left ventricle pumps blood through the aorta to every part of the body; the right ventricle pumps it only to the nearby lungs.
- ✓ Pushing blood all round the body needs a much higher pressure, so its wall has more muscle.

b. MARKING SCHEME

U • 2

- ✓ Blood in arteries is under high pressure from the heart, which keeps it moving forward.
- ✓ Blood in veins is at low pressure and often flows uphill, so valves stop it flowing backwards.

c. MARKING SCHEME

A • 2

- ✓ 130 mmHg is the systolic pressure (ventricles contracting) and 90 mmHg the diastolic pressure (ventricles relaxing).
- ✓ Both are above the normal 120/80; a diastolic of 90 is high blood pressure (hypertension) if it stays so, and the person should see a doctor.

6 Long answer

ANSWER

A • 4

- i. X. A shallow cut that won't stop bleeding means the blood isn't clotting.
- ii. Y. Blood coming out under high pressure (spurting) means an **artery** is cut; arteries lie deep and carry blood at high pressure.
- iii. Y's. A cut artery loses blood very fast because of its high pressure, and a person can lose a dangerous amount in minutes. Z's cut was shallow and clotted normally by itself.

MARKING SCHEME

- ✓ i. X.
- ✓ ii. Y.
- ✓ iii. Y's injury.
- ✓ A cut artery loses blood very fast because of its high pressure; Z's shallow cut clotted by itself.

7 Numerical problem

ANSWER

A • 4

- i. $19 \times 4 = 76$ beats per minute.
- ii. Yes: the normal resting rate is 60 to 100 a minute.
- iii. In one day: $76 \times 60 \times 24 = 109,440$ beats, about a hundred thousand.

MARKING SCHEME

- ✓ i. $19 \times 4 = 76$ beats per minute.
- ✓ ii. Yes, it is between 60 and 100 a minute.
- ✓ iii. Minutes in a day: $60 \times 24 = 1,440$.
- ✓ $76 \times 1,440 = 109,440$ beats.



8 Think

ANSWER

HA - 2

It shows systemic circulation (from the left ventricle to an organ of the body and back).
The mistake: blood from the kidney returns to the **right** auricle (through the renal vein and the inferior vena cava), not the left; the left auricle receives blood only from the lungs.

MARKING SCHEME

- ✓ Systemic circulation.
- ✓ Blood from the kidney returns to the right auricle, not the left (the left auricle gets blood only from the lungs).

9 Activity: Measure your pulse rate (Activity 5.4)

(not marked)

WHAT STUDENTS SHOULD FIND

The pulse rate rises after jumping (often to well over 100 a minute) and falls back towards the resting rate after a rest. Working muscles need more oxygen and food, so the heart beats faster to send them more blood. Each beat makes one pulse, so the pulse rate is the heart rate.

See it at Science Playground

Exhibits and plants at the center, Bhaktapur, that go with this unit. Book a class visit at science-playground.com/booking.

- **The Iron Heart** (exhibit): The wire line beside the heart is an ECG trace, the electrical beat doctors read.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	11	7	12	2	32

