



Dr. Bbosa Science

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The circulatory system

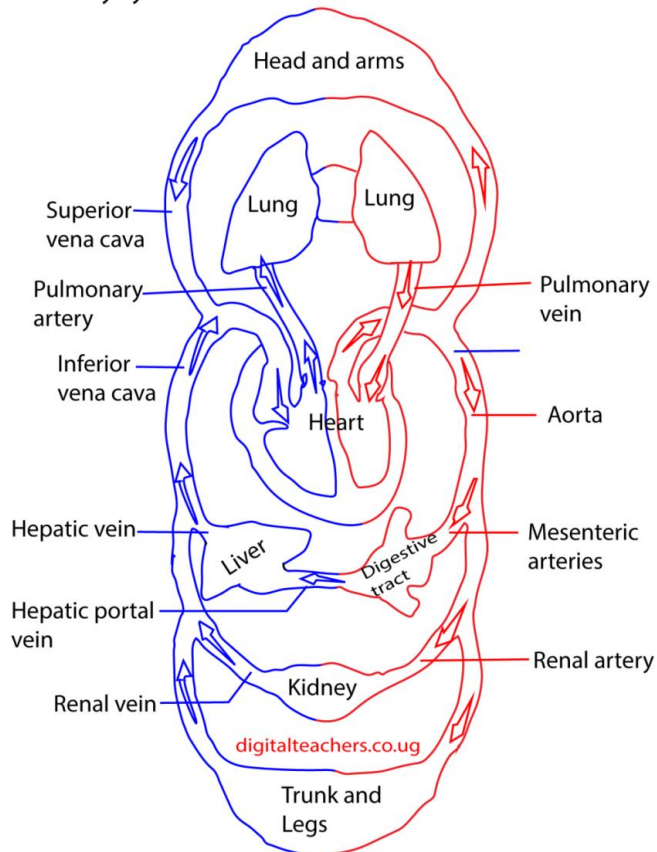
The circulatory system consists of three independent systems that work together:

- the heart (cardiovascular),
- lungs (pulmonary),
- and arteries, veins, coronary and portal vessels (systemic).

The system is responsible for the flow of blood, nutrients, oxygen and other gases, and as well as hormones to and from cell

The figure below shows the main blood vessels in the human Circulatory system

Circulatory system in man



BLOOD VESSELS

Blood vessels are tubes which carry blood around the body. Blood flows in the blood vessels.

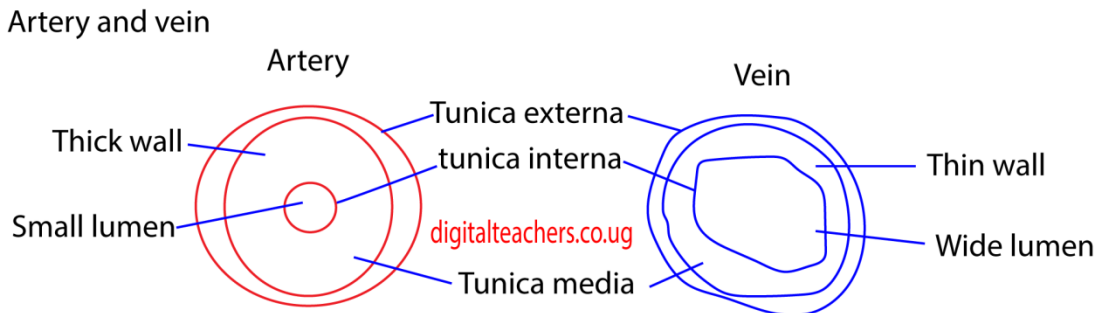
These vessels are:

- arteries,
- veins and
- capillaries.

Arteries are the blood vessels which carry blood away from the heart to the rest of the body. All arteries except the pulmonary artery carry pure blood which is rich in oxygen. This blood is called **oxygenated blood**. However, the **pulmonary artery** carries blood which is rich in carbon dioxide from the heart to the lungs.

Veins are the blood vessels that carry blood from other parts of the body to the heart. All veins carry **deoxygenated blood**, which has a lot of carbon dioxide and less oxygen, apart from the **pulmonary vein**. The pulmonary vein carries blood rich in oxygen from the lungs to the heart.

Capillaries are small blood vessels which connect arteries to veins.



Differences between arteries and veins

	Arteries	veins
1	Thick wall	Thin walls
2.	Narrow lumen	Broad lumen
3.	Have no valves except pulmonary artery and aorta	Have valves
4.	Carry oxygenated blood except pulmonary artery	Carry deoxygenated blood except pulmonary vein

Adaptation of the artery

- thick wall to accommodate high pressure
- have a narrow lumens to maintain high pressures
- some arteries like aorta valves to prevent back flow of blood.

Adaptation of veins

- wide lumen to lower resistance to blood flow
- valves allow blood to flow in one direction

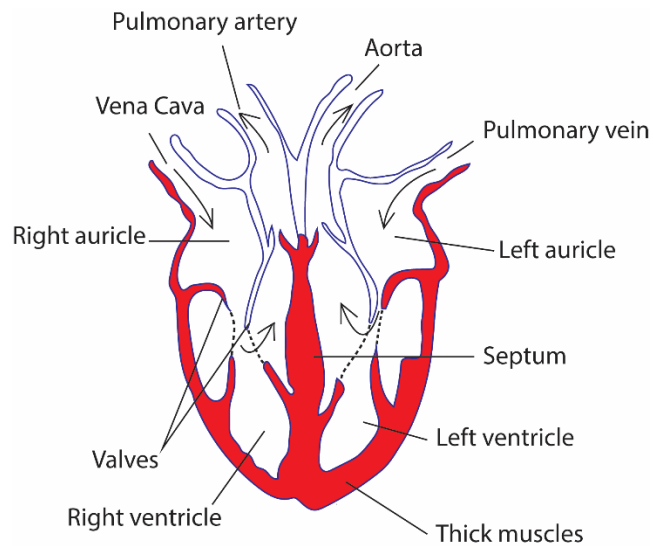
Capillaries

They connect the arteries and veins.
They allow exchange between blood and cells.

Adaptation of capillaries

- thin walls for fast diffusion
- Ramify the body to increase surface area for exchange

The heart



The heart pumps blood around the body. The heart has four parts, two upper ones called **auricles** and two lower ones called **ventricles**.

The left ventricle is usually thicker than the right ventricle due to its greater function of pumping blood to all parts of the body through the aorta.

Septa separates oxygenated from deoxygenated blood from oxygenated blood

Valves in the heart prevent back flow of blood

Blood

This is the red fluid that flows around the body. An adult human being has about five litres

Blood vessel

COMPOSITION OF BLOOD

Blood is composed of blood cells, plasma and platelets.

Blood cells

There are two types of blood cells namely:

1. The red blood cells



Red blood cells

The **red blood cells** contain hemoglobin a red coloring matter, which makes blood red.

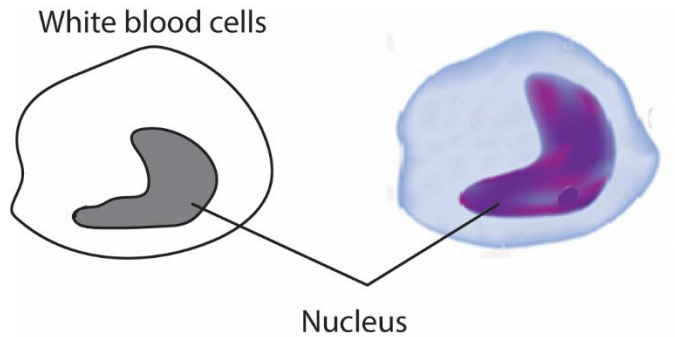
They are disc shaped

They lack a nucleus

Hemoglobin carries oxygen and transports it around the body.

Lack of red blood cells or iron in blood causes a disease called anemia

2. The white blood cells



The **white blood cells** are fewer than red blood cells and are colorless.

They have a nucleus

They are larger than the red blood cells

They fight diseases causing germs. They are the soldiers that defend our bodies against diseases.

Causing germs

Plasma

Plasma is the liquid part of blood, which is pale yellow in color. It is mainly made up of water and contains digested food, salts and proteins. Plasma helps in holding the other components of blood.

Functions of plasm

- (i) Transports waste products to excretory organs
- (ii) Distribute digested food
- (iii) Transports other components of blood

Platelets

These are small pieces (fragments) of cells whose function is to help blood to clot when a blood vessel is cut or injured.

Diseases of the circulatory system

- (i) Anemia or lack of red blood cells in the body. Anemia is treated with blood transfusion and balanced diet
- (ii) Infections treat by antibiotics
- (iii) Malaria
- (iv) Leukemia
- (v) High blood pressure
- (vi) Dehydration

Causes of dehydration

- (i) Vomiting
- (ii) Diarrhea
- (iii) Excessive exercise

Sign of dehydration in children

Sunken eyes

Pale skin

Thin skin

Treatment of dehydration

- (i) Taking Oral rehydration solution (ORS)
- (ii) Intravenous fluids
- (iii) Drinking a lot of juice or water

Preparation of oral rehydration salt solution

- Wash your hands
- Put two 0.5L cups of water in a clean container
- Add a sachet of ORS and stir to dissolve
- Use within 24 hours.

- The more ORS solution one drinks the better. ORS solution has no over dose

Fainting

This a condition where a person loses consciousness due to lack of enough blood to the brain

Conditions that lead to fainting

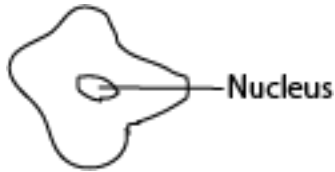
- Hunger
- Happiness
- Anger
- sickness

First Aid for fainting

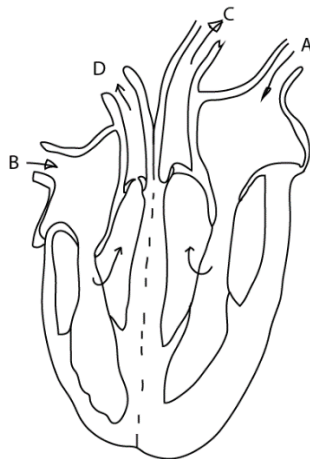
- Remove a person from dangerous place
- Loosen tight clothes
- Check to see whether the person is breathing.
- Lie the victim on his back and raise the legs above the heart to increase blood to flow the head.
- Call for help.

Revision questions

The diagram is of a blood cell. Use it to answer questions 1 and 2



1. What type of blood cell is shown in the diagram?
.....
2. What is the main function of the cell above?
.....
3. 13. What is the main cause of fainting?
.....
4. Which blood cell is responsible for defense of the body?
.....
5. How is the chamber of the heart which pumps blood throughout the body adapted to its function?
.....
6. A boy bleeding from the nose is made to lie down or sit on a chair with his nose upwards. What should be done next to stop bleeding?
.....
7. What causes anemia?
.....
8. Why does a heart of a person who is running beat faster than normal?
.....
9. The diagram below is of a human heart. Use it to answer the questions which follow.



- (a) What is the function of the valves in the heart?
.....
- (b) What is the difference between the blood which enters the heart through A and that through B?

.....
(c) After leaving the heart at C and D where does the blood go?

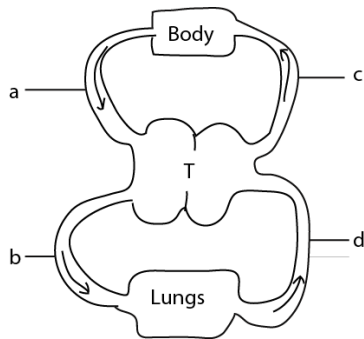
C:

D:

10. What is the importance of red blood cells in human body?
.....

11. Which condition is caused by shortage of red blood cells in the body?
.....

12. The diagram below is an illustration of a blood circulation system in a mammal. Study it carefully and use it to answer questions (a) and (b) below.



(a) What body organ does part T represent?
.....

(b) What is the difference in the blood carried by blood vessels marked b and c.
.....

(c) Give the difference between an artery and a vein.
.....

13. 47. Match items of group A with those of group B by completing the table below

A	B
Heart	Sensory organ
Kidney	memory
Skin	carbon dioxide
Lungs	circulation
Brain	urine

Complete the table below

A	B
(a) heart	Circulation
(b) Skin	Sensory organ
(c) Brain	Memory
(d) Lung	Carbon dioxide

14. Give the general name of blood vessels which carry blood away from the heart to various parts of the body.

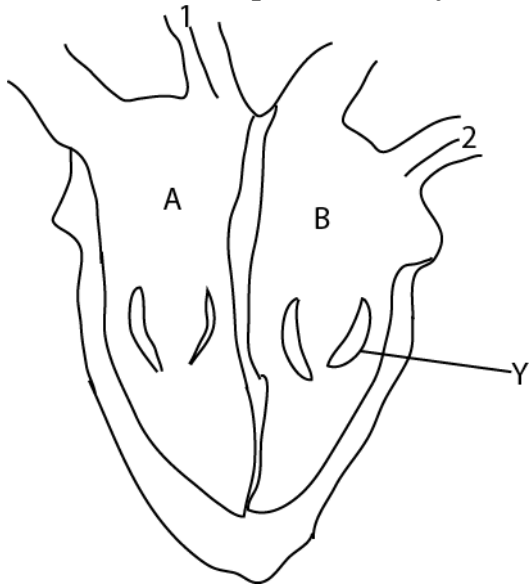
.....

15. Why does blood go to the kidneys during circulation?

.....

16. The diagram shows a human heart.

Use to answer the questions that follow.



(a) What is the function of the part marked with letter **Y**?

.....

(b) Give the difference between the blood in the regions marked with letters **A** and **B**

.....

(c) Put arrows on the short lines marked with numbers 1 and 2 to show the direction of the movement of blood.

17. (a) Why does blood move from the heart to the lungs before it moves round the body?

.....

(b) Give ant one function of each of the following

(i) White blood cells

.....

(ii)Red blood cells

.....

(ii) Platelets

.....

18. Match the items in list A with their function in list B

List A	List B
Red blood cells	Stop bleeding when the skin is cut.
Arteries	Carry oxygen around the body
Valves	Carry blood away from the heart
platelets	Prevent back flow of blood in veins

(a) Red blood cells:

(b) Arteries:

(c) Platelets:

(d) Valves:

19. (a) Name the human body organ where each of the following takes place:

(i) Filtration of blood

.....

(ii) Blood gets oxygen while carbon dioxide is removed.

.....

(b) Give the use of the following components of blood in the body

(i) White blood cells

.....

(ii) Blood platelets

.....

20. How is the function of the pulmonary vein different from that of other veins?

.....

21. Name the blood vessel which takes blood from the heart to the lung.

.....

22. (a) Apart from the respiratory gases and body wastes, name any other two materials carried in blood.

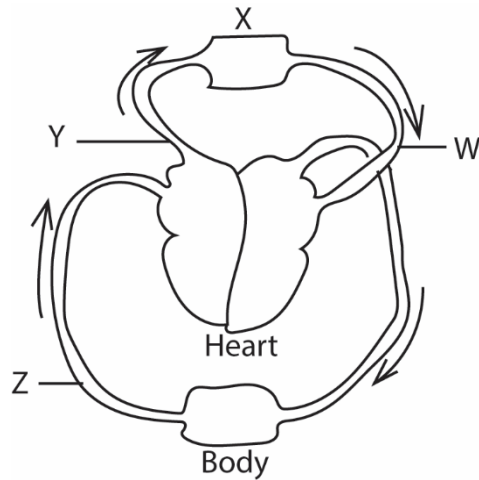
(i)

(ii)

(b) Name the component of blood which transport oxygen in the human body.
.....

(c) Which disease-causing germ attacks the white blood cells in humans?
.....

23. The diagram below shows circulation of blood in the human body
Study and use it to answer the question that follow



(a) Name the organ marked with letter X.
.....

(b) Which blood vessel is marked with letter W?
.....

(c) State the similarity between blood vessel Y and blood vessel Z.
.....

(d) Why does blood W bring back to the heart.
.....

24. (a) State two causes of diarrhea.
.....
.....

(b) How can diarrhea be prevented?
.....
.....

25. Matata came back from school and found a piece of left over boiled potato which was not covered. Because he was very hungry, he began to eat it at once.

(a) State two good heathy practice which Matata did not follow.
.....
.....

(b) Name a disease Matata could suffer from

.....
.....

(c) Give a reason for your answer in (b) above?

.....
.....

26. When does a person become dehydrated?

.....
.....

27. Why are the legs of a person who has fainted raised higher than the head as a way of giving first aid?

.....
.....

28. (a) Which type of blood vessels return blood to the heart?

.....

(b) What is the function of valves in the blood vessels during blood circulation?

.....

(c) What type of blood is carried by most blood vessels with valves?

.....

(d) Give any one waste materials carried by blood.

.....

29. Which condition in babies is shown by sunken spot on the head?

.....

30. How is the function of the pulmonary vein different from that of other veins?

.....

31. State the injury causes by steam to a human body

.....

32. In which one way does tooth paste promote oral health?

.....

33. (a) Give any two signs which show that a baby is dehydrated

(i)

(ii)

(b) State any two pieces of advice you would give to a mother whose baby is dehydrated

(i)

(ii)

34. (a) What causes fainting?

.....

.....

(b) State any two conditions that can lead to fainting

.....

.....

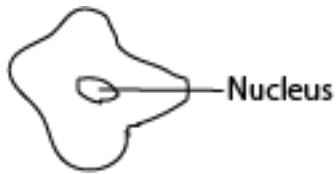
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(c) Why are the legs of a person who has fainted raised higher than the head when giving First Aids

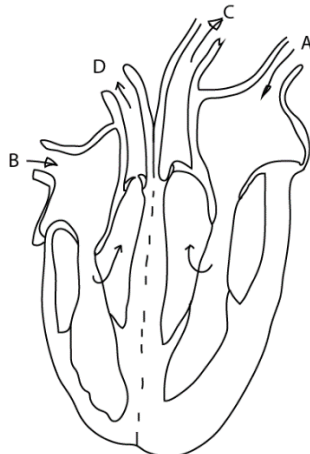
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Revision questions

The diagram is of a blood cell. Use it to answer questions 1 and 2



1. What type of blood cell is shown in the diagram?
White blood cell
2. What is the main function of the cell above?
Fight against disease causing germs
3. 13. What is the main cause of fainting?
Shortage of blood supply to the brain
4. Which blood cell is responsible for defense of the body?
White blood cells
5. How is the chamber of the heart which pumps blood throughout the body adapted to its function?
Has thick walls which contract with strong force to push blood to the body.
6. A boy bleeding from the nose is made to lie down or sit on a chair with his nose upwards. What should be done next to stop bleeding?
Pitch the nose for some time to stop bleeding
7. What causes anemia?
Lack of enough iron in blood
8. Why does a heart of a person who is running beat faster than normal?
In order to supply enough oxygen and food nutrients to the muscles.
9. The diagram below is of a human heart. Use it to answer the questions which follow.



- (d) What is the function of the valves in the heart?
Prevent backflow of blood in the heart
- (e) What is the difference between the blood which enters the heart through A and that through B?

Blood through A is oxygenated while blood through B is deoxygenated

(f) After leaving the heart at C and D where does the blood go?

C: to other parts of the body

D: to the lungs

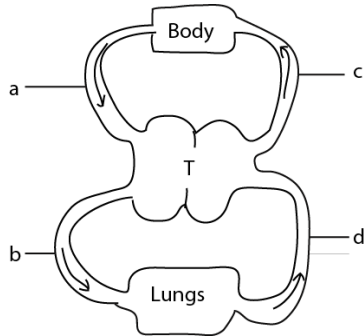
10. What is the importance of red blood cells in human body?

Transport oxygen in blood

11. Which condition is caused by shortage of red blood cells in the body?

Anemia

12. The diagram below is an illustration of a blood circulation system in a mammal. Study it carefully and use it to answer questions (a) and (b) below.



(d) What body organ does part T represent?

Heart

(e) What is the difference in the blood carried by blood vessels marked b and c.

b carries deoxygenated blood whereas c carries oxygenated blood

(f) Give the difference between an artery and a vein.

- **Artery have thick walls whereas veins have thin walls.**
- **Arteries carry blood from the heart to the body whereas veins carry blood from the body to the heart**
- **Most veins have valves whereas arteries do not.**

13. 47. Match items of group A with those of group B by completing the table below

A	B
Heart	Sensory organ
Kidney	memory
Skin	carbon dioxide
Lungs	circulation
Brain	urine

Complete the table below

A	B
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(f) Skin	Sensory organ
(g) Brain	Memory
(h) Lung	Carbon dioxide

14. Give the general name of blood vessels which carry blood away from the heart to various parts of the body.

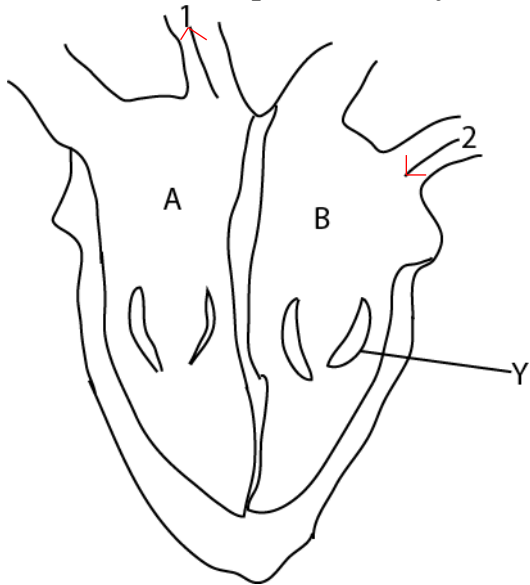
Arteries

15. Why does blood go to the kidneys during circulation?

To remove metabolic wastes and excess water

16. The diagram shows a human heart.

Use to answer the questions that follow.



(a) What is the function of the part marked with letter **Y**?

Prevent backflow of blood

(b) Give the difference between the blood in the regions marked with letters **A** and **B**

Blood in A is deoxygenated while that in B contains oxygenated blood

(c) Put arrows on the short lines marked with numbers 1 and 2 to show the direction of the movement of blood.

17. (a) Why does blood move from the heart to the lungs before it moves round the body?

Blood goes to the lungs to acquire oxygen and carbon dioxide is removed

(b) Give ant one function of each of the following

(i) White blood cells

Fight disease causing germs

(ii)Red blood cells

Transport oxygen in blood

(ii) Platelets

Used for blood clotting

18. Match the items in list A with their function in list B

List A	List B
Red blood cells	Stop bleeding when the skin is cut.
Arteries	Carry oxygen around the body
Valves	Carry blood away from the heart
platelets	Prevent back flow of blood in veins

(a) Red blood cells: **Carry oxygen around the body**

(b) Arteries: **Carry blood away from the heart**

(c) Platelets: **Stop bleeding when the skin is cut.**

(d) Valves: **Prevent back flow of blood in veins**

19. (a) Name the human body organ where each of the following takes place:

(i) Filtration of blood

Kidney

(ii) Blood gets oxygen while carbon dioxide is removed.

Lungs

(b) Give the use of the following components of blood in the body

(i) White blood cells

Fight disease against disease causing germs

(ii) Blood platelets

Form blood clot that stops bleeding

20. How is the function of the pulmonary vein different from that of other veins?

It carries oxygenated blood while others carry deoxygenated blood

21. Name the blood vessel which takes blood from the heart to the lung.

Pulmonary artery

22. (a) Apart from the respiratory gases and body wastes, name any other two materials carried in blood.

(i) Antibodies

(ii) Glucose/ food nutrients

(iii) drugs

(b) Name the component of blood which transport oxygen in the human body.

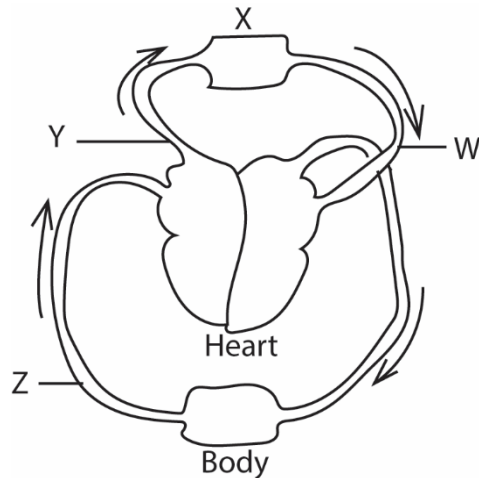
Red blood cells

(c) Which disease-causing germ attacks the white blood cells in humans?

Bacteria, viruses

23. The diagram below shows circulation of blood in the human body

Study and use it to answer the question that follow



(e) Name the organ marked with letter X.

Lungs

(f) Which blood vessel is marked with letter W?

Pulmonary vein

(g) State the similarity between blood vessel Y and blood vessel Z.

Both carry deoxygenated blood

(h) Why does blood W bring back to the heart.

Brings oxygenated blood to be supplied to the body

24. (a) State two causes of diarrhea.

Eating contaminated food
Eating food without washing hands
Drinking contaminated water

(c) How can diarrhea be prevented?

- **Washing hands before eating food**
- **Washing fruits before eating**
- **Covering food properly**
- **By giving a patient with diarrhea plenty of fluids.**

25. Matata came back from school and found a piece of left over boiled potato which was not covered. Because he was very hungry, he began to eat it at once.

(d) State two good healthy practice which Matata did not follow.

- **Did not wash his hands first**

- **He did not warm the food before eating it**

(e) Name a disease Matata could suffer from

- **Diarrhea**

- **Cholera**

- **dysentery**

(f) Give a reason for your answer in (b) above?

Housefly could have left germs because it was not covered.

26. When does a person become dehydrated?

When he/she loses water through vomiting or diarrhea.

27. Why are the legs of a person who has fainted raised higher than the head as a way of giving first aid?



Raising legs allows more blood supply to the brain

28. (a) Which type of blood vessels return blood to the heart?

Veins

(b) What is the function of valves in the blood vessels during blood circulation?

Allow blood to flow in one direction

(C) What type of blood is carried by most blood vessels with valves?

Deoxygenated blood

(d) Give any one waste materials carried by blood.

Urea

Uric acid

Carbon dioxide

29. Which condition in babies is shown by sunken spot on the head?

Dehydration

30. How is the function of the pulmonary vein different from that of other veins?

Pulmonary vein carries oxygenated blood whereas other carry deoxygenated blood.

31. State the injury causes by steam to a human body

Scald

32. In which one way does tooth paste promote oral health?

Supplies calcium for strong tooth

Provides good breathe

33. (a) Give any two signs which show that a baby is dehydrated
- (iii) Sunken eye
 - (iv) Pale skin
- (b) State any two pieces of advice you would give to a mother whose baby is dehydrated
- (iii) Give oral rehydration salt solution
 - (iv) Give a lot of juices
34. (a) What causes fainting?
Low blood circulation to the brain
- (b) State any two conditions that can lead to fainting
- (i) sickness
 - (ii) fatigue/tiredness
 - (iii) hunger
 - (iv) anger
 - (v) emotions
- (d) Why are the legs of a person who has fainted raised higher than the head when giving First Aids
To increase blood flow in to the brain