

Circulatory System: Complete Study File + Ministerial-Style Assessment Bank



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المزيد من مادة
أحياء:

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التواصل الاجتماعي بحسب الصف الثاني عشر المتقدم



صفحة المناهج
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المزيد من الملفات بحسب الصف الثاني عشر المتقدم والمادة أحياء في الفصل الأول

Respiratory System

1

شرح وأسئلة حول درس علم الوراثة المندلية

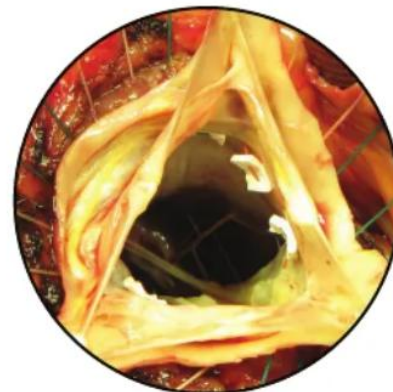
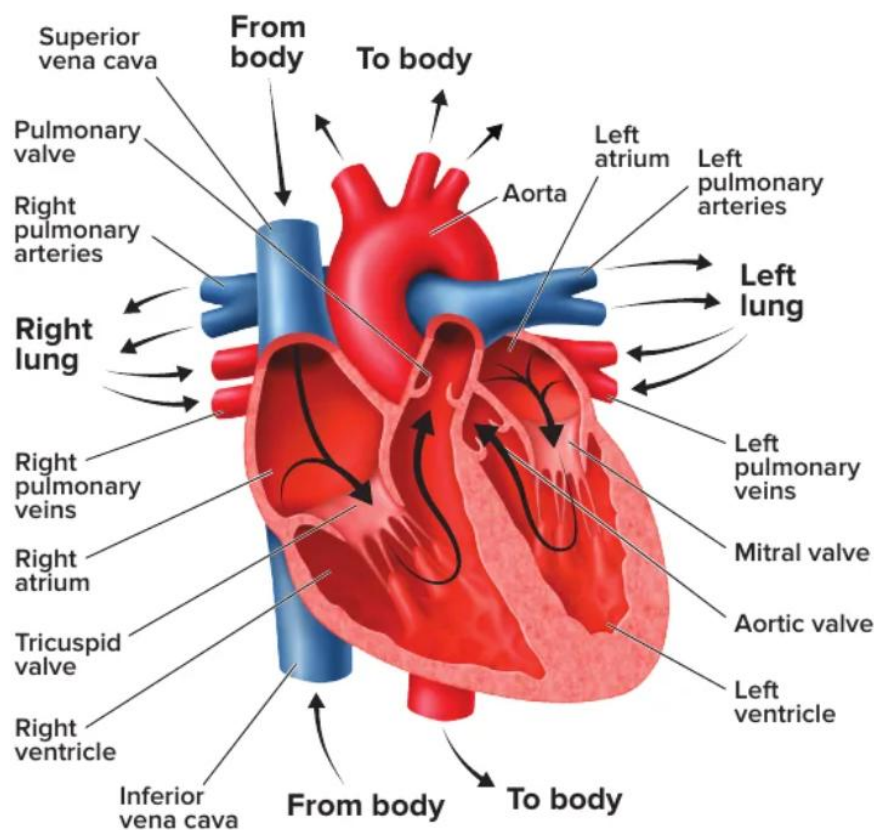
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أنماط الوراثة المعقدة - بريدج

3

CIRCULATORY SYSTEM

Complete Study File + Ministerial-Style Assessment Bank



Aortic valve in an opened position

Figure Cover. Core heart structure from the supplied textbook pages.

Course	Biology
Grade	12 ATS
Prepared by	Mr. Ahmed Elhddad
Teacher signature	"the 1st Biology twacher"

Focus Question: How does exercise, such as lifting weights, positively affect the circulatory system?

Scope: This Study edition summarizes and reorganizes the supplied textbook lesson. It is designed for strong exam coverage, concept explanation, and practice - without copying long textbook passages.



LESSON ROADMAP & LEARNING OUTCOMES

A fast map for teaching the lesson in a logical sequence

By the end of the lesson, the student should be able to:

- Compare arteries, capillaries, and veins using structure and function.
- Label the four chambers, main valves, and major vessels of the heart.
- Trace blood through the heart, lungs, and body in the correct order.
- Explain how the SA node and AV node coordinate the heartbeat.
- Distinguish systolic from diastolic blood pressure.
- Explain the roles of plasma, RBCs, WBCs, and platelets.
- Solve ABO and Rh concept questions using markers and antibodies.
- Link atherosclerosis to reduced blood flow, heart attack, and stroke.

High-yield exam language

- "Away from the heart" → artery.
- "Exchange / one-cell wall" → capillary.
- "Valve / low pressure / return to heart" → vein.
- "Natural pacemaker" → SA node.
- "Higher BP value" → systolic.
- "Oxygen-binding protein" → hemoglobin.
- "Fibrin mesh" → clotting.
- "Plaque narrows arteries" → atherosclerosis.

Recommended teaching sequence

1. Vessels →	2. Heart structure →	3. Heartbeat/B P →	4. Double circulation →	5. Blood →	6. Blood groups →	7. Disorders
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1 BLOOD VESSELS

Arteries, capillaries, veins - structure explains function

Concept Core

- **Arteries:** carry blood away from the heart. Their thick smooth-muscle and elastic/connective layers withstand high pressure.
- **Capillaries:** microscopic exchange vessels. Their wall is a single endothelial layer, giving a very short diffusion distance.
- **Veins:** return blood to the heart at lower pressure. A large lumen, valves, skeletal-muscle contractions, and breathing help venous return.
- **Flow sequence:** artery → arteriole → capillary → venule → vein.
- **Exercise response:** working-muscle capillaries dilate, increasing blood flow, oxygen delivery, and waste removal.

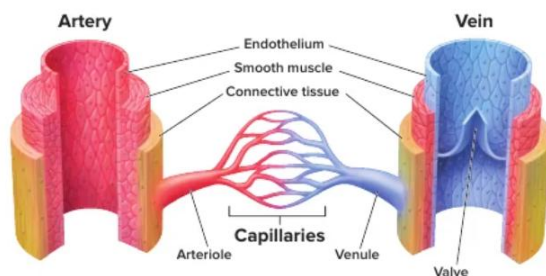


Figure 3 Blood circulates throughout the body inside blood vessels.

Hypothesize how body temperature can be regulated by the diameter of blood vessels.

Figure 1. Textbook vessel comparison: artery, capillary network, and vein with a valve.

Exam Comparison / Organizer

Feature	Artery	Capillary	Vein
Direction	Away from heart	Between arterioles and venules	Toward heart
Wall	Thick; muscle + elastic/connective tissue	One-cell-thick endothelium	Thinner than arteries
Lumen	Relatively narrow	Extremely narrow; RBCs may pass single-file	Wide
Pressure	High	Falls across network	Low
Valves	Usually absent	Absent	Present in many veins
Main job	Fast delivery	Exchange by diffusion	Return blood to heart

Exam trap: Do not use oxygen level alone to define an artery or vein. Direction relative to the heart is the defining rule. Pulmonary arteries carry deoxygenated blood; pulmonary veins carry oxygenated blood.

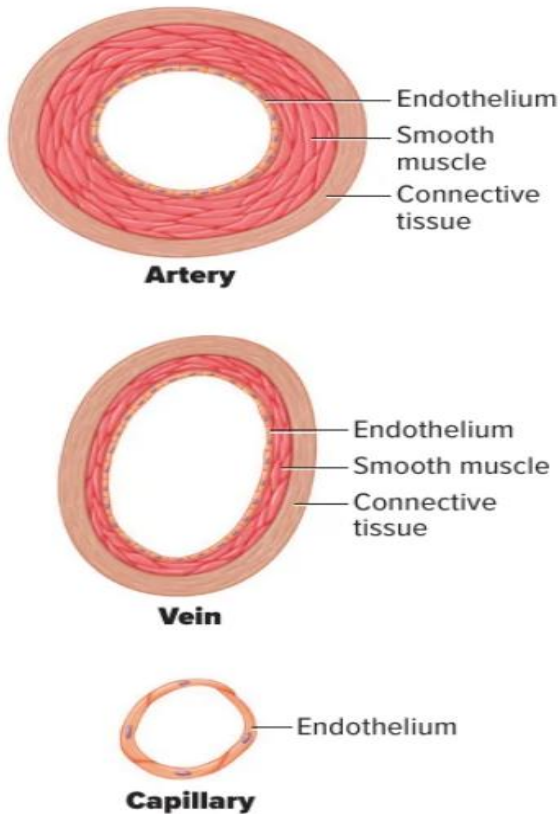


Figure 1 The three major blood vessels in the body are arteries, veins, and capillaries.

Textbook cross-sections of artery, vein, and capillary.

Structure → Function cue

- Thicker muscular wall → handles higher pressure.
- One-cell endothelium → fast diffusion.
- Wider lumen + valves → supports low-pressure return to the heart.

HEART → Artery → Arteriole → Capillary → Venule → Vein → HEART

Blood Vessels - Ministerial-Style Check

A. Multiple Choice (6)

1. Which vessel has a wall only one cell thick? A. Artery B. Capillary C. Vein D. Aorta	4. Which feature most directly prevents backflow in many veins? A. Thick elastic wall B. Very narrow lumen C. Valves D. High pressure
2. Why are artery walls thick and muscular? A. To allow gas exchange B. To withstand high pressure C. To store antibodies D. To prevent clotting	5. Which vessel is an exception to the usual oxygen pattern of veins? A. Renal vein B. Pulmonary vein C. Vena cava D. Femoral vein
3. During exercise, capillaries in active skeletal muscle usually _____. A. constrict permanently B. dilate to increase blood flow C. close all valves D. become arteries	6. In Figure 1, a vessel has a wide lumen, a relatively thin wall, and a valve. It is most likely a _____. A. capillary B. artery C. vein D. arteriole

B. Complete the statements (3)

- The single-cell layer lining a capillary is the _____.
- Small arteries branch into _____ before blood reaches capillaries.
- Many veins contain _____ that keep blood moving in one direction.

C. True / False (3)

- All arteries carry oxygen-rich blood.
- Capillaries are specialized for exchange because their walls are very thin.
- Contractions of nearby skeletal muscles can help move venous blood toward the heart.

D. Short Answer (2)

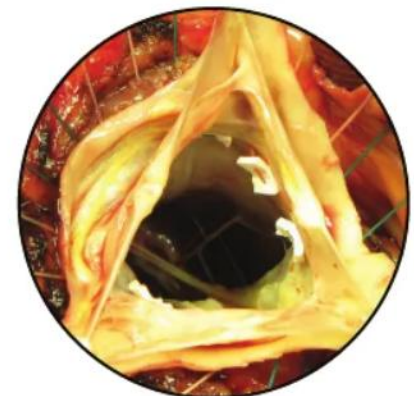
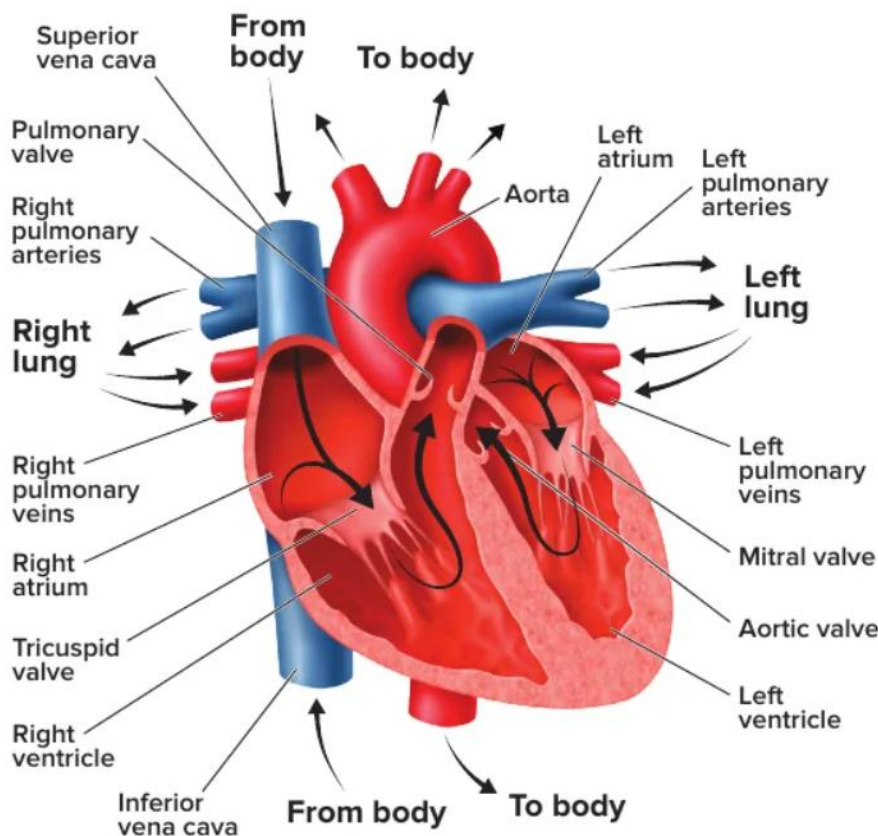
- Explain how the structure of an artery is suited to its function.
- Predict what could happen to venous blood flow if valves in a leg vein do not close properly. Explain your reasoning.

2 THE HEART: STRUCTURE AND VALVES

Four chambers, septum, valves, and one-way flow

Concept Core

- **Cardiac muscle:** the heart is a muscular pump located near the center of the chest.
- **Atria:** the right and left atria are receiving chambers.
- **Ventricles:** the right and left ventricles pump blood away from the heart.
- **Septum:** a muscular wall separates the right and left sides and prevents mixing of oxygenated and deoxygenated blood.
- **Valves:** tricuspid, mitral, pulmonary, and aortic valves keep blood moving in one direction.
- **Left ventricle:** has the thickest muscular wall because it must generate pressure for the systemic circuit.



Aortic valve in an opened position

Figure 2. Textbook heart diagram showing chambers, major vessels, valves, and direction of blood flow.

Exam Comparison / Organizer

Structure	Receives / sends blood	Key point
Right atrium	Receives from venae cavae	Deoxygenated blood from body
Right ventricle	Pumps to pulmonary arteries	Sends blood to lungs
Left atrium	Receives from pulmonary veins	Oxygenated blood from lungs
Left ventricle	Pumps into aorta	Sends blood to body; thick wall
Tricuspid valve	RA → RV	Prevents backflow to RA
Mitral valve	LA → LV	Prevents backflow to LA
Pulmonary valve	RV → pulmonary artery	Semilunar valve
Aortic valve	LV → aorta	Semilunar valve

Exam trap: The right side of a heart diagram may appear on the left side of the page. Use labels and blood flow, not page position.

Venae cavae → RA → Tricuspid → RV → Pulmonary valve → Lungs → Pulmonary veins → LA → Mitral → LV → Aortic valve → Aorta

The Heart: Structure and Valves - Ministerial-Style Check

A. Multiple Choice (6)

1. Which chamber receives deoxygenated blood returning from the body?

- A. Left atrium
- B. Right atrium
- C. Left ventricle
- D. Right ventricle

4. Which chamber has the thickest muscular wall?

- A. Right atrium
- B. Left atrium
- C. Right ventricle
- D. Left ventricle

2. Which valve lies between the left atrium and left ventricle?

- A. Tricuspid valve
- B. Pulmonary valve
- C. Mitral valve
- D. Aortic valve

5. In Figure 2, blood leaves the right ventricle through the ____.

- A. aortic valve
- B. pulmonary valve
- C. mitral valve
- D. vena cava

3. The septum is important because it _____.

- A. produces red blood cells
- B. prevents mixing between the two sides
- C. opens the aorta
- D. acts as the pacemaker

6. Which sequence is correct?

- A. Pulmonary veins → right atrium → right ventricle
- B. Vena cava → right atrium → right ventricle
- C. Aorta → left atrium → left ventricle
- D. Pulmonary artery → left atrium → aorta

B. Complete the statements (3)

1. The two upper chambers of the heart are called the _____.
2. The large artery that carries blood from the left ventricle to the body is the _____.
3. The muscular wall separating the left and right sides of the heart is the _____.

C. True / False (3)

1. The right ventricle pumps blood to the lungs.
2. The mitral valve is located between the right atrium and right ventricle.
3. Heart valves help maintain one-way blood flow.

D. Short Answer (2)

1. Trace the path of blood from the vena cava to the aorta, naming the chambers and valves in order.
2. Explain why the left ventricle has a thicker wall than the right ventricle.

3 HOW THE HEART BEATS & BLOOD PRESSURE

Pacemaker control, pulse, systolic pressure, and diastolic pressure

Concept Core

- **Heartbeat cycle:** atria contract first to fill the ventricles; ventricles then contract to pump blood to lungs and body; relaxation allows refilling.
- **SA node:** a group of cells in the right atrium that acts as the natural pacemaker and initiates each heartbeat.
- **AV node:** receives the signal from the atria and conducts it through fibers that stimulate both ventricles.
- **Pulse:** the rhythmic expansion and recoil of arteries produced by ventricular pumping; pulse rate matches heart rate.
- **Blood pressure:** the force of blood against vessel walls. Systolic pressure is the higher value during ventricular contraction; diastolic pressure is the lower value during relaxation.
- **Textbook adult reference:** 120/80 mmHg is given as an ideal adult reading; interpretation of real readings is a healthcare task, not just a single-number judgment.

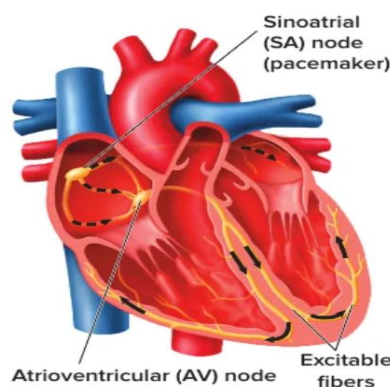


Figure 5 The SA node initiates the contraction of the heart, which spreads through both atria to the AV node. The AV node transmits the signal through excitatory fibers that stimulate both ventricles.

Figure 3. Textbook conduction diagram: SA node initiates the heartbeat; the signal passes to the AV node and through excitatory fibers.

Exam Comparison / Organizer

Term	When / where	Meaning
SA node	Right atrium	Starts the electrical signal; natural pacemaker
AV node	Between atria and ventricles	Relays signal to ventricular conduction fibers
Pulse	Arteries	Expansion/recoil linked to each heartbeat
Systolic pressure	Ventricular contraction	Higher/top value
Diastolic pressure	Heart relaxation	Lower/bottom value

Exam trap: If a blood-pressure value is written 120/80, 120 is systolic and 80 is diastolic. Do not reverse them.



Figure 6 A sphygmomanometer measures the blood pressure in an artery.

Textbook sphygmomanometer image.

Reading a BP value

- Top / higher number = systolic pressure.
- Bottom / lower number = diastolic pressure.
- The device measures pressure in an artery.

SA node starts → **Atria contract** → **AV node relays** → **Ventricles contract** → **Arteries pulse**

How the Heart Beats & Blood Pressure - Ministerial-Style Check

A. Multiple Choice (6)

1. Which structure normally initiates each heartbeat?

- A. AV node
- B. SA node
- C. Aortic valve
- D. Septum

4. Which blood-pressure value is measured during ventricular contraction?

- A. Diastolic
- B. Venous
- C. Systolic
- D. Capillary

2. After the SA node fires, the signal is next relayed through the ____.

- A. AV node
- B. vena cava
- C. pulmonary vein
- D. mitral valve

5. A reading of 118/76 mmHg has a diastolic value of ____.

- A. 118
- B. 76
- C. 42
- D. 194

3. A pulse felt at the wrist is produced mainly by ____.

- A. movement of air in lungs
- B. expansion and recoil of an artery
- C. opening of venous valves
- D. diffusion across capillaries

6. If the SA node fails to send normal signals, which process is directly disrupted first?

- A. Clot formation
- B. Heart rhythm initiation
- C. Oxygen binding to hemoglobin
- D. Antibody production

B. Complete the statements (3)

1. The heart's natural pacemaker is the _____ node.
2. The higher number in a blood-pressure reading is the _____ pressure.
3. The number of pulse beats counted per minute is the _____ rate.

C. True / False (3)

1. The AV node normally starts the heartbeat before the SA node.
2. Systolic pressure occurs when the ventricles contract.
3. A pulse is related to the repeated expansion and relaxation of arteries.

D. Short Answer (2)

1. Compare the roles of the SA node and AV node in one heartbeat.
2. A student counts 18 pulse beats in 15 seconds. Calculate the heart rate in beats per minute and show the method.

4

BLOOD FLOW IN THE BODY & CIRCULATORY FUNCTIONS*Pulmonary circuit + systemic circuit + transport and homeostasis***Concept Core**

- **Double circulation:** blood moves through two connected loops - pulmonary circulation and systemic circulation.
- **Pulmonary circuit:** right heart → pulmonary arteries → lung capillaries → pulmonary veins → left heart.
- **At the lungs:** oxygen diffuses from air spaces into blood, while carbon dioxide diffuses from blood into the lungs.
- **Systemic circuit:** left heart → aorta/arteries → body capillaries → veins/venae cavae → right heart.
- **At body tissues:** oxygen and useful dissolved materials move toward cells; carbon dioxide and other wastes move into the blood.
- **Main functions:** transport gases and nutrients, remove wastes, carry immune and clotting components, distribute heat, and help maintain homeostasis.

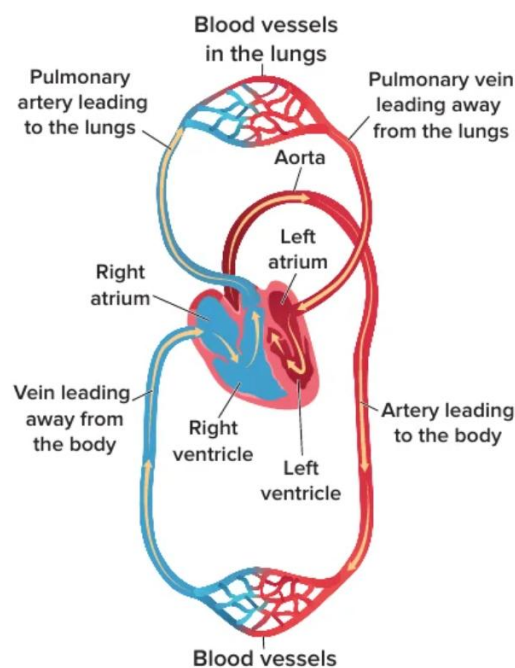


Figure 7 Blood flow through the body consists of two different circulatory loops.

Figure 4. Textbook double-circulation diagram: pulmonary loop to the lungs and systemic loop to the body.

Exam Comparison / Organizer

Circuit	Starts from	Main destination	Returns to
Pulmonary	Right ventricle	Lungs	Left atrium
Systemic	Left ventricle	Body tissues	Right atrium

Exam trap: Pulmonary artery and pulmonary vein are named by direction relative to the heart, not by oxygen content.

Right ventricle →
Lungs

→ Left atrium

→ Left ventricle →
Body

→ Right atrium

Blood Flow in the Body & Circulatory Functions - Ministerial-Style Check

Question strategy: Read the command word first. For figure-based items, identify the structure, then connect its structure to its function.

A. Multiple Choice (6)

1. Which vessel carries blood from the right ventricle toward the lungs?

- A. Aorta
- B. Pulmonary artery
- C. Pulmonary vein
- D. Vena cava

2. Where does oxygen enter the blood in the pulmonary circuit?

- A. Aorta
- B. Lung capillaries
- C. Vena cava
- D. Left ventricle

3. Which chamber starts the systemic circuit by pumping blood to the body?

- A. Right atrium
- B. Right ventricle
- C. Left atrium

4. Carbon dioxide moves from body cells into the blood mainly by ____.

- A. active transport only
- B. diffusion
- C. valve action
- D. blood clotting

5. Which is NOT a main circulatory function?

- A. Transporting nutrients
- B. Carrying immune cells
- C. Distributing heat
- D. Producing electrical signals for skeletal muscles

6. In Figure 4, the loop that connects the heart and lungs is called ____.

- A. systemic circulation
- B. pulmonary circulation
- C. coronary clotting
- D. lymph formation

D. Left ventricle

B. Complete the statements (3)

1. The two major circulation loops are pulmonary and _____ circulation.
2. Oxygenated blood returns from the lungs to the heart through the pulmonary _____.
3. Keeping internal conditions relatively stable is called _____.

C. True / False (3)

1. The systemic circuit carries blood between the heart and the body tissues.
2. Pulmonary veins carry deoxygenated blood from the heart to the lungs.
3. The circulatory system helps distribute heat throughout the body.

D. Short Answer (2)

1. Compare pulmonary and systemic circulation using starting chamber, destination, and returning chamber.
2. Explain how diffusion at body capillaries supports cellular respiration and waste removal.

5 BLOOD COMPONENTS & CLOTTING

Plasma, red blood cells, white blood cells, platelets, and fibrin

Concept Core

- **Plasma:** the clear yellowish liquid portion; more than half of blood volume. It is mostly water and carries dissolved nutrients, wastes, hormones, proteins, minerals, and other substances.
- **Red blood cells (RBCs):** made in bone marrow; contain hemoglobin, which binds oxygen. Mature RBCs lack nuclei and typically live about 120 days.
- **White blood cells (WBCs):** defend the body. Different types recognize pathogens, release defensive chemicals, or destroy invaders. They have nuclei and are much less numerous than RBCs.
- **Platelets:** cell fragments essential for blood clotting.
- **Clot formation:** platelets collect at a wound and help trigger formation of fibrin. Fibrin threads form a mesh that traps platelets and blood cells, producing a clot/scab.
- **Plasma proteins:** include groups involved in water balance, defense against disease, and blood clotting.

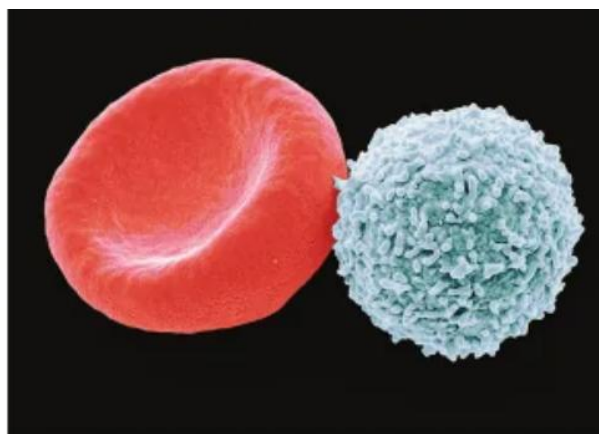


Figure 9 Blood is composed of liquid plasma, red blood cells (dimpled disc on the left), white blood cells (irregularly shaped cell on the right), and platelets (flat fragments, not shown).

Figure 5. Textbook micrograph-style figure showing red blood cells, a white blood cell, and platelets.

Exam Comparison / Organizer

Component	Key structure / feature	Main function
Plasma	Mostly water; dissolved substances	Transport medium; carries proteins, nutrients, wastes, hormones
Red blood cells	Hemoglobin; no nucleus when mature	Transport oxygen (and some CO ₂)
White blood cells	Nucleus; several types	Defense against pathogens
Platelets	Cell fragments	Start and support clot formation

Exam trap: Platelets are cell fragments, not full white blood cells. Fibrin is a protein mesh formed during clotting; it is not a blood cell.

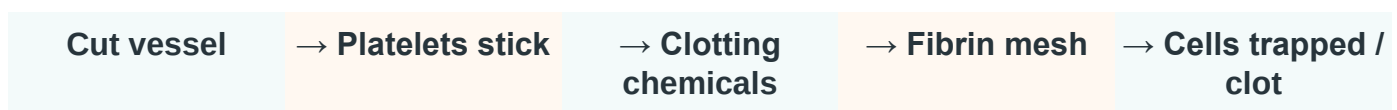


Textbook plasma separation image.



Figure 10 A scab forms as fibrin threads trap blood cells and platelets.

Textbook clotting image: fibrin threads trap blood cells and platelets.



Blood Components & Clotting - Ministerial-Style Check

A. Multiple Choice (6)

1. Which blood component makes up the largest fraction of blood by volume?

- A. Platelets
- B. Plasma
- C. White blood cells
- D. Hemoglobin

4. Which component is most directly responsible for beginning a clot at a cut?

- A. Platelets
- B. Plasma water
- C. Red blood cells
- D. Atria

2. Which molecule in red blood cells binds oxygen?

- A. Fibrin
- B. Hemoglobin
- C. Antibody
- D. Insulin

3. Which feature distinguishes most mature red blood cells from white blood cells?

- A. RBCs have nuclei
- B. RBCs lack nuclei
- C. WBCs contain hemoglobin
- D. WBCs are cell fragments

5. Fibrin helps stop bleeding by _____.

- A. dissolving red blood cells
- B. forming a mesh that traps cells and platelets
- C. opening blood vessels
- D. carrying oxygen

6. A student observes a blood cell with a nucleus that can attack pathogens. It is most likely a _____.

- A. red blood cell
- B. white blood cell
- C. platelet
- D. plasma protein

B. Complete the statements (3)

1. The oxygen-binding protein inside red blood cells is _____.
2. The liquid portion of blood is called _____.
3. During clotting, _____ threads form a mesh across the wound.

C. True / False (3)

1. Mature red blood cells normally contain nuclei.
2. White blood cells help defend the body against disease-causing organisms.
3. Platelets are important in blood clot formation.

D. Short Answer (2)

1. Compare red blood cells and white blood cells in structure and function.
2. Describe the sequence from a cut blood vessel to formation of a fibrin clot.

6 BLOOD GROUPS: ABO AND RH

Markers, antibodies, transfusion compatibility, and Rh factor

Concept Core

- **Blood-group markers:** specific molecules on red blood cell surfaces determine ABO type.
- **Type A:** A markers; anti-B antibodies in plasma.
- **Type B:** B markers; anti-A antibodies in plasma.
- **Type AB:** A and B markers; no anti-A or anti-B antibodies. In simplified ABO red-cell transfusion, AB can receive A, B, AB, or O.
- **Type O:** no A/B markers; anti-A and anti-B antibodies. In simplified ABO red-cell transfusion, O red cells can donate to A, B, AB, or O.
- **Rh factor:** another RBC marker. Rh-positive blood has the marker; Rh-negative blood lacks it. Rh incompatibility can matter in pregnancy and transfusion contexts.

Table 1 Blood Types

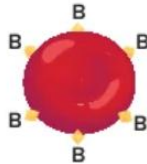
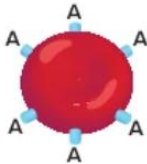
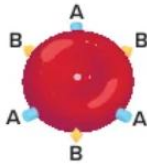
Blood Type	A	B	AB	O
Marker molecule and antibody	Marker molecule: A Antibody: anti-B	Marker molecules: B Antibody: anti-A	Marker molecules: AB Antibody: none	Marker molecules: none Antibodies: anti-A, anti-B
Example				
Can donate blood to:	A or AB	B or AB	AB	A, B, AB, or O
Can receive blood from:	A or O	B or O	A, B, AB, or O	O

Figure 6. Textbook ABO blood-type table with marker molecules, antibodies, and simplified red-cell transfusion compatibility.

Exam Comparison / Organizer

ABO type	RBC marker(s)	Plasma antibody(ies)	Can receive RBCs from*
A	A	anti-B	A, O
B	B	anti-A	B, O
AB	A and B	none	A, B, AB, O
O	none	anti-A and anti-B	O

Exam trap: Transfusion questions in this lesson use simplified red-blood-cell ABO compatibility unless Rh is explicitly included. Mixing incompatible markers and antibodies can cause clumping.

Check RBC markers

→ Check plasma antibodies

→ Avoid marker-antibody conflict

→ Prevent clumping

Blood Groups: ABO and Rh - Ministerial-Style Check

A. Multiple Choice (6)

1. A person with type A blood has which RBC marker?

- A. B only
- B. A only
- C. A and B
- D. No A/B markers

2. Which antibodies are expected in type O plasma?

- A. None
- B. anti-A only
- C. anti-B only
- D. anti-A and anti-B

3. In simplified ABO red-cell transfusion, which blood type can receive RBCs from A, B, AB, or O?

- A. A
- B. B
- C. AB
- D. O

4. Why can an incompatible transfusion be dangerous?

- A. It increases capillary wall thickness
- B. Antibodies can cause RBCs to clump
- C. It converts veins to arteries
- D. It stops the SA node from existing

5. A person has B markers on RBCs. Which ABO type is most likely?

- A. A
- B. B
- C. AB only in every case
- D. O

6. In Figure 6, a type O recipient should receive RBCs from which ABO type?

- A. O only
- B. A only
- C. B only
- D. AB only

B. Complete the statements (3)

1. Type AB red blood cells carry both _____ and _____ markers.
2. Type O plasma contains anti-A and anti-_____ antibodies.
3. The additional red-blood-cell marker discussed after ABO is the _____ factor.

C. True / False (3)

1. Type AB plasma normally contains both anti-A and anti-B antibodies.
2. Type O red blood cells have neither A nor B markers.
3. Rh-positive blood has the Rh marker on red blood cells.

D. Short Answer (2)

1. Explain why a type A person should not receive type B red blood cells in the simplified ABO model.
2. Compare type O and type AB blood in terms of ABO markers, antibodies, and receiving red blood cells.

7 CIRCULATORY SYSTEM DISORDERS

Atherosclerosis, heart attack, and stroke - cause and effect

Concept Core

- **Atherosclerosis:** fat deposits and other material can narrow arteries and reduce oxygen-rich blood flow.
- **Effect on the heart:** when blood flow is restricted, the heart may need to work harder to move blood through the narrowed vessels.
- **Heart attack:** can occur when blood flow through vessels supplying heart muscle is blocked, so part of the heart muscle does not receive enough oxygen.
- **Stroke:** can occur when blood flow to part of the brain is blocked or when a brain vessel ruptures, depriving brain tissue of oxygen.
- **Long-term risk reduction:** the textbook emphasizes regular exercise, a healthy diet, and maintaining a healthy weight; medical treatment decisions belong to qualified healthcare professionals.

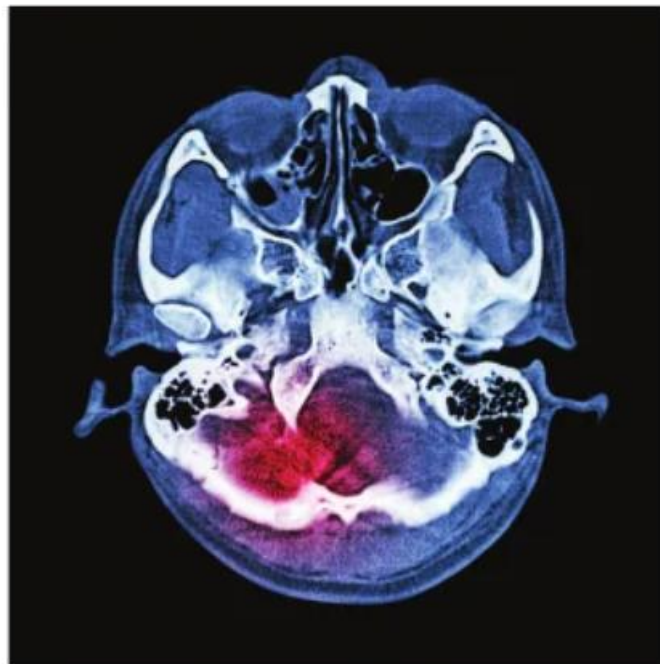


Figure 11 A stroke is associated with ruptured blood vessels in the brain, as shown in red.

Figure 7. Textbook image associated with a stroke: disrupted blood flow can deprive brain tissue of oxygen.

Exam Comparison / Organizer

Condition	Primary location	Core event	Main consequence
Atherosclerosis	Arteries	Plaque narrows vessel	Reduced blood flow; higher resistance
Heart attack	Vessels supplying heart muscle	Blood flow blocked	Heart muscle lacks oxygen
Stroke	Blood vessels in brain	Blocked or ruptured vessel	Brain tissue lacks oxygen / is damaged

Exam trap: Atherosclerosis is the narrowing process; heart attack and stroke are acute events that can result from interrupted blood flow in different organs.

Plaque narrows artery	→ Less blood flow	→ Less oxygen	→ Tissue damage risk
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Circulatory System Disorders - Ministerial-Style Check

A. Multiple Choice (6)

1. Atherosclerosis most directly involves ____. A. narrowing of arteries by deposits B. formation of new atria C. loss of hemoglobin from all RBCs D. opening of venous valves	4. Why can narrowed arteries make the heart work harder? A. They reduce resistance B. They increase resistance to blood flow C. They turn arteries into veins D. They remove all platelets
2. A heart attack occurs when blood flow is blocked to ____. A. brain tissue B. heart muscle C. lung air spaces D. bone marrow	5. Which event may cause a stroke according to the lesson? A. A brain vessel becomes blocked or ruptures B. A pulmonary vein carries oxygen C. Capillaries become one cell thick D. The septum separates the ventricles
3. A stroke directly affects blood flow to the ____. A. liver B. skin C. brain D. stomach	6. Figure 7 is most closely associated with loss of oxygen to which tissue? A. Cardiac muscle B. Brain tissue C. Bone tissue D. Skeletal muscle only

B. Complete the statements (3)

1. Narrowing of arteries by fatty deposits is called _____.
2. A blocked blood supply to heart muscle can cause a _____.
3. A blocked or ruptured blood vessel in the brain can cause a _____.

C. True / False (3)

1. Atherosclerosis can reduce the flow of oxygen-rich blood through arteries.
2. A stroke occurs only when a vein in the leg is damaged.
3. A heart attack and a stroke affect the same organ.

D. Short Answer (2)

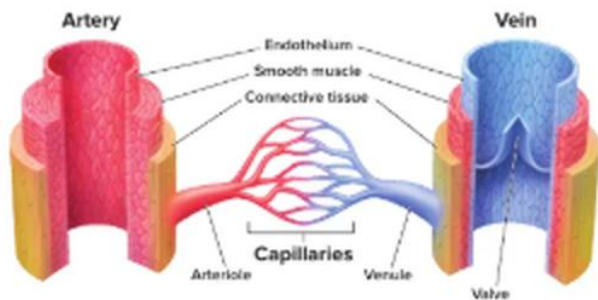
1. Use cause-and-effect reasoning to explain how atherosclerosis can increase the risk of a heart attack.
2. Distinguish between a heart attack and a stroke by organ affected and blood-flow problem.



FINAL LESSON REVIEW

Cumulative ministerial-style practice across the whole lesson

How to use this review: First attempt it without notes. Then mark it using the Teacher Answer Key. Re-study any concept linked to a wrong answer.



Review Figure A –
Blood
vessels

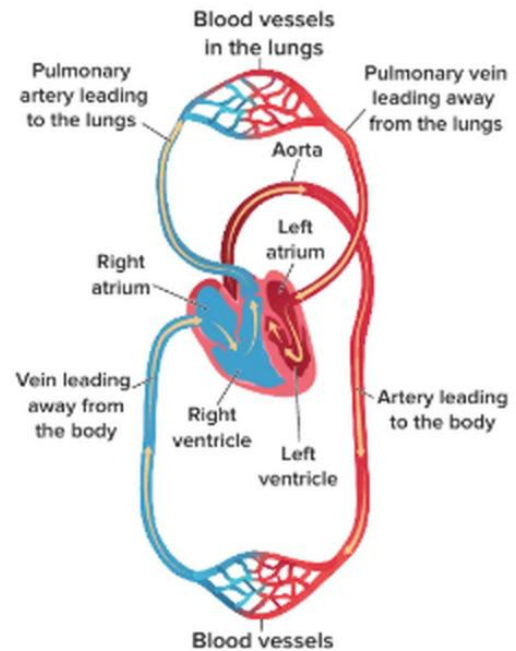


Figure 7 Blood flow through the body consists of two
Review Figure B - double circulation

A. Multiple Choice (10)

1. Which blood vessel is best adapted for rapid diffusion between blood and body cells?

- A. Artery
- B. Capillary
- C. Vein
- D. Aorta

2. Which sequence correctly traces deoxygenated blood after it enters the heart from the body?

- A. RA → RV → pulmonary artery
- B. LA → LV → aorta
- C. RA → LA → aorta
- D. RV → LA → pulmonary vein

6. Which ABO type has no A or B markers on its red blood cells?

- A. A
- B. B
- C. AB
- D. O

7. Which circuit carries blood from the left ventricle to body tissues and back to the right atrium?

- A. Pulmonary
- B. Systemic
- C. Coronary only
- D. Lymphatic only

3. Which structure is the heart's natural pacemaker?

- A. AV node
- B. SA node
- C. Aortic valve
- D. Septum

4. What is the main function of hemoglobin?

- A. Clot formation
- B. Oxygen transport
- C. Antibody production
- D. Valve control

5. Which blood component forms cell fragments essential for clotting?

- A. Platelets
- B. RBCs
- C. WBCs
- D. Plasma water

8. The higher number in a blood-pressure reading is the ____.

- A. diastolic pressure
- B. systolic pressure
- C. pulse pressure only
- D. venous pressure

9. In Review Figure A, which feature identifies the vein most clearly?

- A. One-cell-thick wall
- B. Valve
- C. Highest pressure
- D. No lumen

10. Atherosclerosis increases health risk mainly because it ____.

- A. widens all arteries
- B. narrows arteries and reduces blood flow
- C. creates new valves
- D. increases capillary thickness for exchange

B. True / False (5)

1. Pulmonary arteries carry blood away from the heart.
2. The left ventricle sends blood to the lungs.
3. White blood cells are involved in body defense.
4. Type AB blood has neither A nor B RBC markers.
5. A stroke can result when blood flow to part of the brain is interrupted.

C. Complete the statements (5)

1. The valve between the right atrium and right ventricle is the _____ valve.
2. The smallest exchange vessels are the _____.
3. The lower value in a blood-pressure reading is the _____ pressure.
4. The protein mesh that traps cells during clotting is _____.
5. The large artery leaving the left ventricle is the _____.

D. Short Answer (5)

1. Use Review Figure B to explain why the human circulatory system is described as double circulation.
2. Compare an artery and a vein using wall thickness, pressure, lumen, and valves.
3. Explain why damage to the SA node could affect the whole heartbeat.
4. A patient with type B blood is considered for a red-cell transfusion. Using the simplified ABO model, state which ABO red-cell types can be received and explain why.
5. Explain how the circulatory system and blood components work together after a tissue is cut and begins to bleed.



MASTER SUMMARY

Use this compact map for the final 5-minute revision

Blood flow essentials

- Arteries: away from heart; high pressure; thick walls.
- Capillaries: one-cell wall; exchange by diffusion.
- Veins: toward heart; low pressure; valves; wide lumen.
- Right heart → lungs; left heart → body.
- LV has thickest wall.
- SA node starts; AV node relays.
- Systolic = contraction / higher number.
- Diastolic = relaxation / lower number.

Blood essentials

- Plasma: liquid transport medium.
- RBC: hemoglobin; oxygen transport; no mature nucleus.
- WBC: defense; nucleus.
- Platelets + fibrin: clotting.
- A = A marker / anti-B.
- B = B marker / anti-A.
- AB = A+B markers / no anti-A or anti-B.
- O = no A/B markers / anti-A + anti-B.

Blood pathway memory chain

- Body → venae cavae → RA → tricuspid → RV.
- RV → pulmonary valve → pulmonary artery → lungs.
- Lungs → pulmonary veins → LA → mitral → LV.
- LV → aortic valve → aorta → body.

Disorders cause-and-effect

- Atherosclerosis: plaque narrows arteries.
- Narrower lumen → greater resistance / reduced flow.
- Heart attack: blocked blood flow to heart muscle.
- Stroke: blocked or ruptured brain vessel.
