

Biology Paper 1

[4551/1]

- 1 Diagram 1 shows a type of muscle tissue found in the human body. Where is the tissue found?

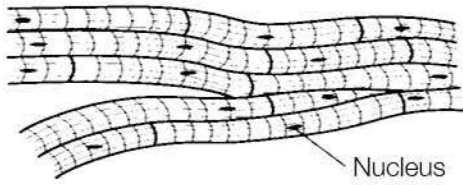


Diagram 1

- A Heart
B Pancreas
C Biceps
D Small intestine

- 2 The plasma membrane consists of molecules arranged in a double layer as shown in Diagram 2.

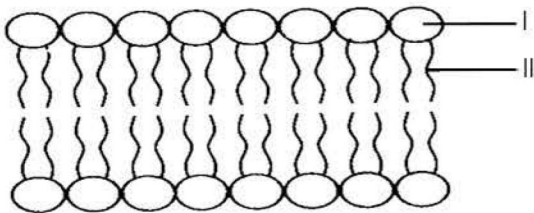


Diagram 2

The part labelled I and II are

- A hydrophobic and hydrophilic respectively
B hydrophilic and hydrophobic respectively
C both hydrophobic
D both hydrophilic

- 3 Diagram 3 shows the net flow of water molecules from a dilute solution to a concentrated solution through a semi-permeable membrane.

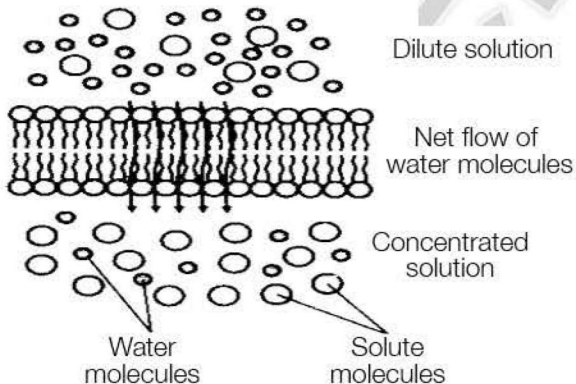


Diagram 3

What is this process called?

- A Osmosis
B Active transport
C Simple diffusion
D Facilitated diffusion

- 4 Diagram 4 is a graph which shows the changes in mass of potato strips immersed in different concentrations of sucrose solution.

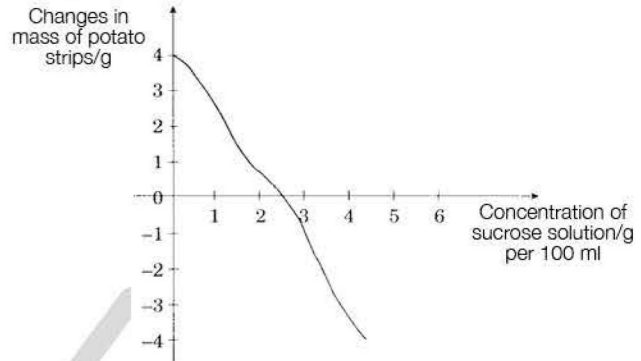


Diagram 4

Based on the graph, which of the following concentrations of sucrose solution should be used so that a flaccid potato strip regains its turgidity?

- A 1.5 g per 100 ml
B 2.5 g per 100 ml
C 3.5 g per 100 ml
D 4.5 g per 100 ml

- 5 Lipid is needed to build substance X while cellulose is needed to build substance Y.

What are substances X and Y?

| | Substance X | Substance Y |
|---|-----------------|-----------------|
| A | Protoplasm | Cell wall |
| B | Plasma membrane | Cell wall |
| C | Cell wall | Protoplasm |
| D | Cell wall | Plasma membrane |

- 6 Haemoglobin is an example of a

- A primary structure of protein
B secondary structure of protein
C tertiary structure of protein
D quaternary structure of protein

- 7 Diagram 5 below shows a phase of mitosis taking place in the nucleus of a cell.

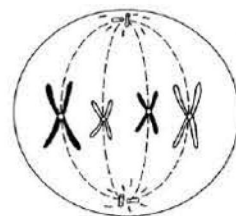


Diagram 5

Name the phase.

- A. Prophase
B. Metaphase
C. Anaphase
D. Telophase

8 Diagram 6 shows the phases in a cell cycle.

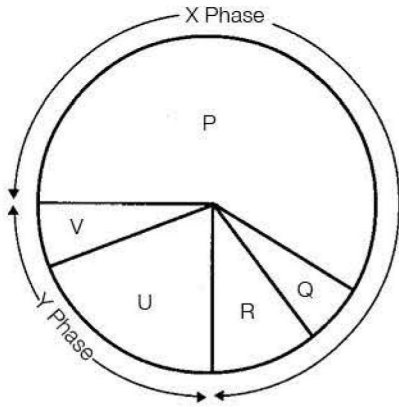


Diagram 6

Which of the following represents V?

- A mitosis
B cytokinesis
C stage S
D stage G₁

9 Diagram 7 shows a phase in mitosis of a plant cell.

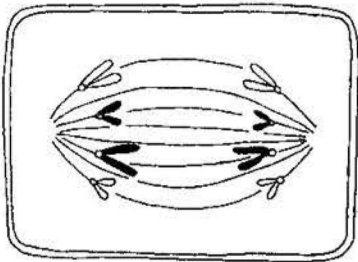


Diagram 7

Which of the following is true about the cell in Diagram 7?

| | Stage of mitosis | Number of chromosomes in the mother cell |
|---|------------------|--|
| A | Anaphase | 4 |
| B | Telophase | 4 |
| C | Anaphase | 8 |
| D | Telophase | 8 |

10. Crossing over is an important process in meiosis. It results in variations in the daughter cells. At which stage of meiosis does crossing over take place?

- A Prophase I
B Prophase II
C Metaphase II
D Anaphase I

11 Lack of vitamin D in the diet will cause the disease

- A scurvy.
B beri-beri.
C rickets.
D pellagra.

12 Diagram 8 shows the molecular structure of three food classes.

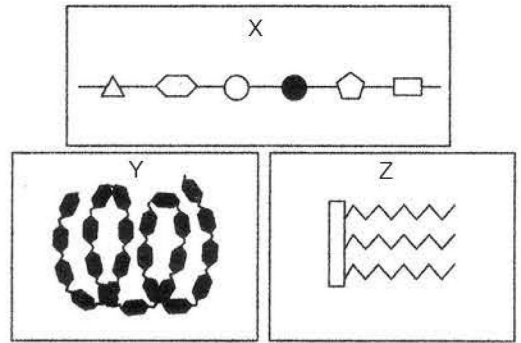


Diagram 8

Which food classes do X, Y and Z belong to?

| | X | Y | Z |
|---|--------------|--------------|--------------|
| A | Carbohydrate | Protein | Lipid |
| B | Protein | Lipid | Carbohydrate |
| C | Protein | Carbohydrate | Lipid |
| D | Lipid | Carbohydrate | Protein |

13 Diagram 9 shows part of the human alimentary canal.

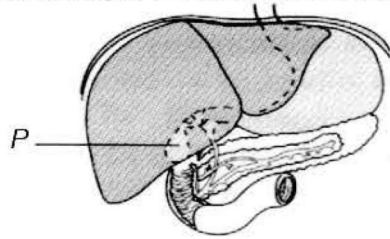


Diagram 9

A person who has structure P removed must control his dietary intake of

- A fats
B carbohydrate
C protein
D water

14 In the absence of oxygen, the skeletal muscles contract using energy from the breakdown of glucose and glycogen to

- A ethanol and water
B energy and water
C ethanol and lactic acid
D lactic acid and energy

15 Which of the following is not involved in the transportation of carbon dioxide by the blood.

- A Carbonic acid
B Carbaminohaemoglobin
C Hydrogen carbonate ion
D Carbon monoxide

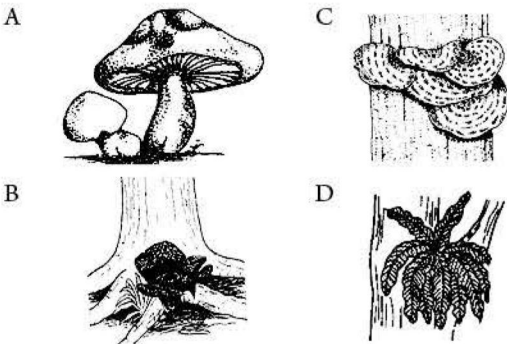
16 Table shows the biomass of a few types of organisms in a community.

| Organism | Total Biomass of all the organisms at each trophic level(kg) |
|----------|--|
| P | 1200 |
| Q | 30 |
| R | 150 |
| S | 670 |
| T | 100 |
| U | 2700 |

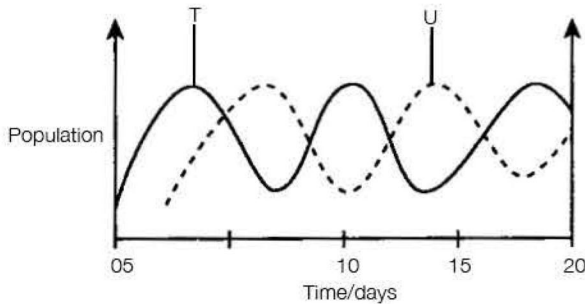
Which of the following is a possible food chain in this community?

- A P → U → S → T
 B Q → R → S → P
 C P → S → T → Q
 D U → S → P → Q

17 Which of the following organisms is a parasite?



18 Graph below shows changes in the population of two species of beetles, T and U, over a period of time. Both species feed on the same food source.



What is the interrelationship between species T and U?

- A Symbiosis
 B Predation
 C Parasitism
 D Competition

19 Diagram 10 shows a cross section of a young dicotyledon root consisting of a few main tissues.

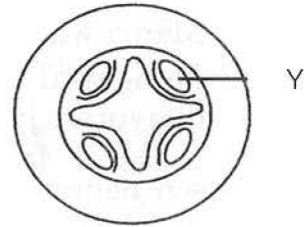


Diagram 10

What is Y?

- A Phloem
 B Xylem
 C Cortex
 D Cambium

20 Diagram 11 shows some human bones.

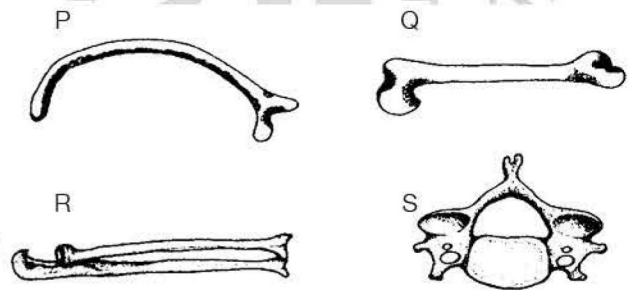


Diagram 11

Which bones are part of the axial skeleton?

- A P and S
 B Q and R
 C P, Q and R
 D Q, R and S

21 Diagram 12 below shows a motor neuron.

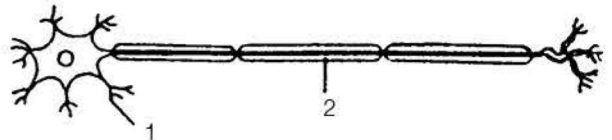


Diagram 12

Which one of the following A, B, C or D in the table below names the labelled parts correctly?

| | 1 | 2 |
|---|-----------|---------------|
| A | Cell body | Axon |
| B | Axon | Dendrite |
| C | Dendrite | Myelin sheath |
| D | Synapse | Dendrite |

22 Diagram 13 shows a plant with soft stem. Which of the following support structures helps the plant climb to obtain sunlight?

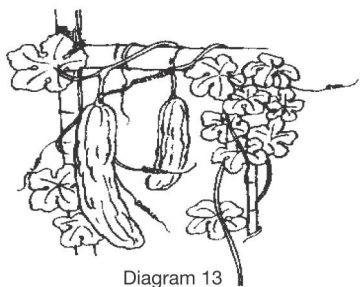


Diagram 13

- A Clasping roots
- B Twining stems
- C Tendrils
- D Thorns.

23 Diagram 14 shows a nerve pathway involved in a reflex action. Which structure is the interneurone?

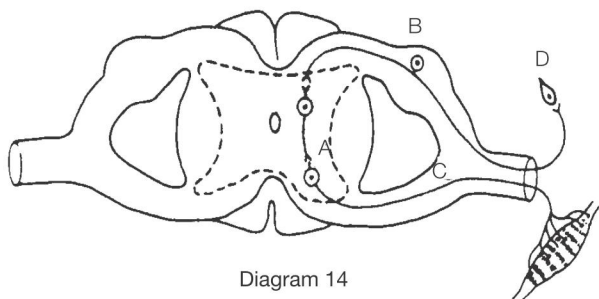


Diagram 14

24 Some cucumber slices are immersed in 0.1% sucrose solution. After 3 hours, the slices are found to be turgid and hard.

Which of the following statements explains this phenomenon?

- A The cucumber cell wall prevents it from shrinking
- B The cell sap is hypotonic towards the sucrose solution
- C The high concentration of the cell sap in the vacuole causes water to diffuse into the cell
- D The cucumber cell wall allows the sucrose molecules to diffuse into the cell

25 Diagram 15 shows the four-chambered stomach of a ruminant.

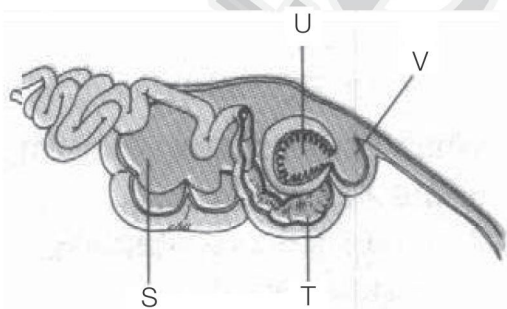


Diagram 15

Which of the following is not a correct match about each chamber and its function?

- A. S- Rumen, mutualistic bacteria digest cellulose.
- B. V- Reticulum, the partially digested food is formed into balls and regurgitated into the mouth for chewing
- C. U- Omasum, the regurgitated food in the mouth is passed into the omasum
- D. T- Duodenum, the digested products are absorbed.

26 What substances are dissolved in the fluid which passes along the ureter to the bladder of a healthy person?

| | Glucose | Protein | Salts | Urea |
|---|---------|---------|---------|---------|
| A | Absent | Absent | Absent | Present |
| B | Absent | Absent | Present | Present |
| C | Present | Absent | Present | Present |
| D | Present | Present | Absent | Absent |

27 Diagram 16 shows the female reproductive system. In which parts are the ova and the zygote formed?



Diagram 16

| | Ova | Zygote |
|---|-----|--------|
| A | 1 | 2 |
| B | 1 | 3 |
| C | 2 | 1 |
| D | 2 | 3 |

28 Diagram 17 shows sex determination in human.

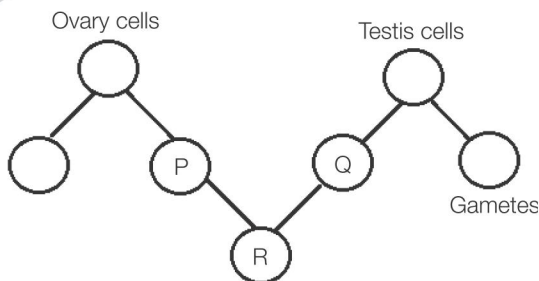


Diagram 17

If a couple have a son, what is the cell composition in P, Q and R?

| | P | Q | R |
|---|--------|--------|---------|
| A | 44 + X | 44 + Y | 44 + XY |
| B | 22 + Y | 22 + X | 44 + XY |
| C | 22 + X | 22 + X | 44 + XX |
| D | 22 + X | 22 + Y | 44 + XY |

29 Which of this genetically inherited disease is dangerous and can cause death at a young age?

- A. Albino
- B. Haemophilia
- C. Short-sightedness
- D. Down syndrome

- 30 Table 1 shows a Punnet square which represents the gametes and progeny from a dihybrid cross. Alphabets a to p represent the daughter cells from this cross.

| | | male gamete | | | |
|----|---------------|-------------|----|----|----|
| | female gamete | HK | Hk | hK | hk |
| HK | a | b | c | d | |
| Hk | e | f | g | h | |
| hK | I | j | k | l | |
| hk | m | n | o | p | |

Table 1

Which of the following daughter cells have the same genotype as the parent?

- A a, f, k, p C d, g, j, m
B b, c, e, I D e, f, h, l

- 31 Diagram 18 shows the development of a pollen tube and its entry into the ovule.

Which part develops into the testa after fertilisation?

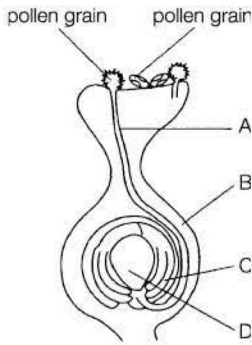


Diagram 18

32. Contraceptive pills contain a combination of

- A estrogen and luteinising hormone.
B progesterone and prolactin
C estrogen and follicle stimulating hormone
D progesterone and estrogen.

33. Which of the following shows the differences between mitosis and meiosis?

| | Mitosis | Meiosis |
|-----|---|---|
| I | Involves one stage of cell division | Involves two stages of cell division |
| II | Produces two diploid daughter cells | Produces four haploid daughter cells |
| III | Synapsis and crossing over takes place between homologous chromosomes | Synapsis and crossing over does not take place |
| IV | Chromosomes are not in pairs | Homologous chromosomes are in pairs at prophase I |

- A I and II only C I, II and IV only
B I and III only D I, II, III and IV

- 34 Diagram 19 is a graph which represents a type of variation found in students.

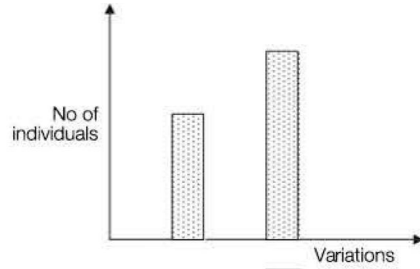


Diagram 19

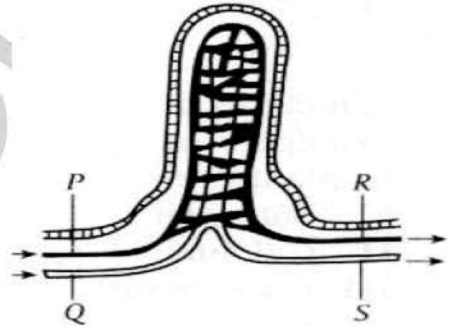
This variation may be

- I height II weight
III type of ear lobe IV dimple
A I and II only C III and IV only
B I and III only D I, II, III and IV

- 35 Which of the following is not a cause of variation?

- A Radiation C Gene mutation
B Asexual reproduction D Meiosis

- 36 Diagram 20 shows the structure of a villus in the ileum



Which vessels P, Q, R and S carry the largest amounts of glucose, amino acids, lipid droplets or fat-soluble vitamins?

| | Glucose | Amino acids | Lipid droplets | Fat soluble vitamins |
|---|---------|-------------|----------------|----------------------|
| A | P | Q | R | S |
| B | Q | P | R | S |
| C | R | R | S | S |
| D | S | S | R | R |

37. Diagram 21 shows a plastic quadrat used to determine the percentage coverage of bread mould on a piece of bread. The shaded area shows the presence of mould.

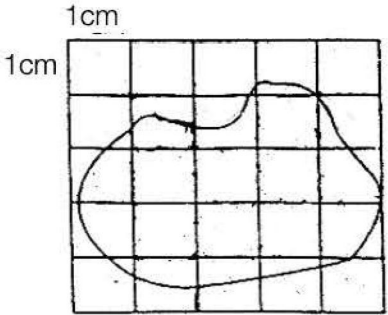


Diagram 21

Based on the result obtained in Diagram 21, calculate the percentage coverage of the bread mould, taking the area of each small square to be 1 cm².

- A 32 %
- B 40 %
- C 56 %
- D 80 %

38. Diagram 22 below shows equipment that can cause the thinning of the ozone layer.

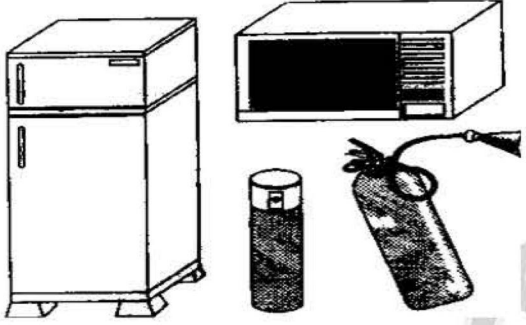


Diagram 22

How can this problem be solved?

- I Stop using chlorofluorocarbon
 - II Replace CFCs with HCFCs
 - III Patching holes in the ozone layer
 - IV Produce less electrical goods
- A I and II
 - B II and IV
 - C I, II and III
 - D I, II, III and IV

39. The following statement is about eutrophication.

- L : Excess fertilisers from agriculture lands flow into lakes
- M : Bacteria grow rapidly
- N : Algae grow rapidly and covers the surface of the lake
- O : The value of BOD increase

What is the correct sequence of the eutrophication process ?

- A O, L, M and N
- B L, N, M and O
- C L, M, O and N
- D O, M, L and N

40. An experiment was carried out to investigate the rate of water loss from a plant in a day. The wind and relative humidity factors were kept constant. Diagram 23 is a graph which shows the result obtained from 0600 to 1300 hours. Which of the curves A, B, C or D is expected to show the rate of water loss in the plant after 1300 hours ?

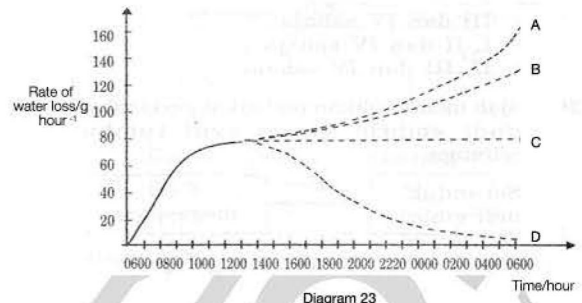


Diagram 23

41. Diagram 24 shows a human arm.

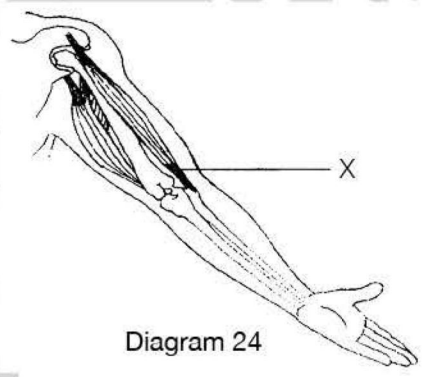


Diagram 24

If tendon X was torn off, what happens to the arm ?

- A The elbow joint loosens up
- B The fingers cannot grip
- C The arm cannot be bent
- D The lower arm cannot twist

42. Diagram 25 is a graph which shows the changes in the glucose concentration in the blood of a person over a period of two hours.

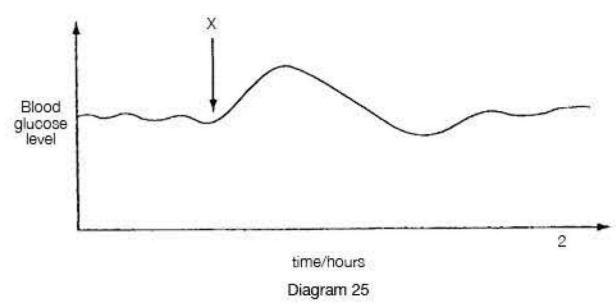


Diagram 25

Which of the following best explains the shape of the graph after X?

- A. The person has eaten a meal that is high in sugar.
- B. The person has had an insulin injection.
- C. The person is suffering from diabetes mellitus.
- D. The person starts some vigorous physical exercise.

43 Which characteristics of the glomerulus enhances the efficiency of ultrafiltration?

- A The diameter of the afferent arteriole is larger than that of the efferent arteriole.
- B The efferent arteriole is larger than that of the afferent arteriole.
- C The low hydrostatic pressure of the blood entering the glomerulus.
- D The Bowman's capsule is made up of only two layers of cells.

44 A woman's menstrual period started on 23rd March. In which week was an egg most likely to have been released?

| Week | March | | | | | | |
|------|-------|-----|-----|-----|-----|-----|-----|
| | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| A | - | - | - | 1 | 2 | 3 | 4 |
| B | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| C | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| D | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| | 26 | 27 | 28 | 29 | 30 | 31 | |

45 What is true about the importance of secondary growth in plants?

- A It increases the diameters of the roots only.
- B It increases the diameters of the stem only.
- C It allows plants to increase in length to achieve maximum height.
- D It produces new phloem and xylem tissues to replace the old and damaged ones.

46 A woman with blood group A claims that a man with blood group AB is the father of her baby. The baby's blood is tested. Which of the following could not be the baby's blood group?

- A Group A
- B Group B
- C Group O
- D Group AB

47 Which of the following shows the difference between continuous variation and discontinuous variation?

| | Continuous Variation | Discontinuous Variation |
|---|-------------------------------|--------------------------------|
| A | Controlled by dominant genes. | Controlled by recessive genes. |
| B | Caused by mutation. | Not caused by mutation. |
| C | Occurs in animals. | Occurs in plants. |
| D | Can be measured. | Cannot be measured. |

48 The *Hydrangea* plant produces blue flowers when grown on acidic soil, and red flowers when grown on alkaline soil. What conclusion can be made from this observation?

- A. The colour of the *Hydrangea* flower is a continuous variation
- B. The environment affects the colour of the flowers
- C. The pH of the soil causes mutation
- D. The colour of the flower is affected by the genetic factor only

49 Among the following events, which occur in anaphase I?

- A Homologous chromosomes line up at the equator of the cell.
- B Homologous chromosomes separate and move to opposite poles
- C Sister chromatids separate and move to different poles
- D Nuclear membrane and nucleolus disintegrate.

50 Diagram 26 shows an organ system.

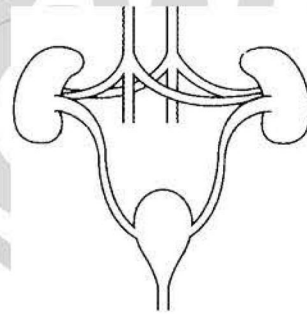


Diagram 26

What of the following is a function of the organ system shown above?

- A To transport oxygen to the body cells
- B To defend the body against diseases
- C To remove metabolic wastes
- D To transport carbon dioxide from the body cells

END OF QUESTIONS PAPER