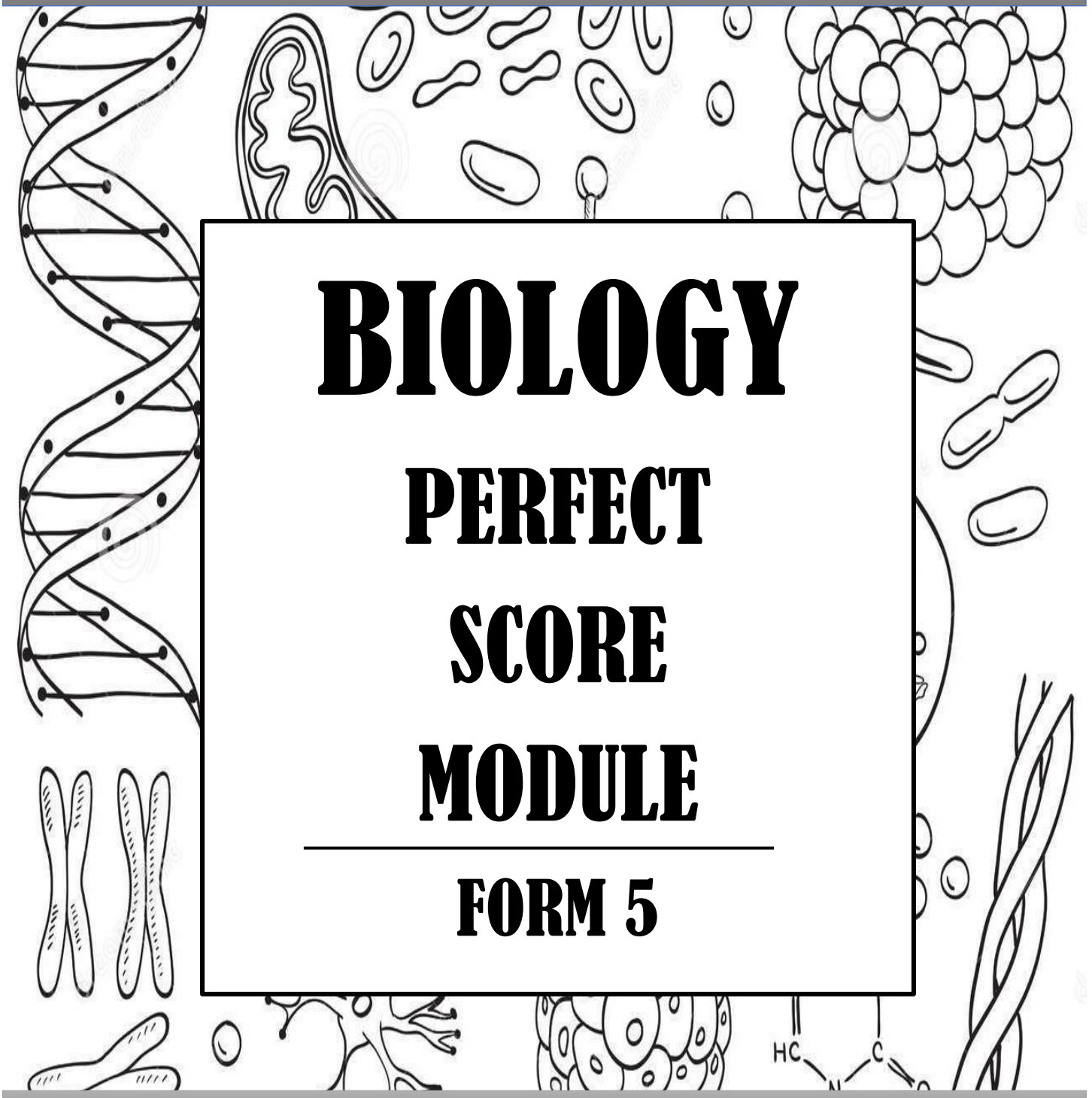


BIOLOGY

PERFECT SCORE MODULE

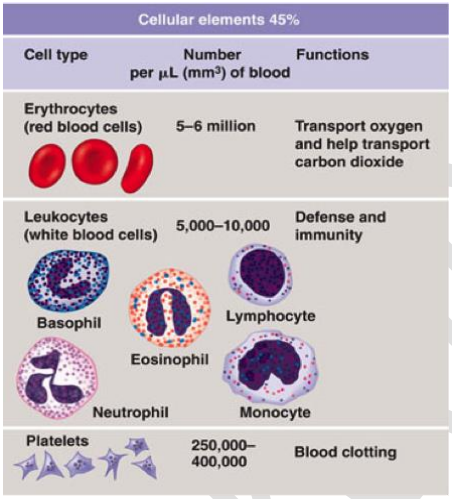
FORM 5

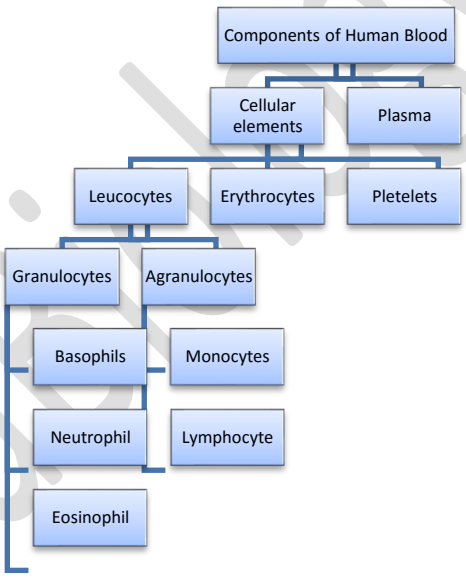
NAME: _____

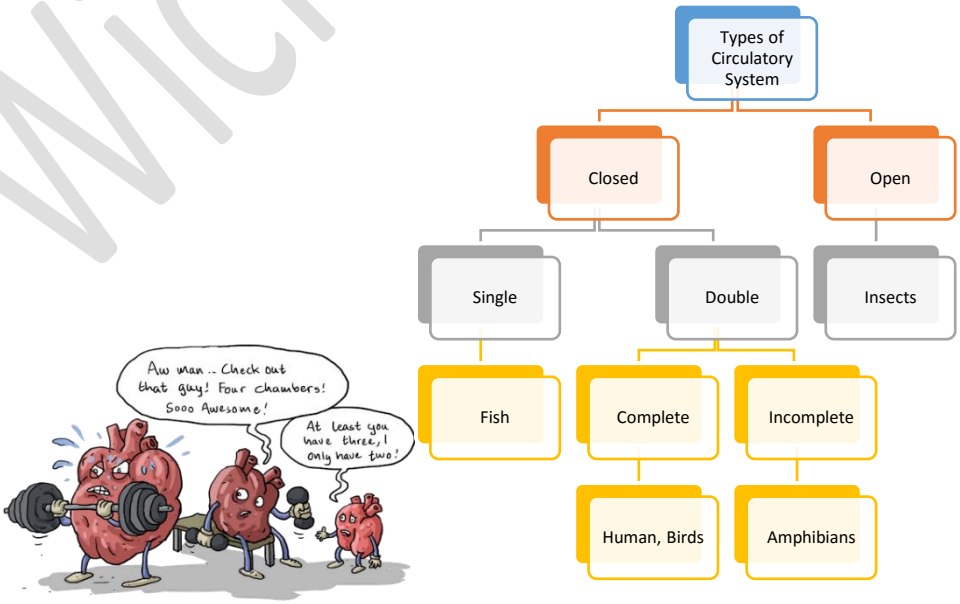
FORM: _____

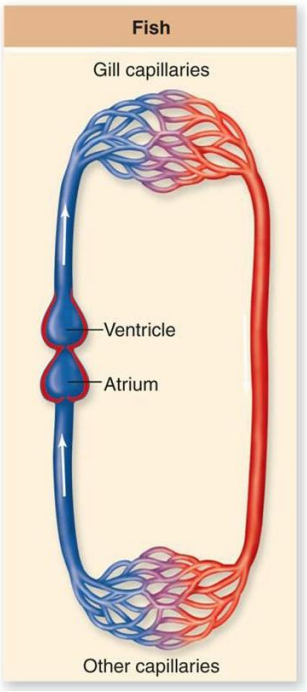
1 TRANSPORT

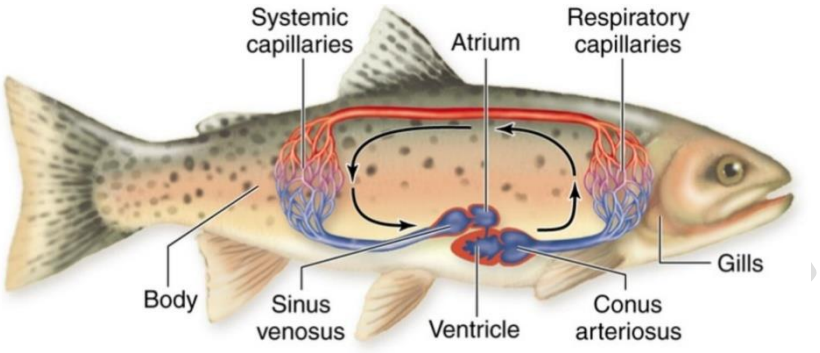
QUICK NOTES & REVISIONS

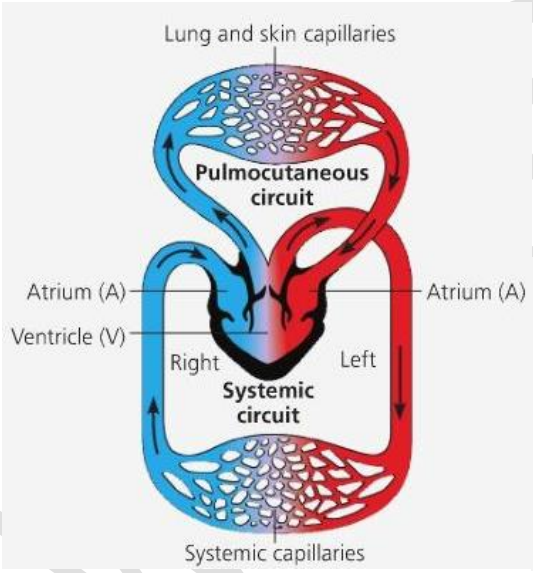






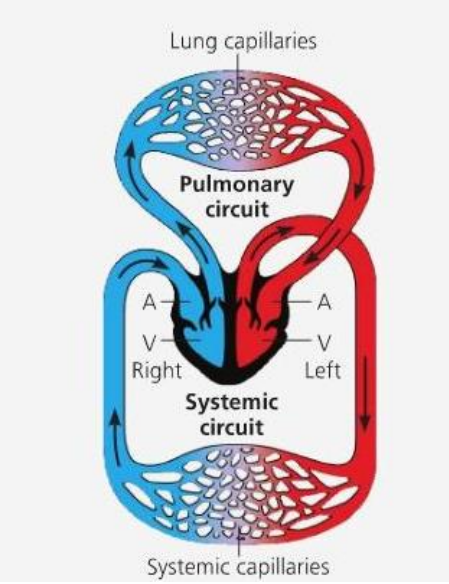






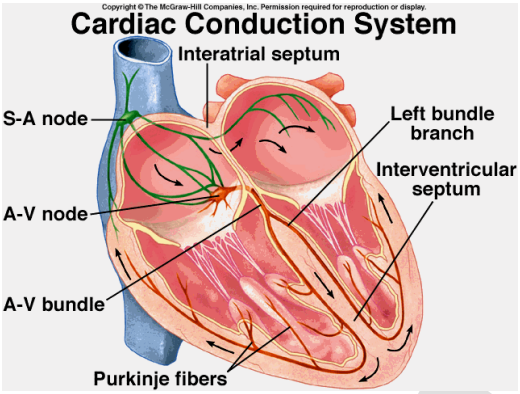
Amphibians

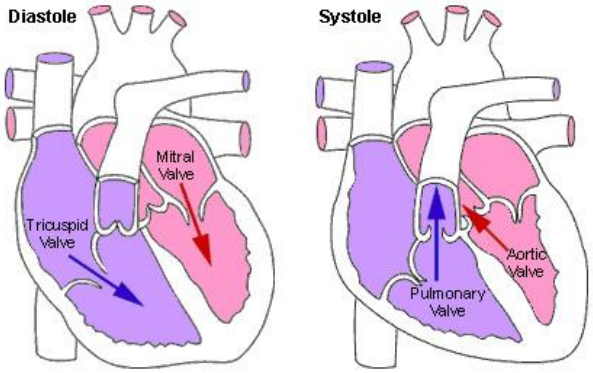
Amphibians have a three-chambered heart and two circuits of blood flow: pulmocutaneous and systemic.



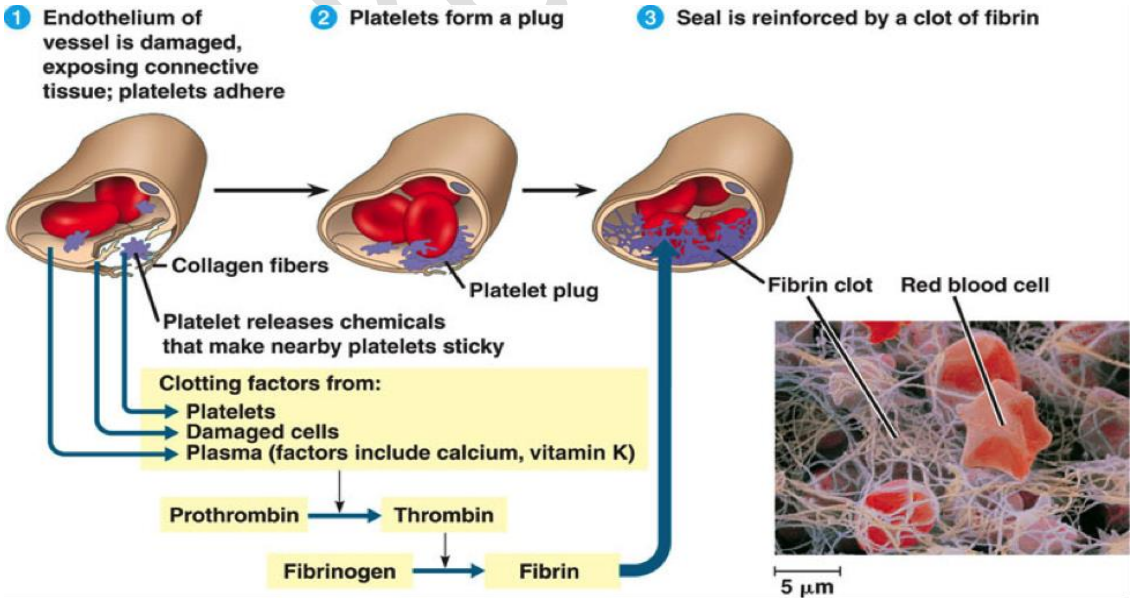
Mammals and Birds

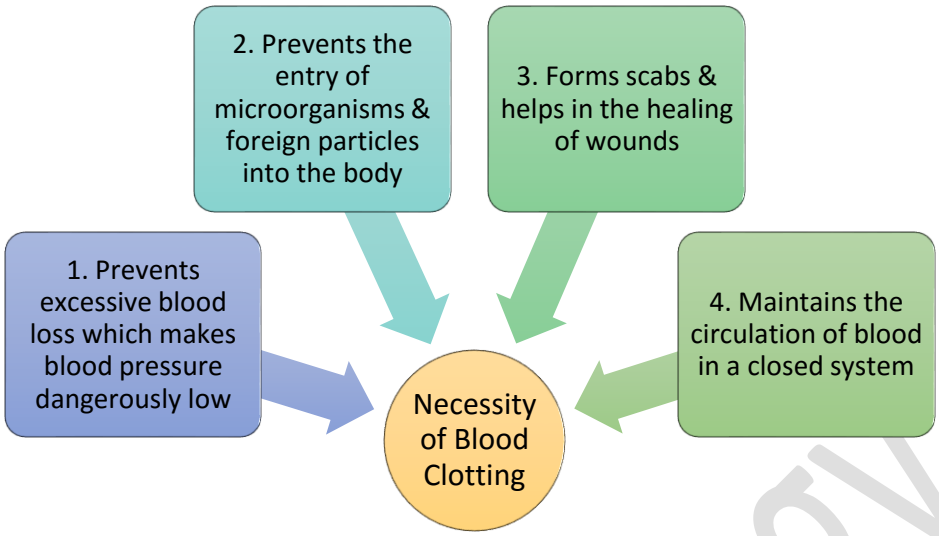
Mammals and birds have a four-chambered heart. In birds, the major vessels near the heart are slightly different than shown, but the pattern of double circulation is essentially the same.

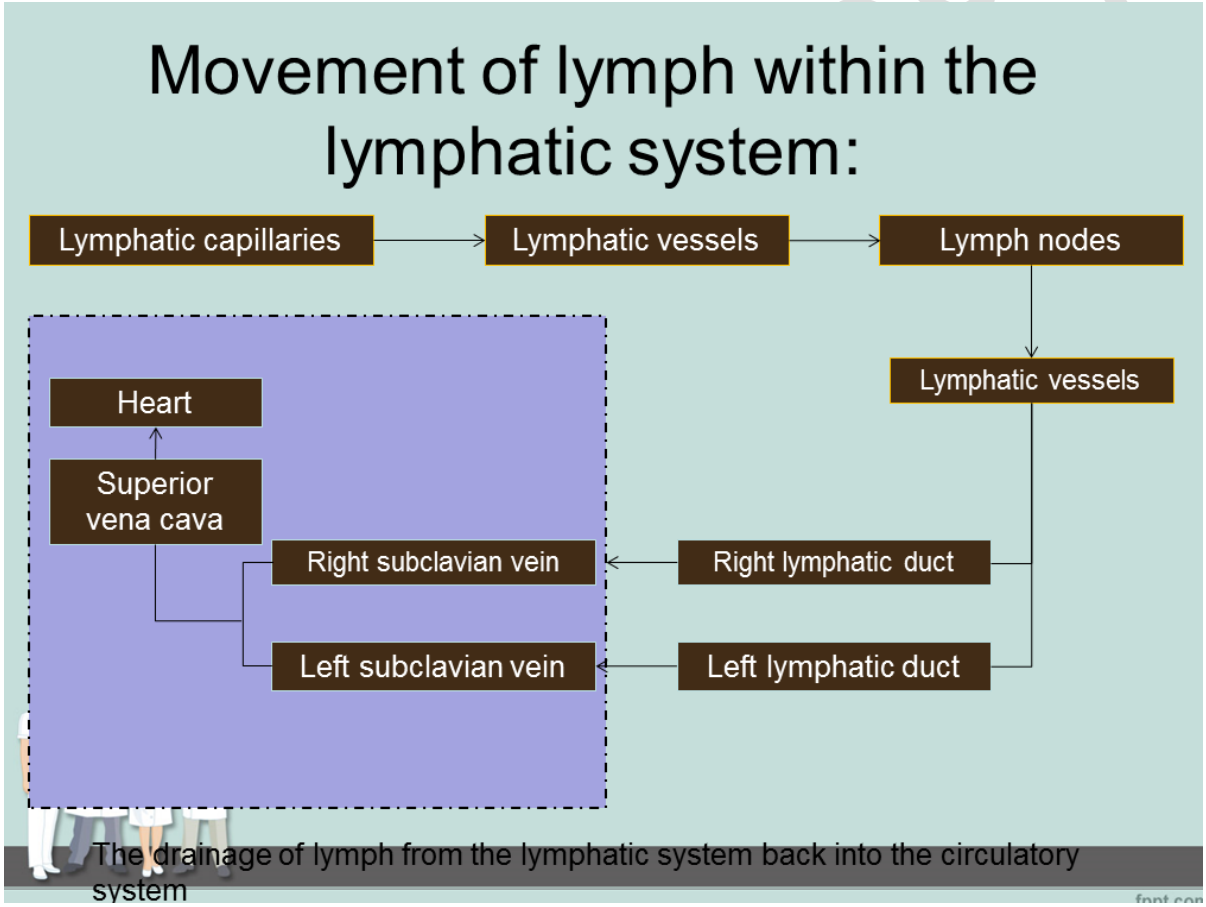


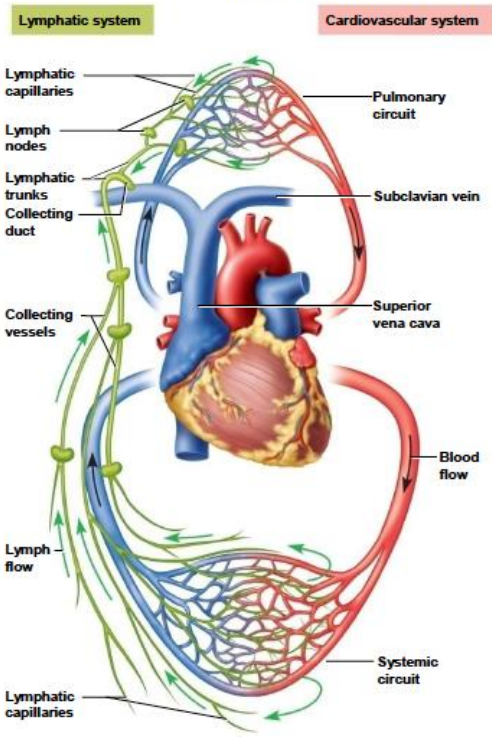


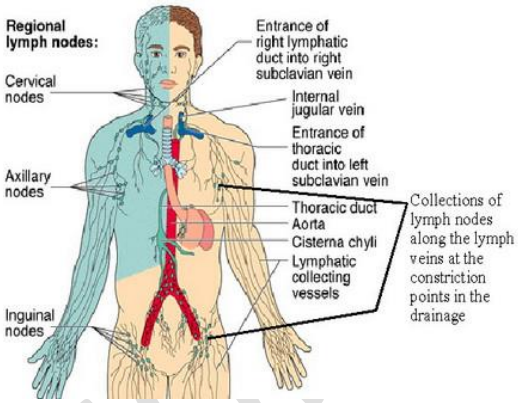
Mechanism of Blood Clotting




2. Prevents the entry of microorganisms & foreign particles into the body
3. Forms scabs & helps in the healing of wounds
1. Prevents excessive blood loss which makes blood pressure dangerously low
4. Maintains the circulation of blood in a closed system
Necessity of Blood Clotting


Movement of lymph within the lymphatic system:
Lymphatic capillaries
Lymphatic vessels
Lymph nodes
Lymphatic vessels
Heart
Superior vena cava
Right subclavian vein
Right lymphatic duct
Left subclavian vein
Left lymphatic duct
The drainage of lymph from the lymphatic system back into the circulatory system





LINE OF DEFENSE MECHANISM

- **Inborn, nonspecific defense mechanism**
  - **FIRST LINE DEFENSE**
    - Skin
    - Mucous membrane
  - **SECOND LINE DEFENSE**
    - White blood cell (phagocytes)
- **Acquired, specific defense mechanism**
  - **THIRD LINE DEFENSE**
    - Lymphocytes
    - Antibodies

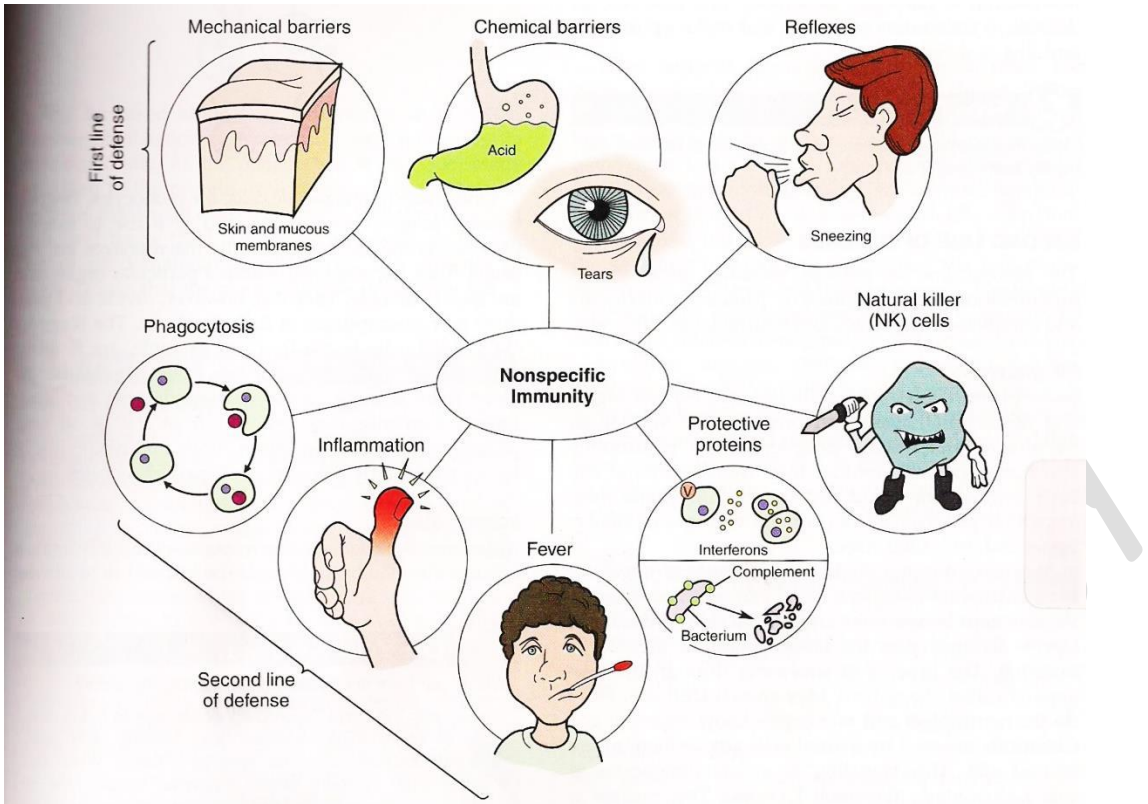


FIGURE 21-1 Nonspecific immunity. First line of defense—mechanical barriers, chemical barriers, and reflexes. Second line of defense—phagocytosis, inflammation, fever, protective proteins, and natural killer (NK) cells.

TYPES OF IMMUNITY
Acquired, specific 3rd line defence

PASSIVE IMMUNITY
Receives immunity from other source. Short term resistance

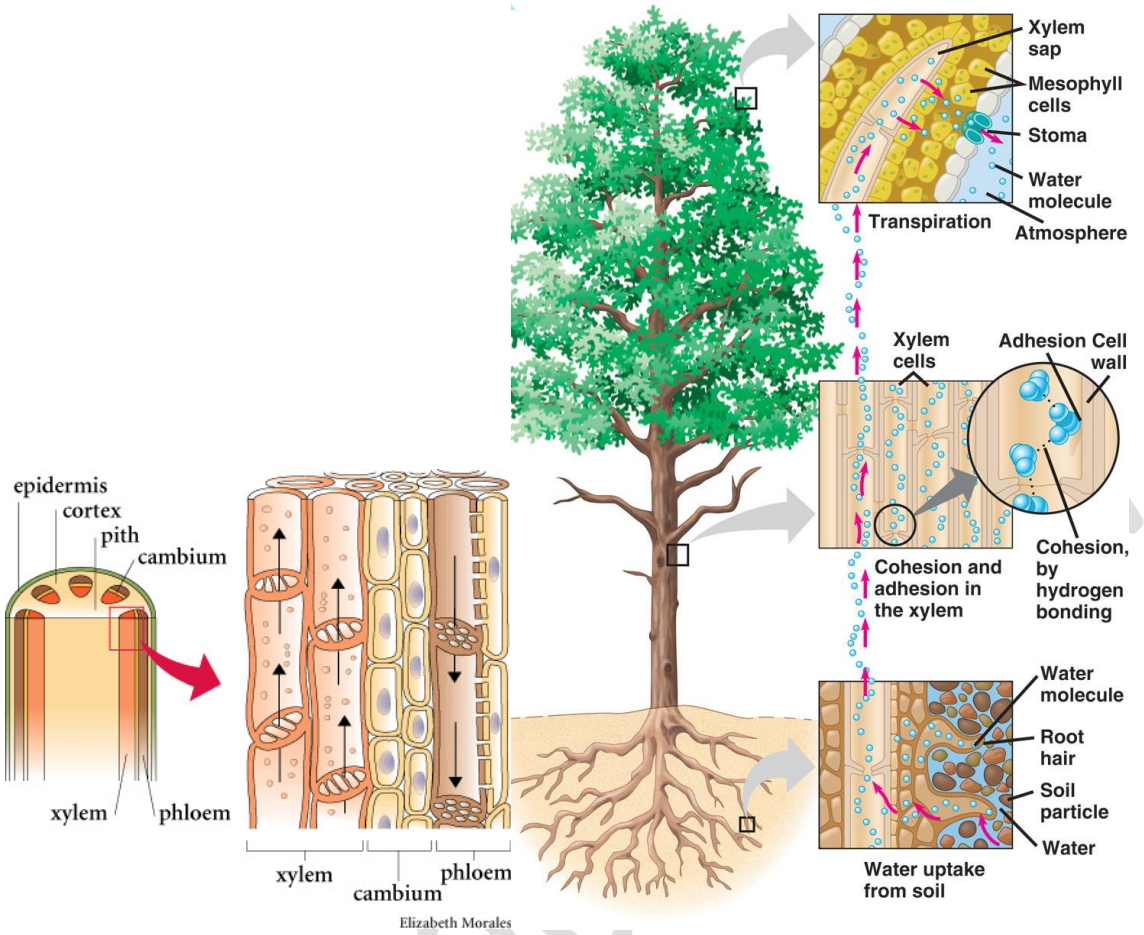
ACTIVE IMMUNITY
Produces own antibody. Long lasting

NATURAL PASSIVE
Baby in uterus
Breastfed baby

ARTIFICIAL PASSIVE
Injection of serum which contain antibodies. Extremely fast, but short lived

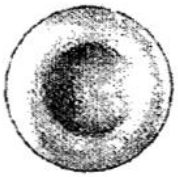
NATURAL ACTIVE
Pathogens enter the body and body makes antibodies

ARTIFICIAL ACTIVE
Vaccine injected to stimulate the production of antibody


epidermis
cortex
pith
cambium
xylem
phloem
xylem
cambium
phloem
Elizabeth Morales
Xylem sap
Mesophyll cells
Stoma
Water molecule
Transpiration
Atmosphere
Xylem cells
Adhesion
Cell wall
Cohesion, by hydrogen bonding
Cohesion and adhesion in the xylem
Water molecule
Root hair
Soil particle
Water
Water uptake from soil

OBJECTIVES QUESTIONS

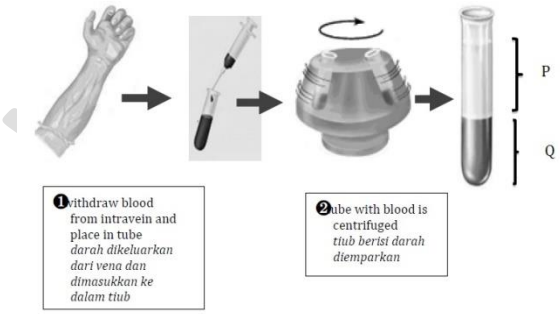
1. Diagram 1 shows a type of human blood cell.



What is the main function of this cell?
A To transport carbon dioxide
B To transport antibodies
C To produce anti-toxin
D To transport oxygen

2. A doctor listened to Ahmad's heart beat by using a sthetoscope. He heard the sound of "lub-hiss, lub-hiss" sound instead of the normal "lub-dup" sound. Which of the following is most likely the cause of the "hiss" sound.
A Clotted coronary artery
B A defective semilunar valve
C High blood pressure
D A damaged pacemaker (SA Node)

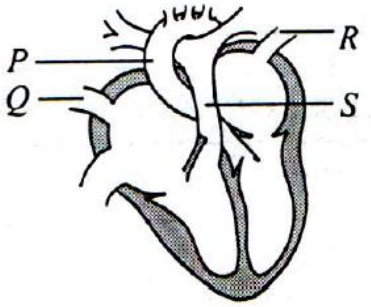
3. Diagram 2 shows how the blood can be divides into its components.



Which of the following is true about P and Q?

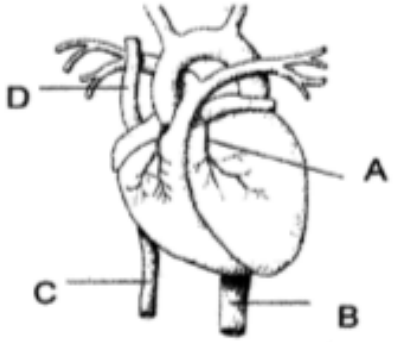
	P	Q
A	Platelets	Erythrocytes, leucocytes and blood plasma
B	Leucocytes	Erythrocytes, platelets and blood plasma
C	Erythrocytes	Leucocytes, platelets and blood plasma
D	Blood plasma	Erythrocytes, leucocytes and platelets

4. Diagram 3 shows the human heart together with the major blood vessels.



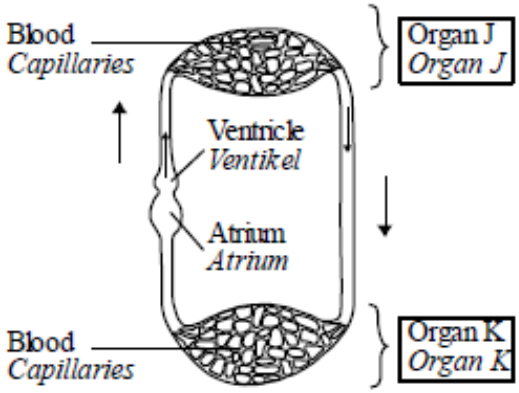
Which blood vessels transport deoxygenated blood?
A P and Q only
B R and S only
C P and R only
D Q and S only

5. Diagram 4 shows the structure of a human heart and its associated blood vessels.



Which of the following **A, B, C** and **D** carry blood to body tissue?

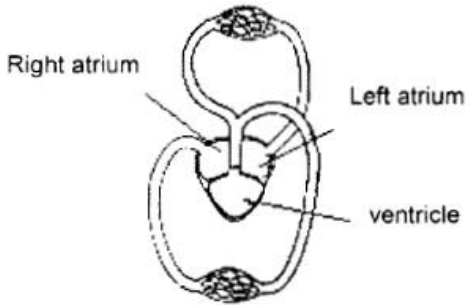
6. Diagram 5 below shows a closed and single circulatory system in an organism.



What are organ J and K?

	J	K
A	Gills	Body tissue
B	Lungs	Body tissue
C	Body tissue	Body tissue
D	Body tissue	Lungs

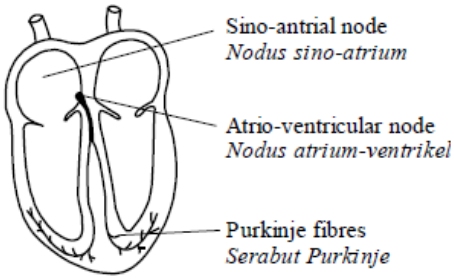
7. Diagram 6 shows a circulatory system of an organism.



Which of the following organisms has this type of circulatory system?

A Man
B Frog
C Fish
D Grasshopper

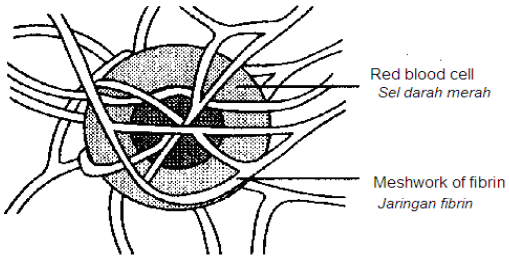
8. Diagram 7 below shows a vertical section through the human heart



Which of the following is the function of the sino-atrial node (SA Node)?

A Control the ventricular contraction
B Transmit the impulse to the ventricular walls
C Control the opening of semilunar valves
D Ace the pacemaker which initiates the heart beat

9. Diagram 8 shows a stage in the blood clotting mechanism.



Which of the following statement explains this stage?

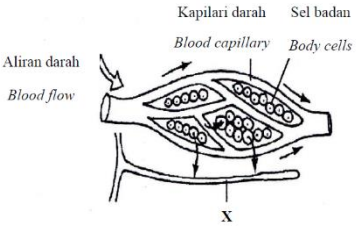
A Thromboplastin converts prothrombin to thrombin
B Thrombin converts fibrinogen to meshwork of fibrin
C Platelets stimulate the formation of meshwork of fibrin
D Platelets release the thromboplastin to form meshwork of fibrin

10. Diagram 9 shows the condition that occurs in a person when the interstitial fluid cannot reabsorb back to the circulatory system.

What is the condition experienced by the person?

A Richet
B Oedema
C Marasmus
D Thrombosis

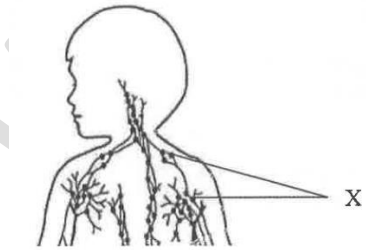
11. Diagram 10 shows capillaries, tissues and vessel X.



What is the fluid that flows into X?

A Blood
B Plasma
C Lymph
D Interstitial fluid

12. Diagram 11 shows the structure X in the lymphatic system.



Which of the following is the function of structure X?

A Filter bacteria and foreign bodies
B Absorbs digested product of fat
C Helps the flow of lymph in the lymphatic system
D Helps to destroy red blood cell

13. A girl accidentally injured herself with a rusty nail. Immediately, she was given an anti-tetanus injection. What type of immunity does the girl obtained?

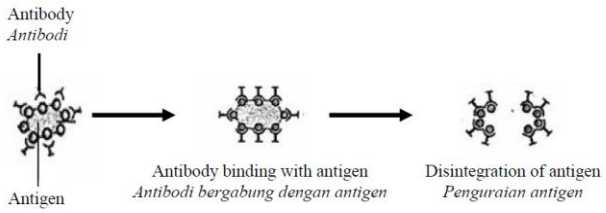
A Active natural immunity
B Active artificial immunity
C Passive artificial immunity
D Passive natural immunity

14. Diagram 12 shows a condition of a disease suffered by a boy.

What types of immunity received by the boy after he recovers from the disease?

A Natural acquired active immunity
B Artificial acquired active immunity
C Natural acquired passive immunity
D Artificial acquired passive immunity

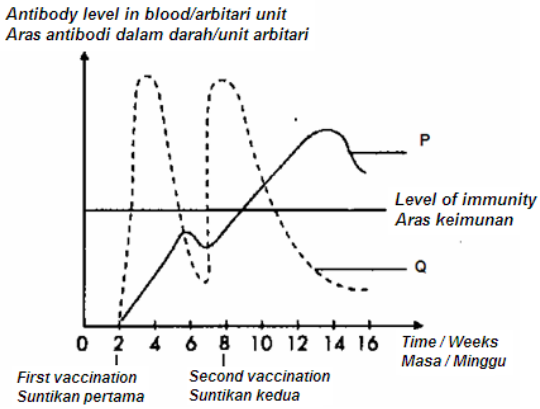
15. The diagram 13 shows a mechanism of antibody destroying an antigen.



Which of the following is the mechanism?

A Lysis
B Neutralisation
C Precipitation
D Agglutination

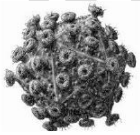
16. Diagram 14 shows a graph of the level of antibody in blood of two patients, P and Q whom have been given vaccination twice.



Which of the following will be the type of immunisation acquired by these two patients?

	P	Q
A	Artificial acquired active immunity	Artificial acquired passive immunity
B	Artificial acquired passive immunity	Artificial acquired active immunity
C	Natural acquired passive immunity	Natural acquired active immunity
D	Natural acquired active immunity	Natural acquired passive immunity

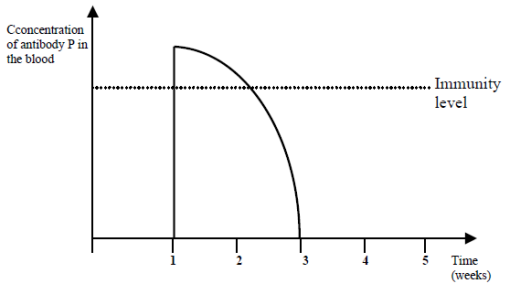
17. Diagram 15 shows a HIV virus that can cause a fatal disease.



Which of the following is the major effect of the virus?

A Lead to cell destruction
B Lead to cell division
C Disrupted the circulatory system
D Weaken the body's immune system

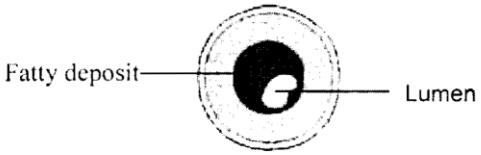
18. Figure 16 shows the concentration of antibody P in the blood of individual X.



What will happen if individual X is infected again in the fourth week?

A He will not get sick again
B There will be no immunity reaction
C His immunity level will increase quickly
D His body will produce the same antibody again

19. Diagram 17 shows a cross section of the blood vessel of a man.



Which of the following is TRUE about the effect of the above disease?

A He does a lot of exercise
B He has high blood pressure
C The lumen become more elastic
D His blood vessel become swollen

20. Diagram 18 shows a cross-section of the root of a dicotyledonous plant.

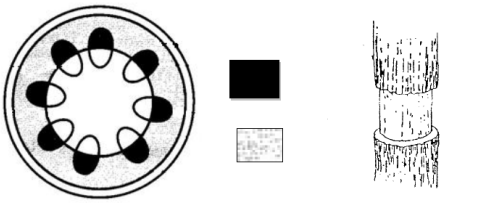


Diagram (a) ***Diagram (b)***

If the ring of the stem shown by shaded area A and B are being removed as in **diagram (a)** while **diagram (b)** shows the ringing of the bark, predict what would happen to the plants after a month?

A Translocation does not occur
B Transpiration does not occur
C Guttation does not occur
D Water flows is blocked

21. Diagram 19 shows water exudes from the special pore at the edge of leaves.

What is the name of the process?
A Translocation
B Transpiration
C Guttation
D Root pressure

STRUCTURE QUESTIONS

1. **Diagram 1.1** shows a vertical section of human heart connected to the lungs.

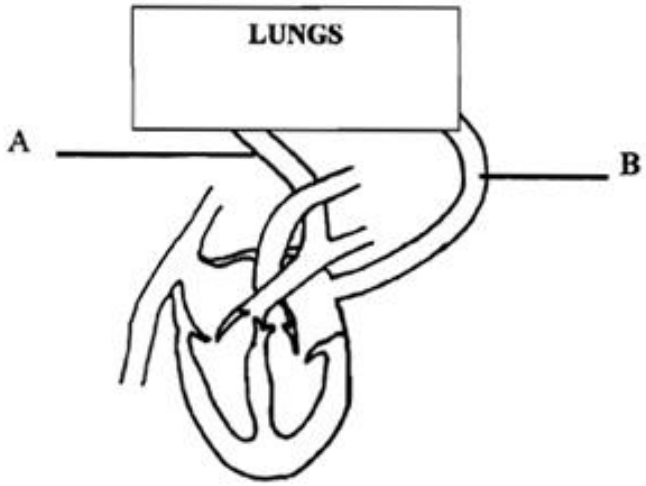


Diagram 1.1

(a) Draw and arrow in vessel A and B on the diagram to show the direction of blood flow between the heart and the lungs. *[1 mark]*

(b) Name blood vessels A and B. *[2 marks]*

A : ……..
B : ……

(c) Blood vessel A has higher pressure than vessel B. Explain why? *[2 marks]*

……
……
……

(d) **Diagram 1.2** shows the deposition in artery X at the heart.

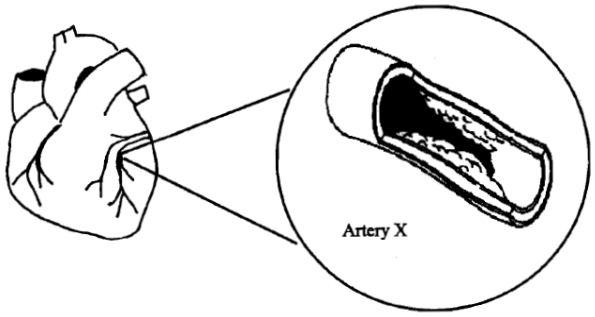


Diagram 1.2

(i) Name artery X. *[1 mark]*

……..

(ii) Explain the effects caused by the blockage in artery X. *[2 marks]*

……
……
……

(e) **Diagram 1.3** shows the mechanism of blood clotting.

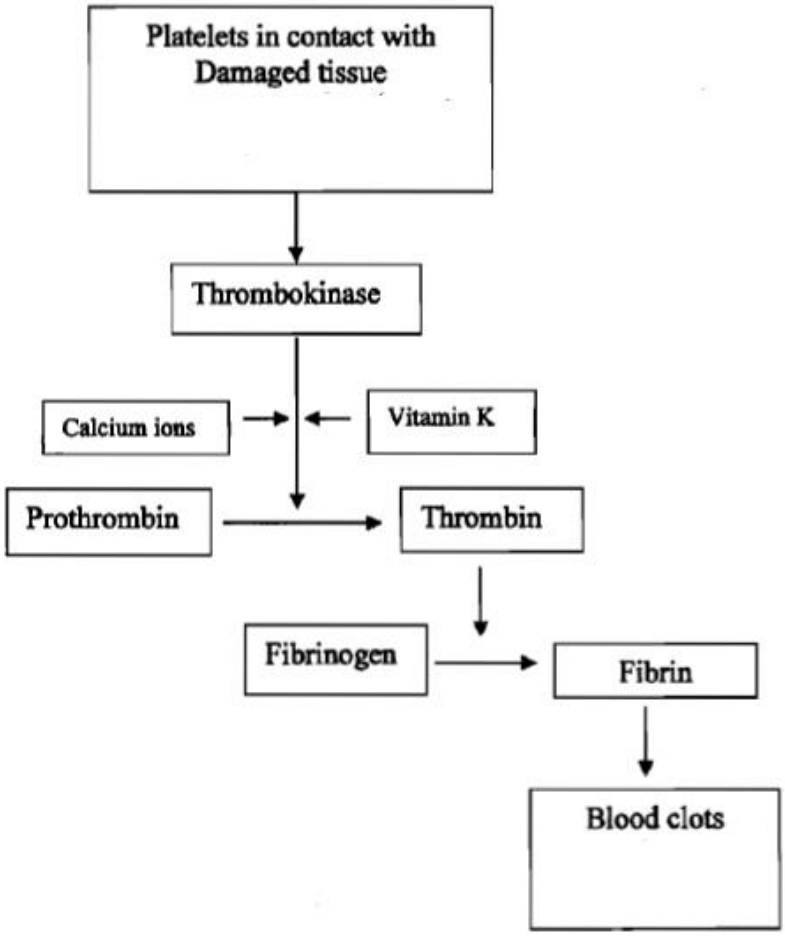


Diagram 1.3

(i) From the diagram, explain the role of platelets. *[2 marks]*

……
……

(ii) Explain one difference between fibrinogen and fibrin. *[2 marks]*

……
……

2. **Diagram 2.1** shows part of the circulatory system and the lymphatic system in the human body.

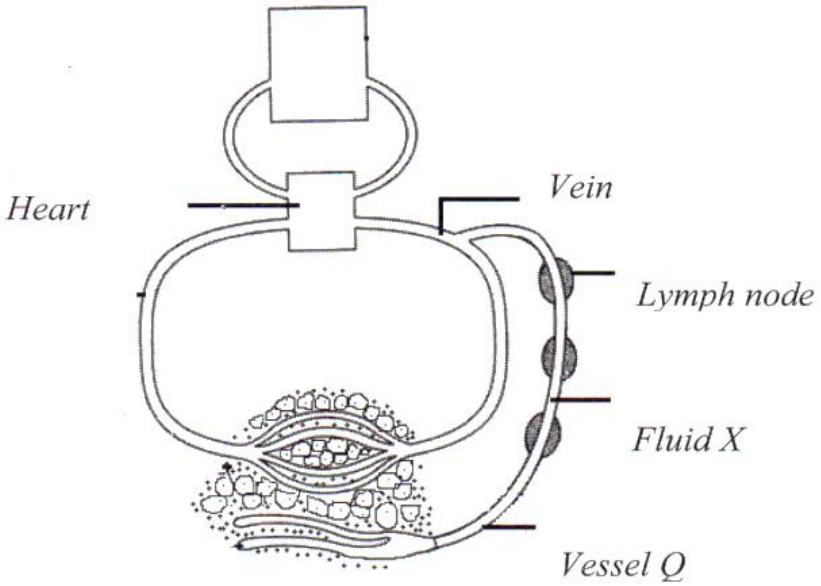


Diagram 2.1

(a)(i) What is fluid X? *[1 mark]*

……

(ii) What happens to the components of fluid X when it passes through the lymph node? *[2 marks]*

……
……..

(b)(i) Fluid X originates from the blood. Describe how fluid X is formed from the blood. *[3 marks]*

……
……
……
……

(ii) State one difference in composition between fluid X and blood. *[1 mark]*

……
……

(iii) State two functions of lymphatic systems. *[2 marks]*

……
……
……
……

(c) **Diagram 2.2** shows an individual suffering from a disease caused by the blockage of the vessel Q.

Diagram 2.2

(i) Name the disease. *[1 mark]*

……..

(ii) Explain how this diseases can happen. *[2 marks]*

……
……
……
…….....

3. Blood circulatory system transport gases and nutrients to all parts of the body. It removes and excretes waste materials through the kidneys. It also protects our body from infection of diseases. Table 1 shows the body's defence mechanism.

Body defence mechanism	
Types of defences	**Lines of defences**
First line defence	Skin and mucous
Second line defence	P
Third line defence	Q

Table 1

(a)(i) Name P and Q. *[2 marks]*

P : …….
Q : ……....

(ii) Explain how P plays it's role in defence mechanism. *[2 marks]*

……
……
……

(b)(i) Name the substance produce by Q. *[1 mark]*

……..

(ii) State the characteristics of the substance you stated in (b)(i). *[1 mark]*

……

(c) The **Diagram 3.1** and **3.2** shows the changes in the amount of antibodies of individual X and Y.

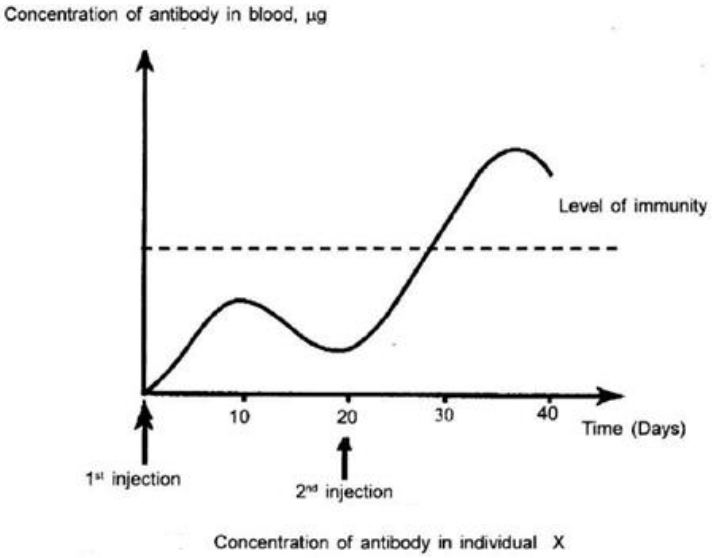


Diagram 3.1

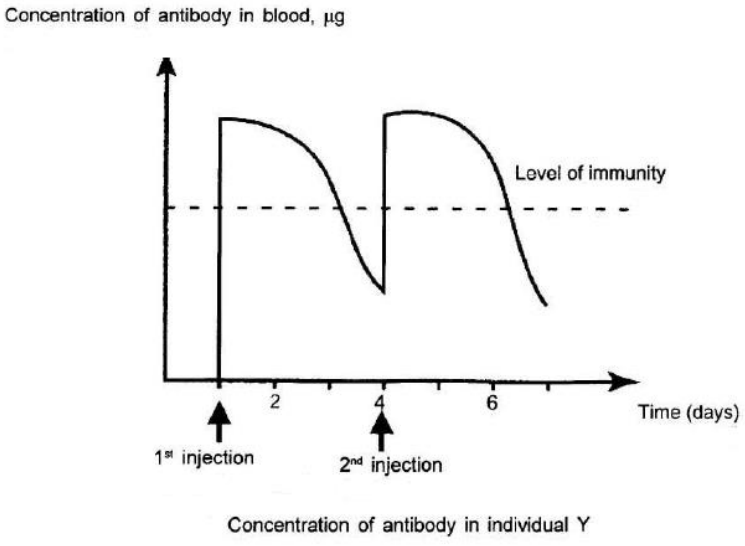


Diagram 3.2

(i) Based on **Diagram 3.1** and **3.2** , name the type of immunity in individual X and Y. *[2 marks]*

Individual X : ……
Individual Y : ……

(ii) Name the substances that are injected into the blood of individual X and Y. *[2 marks]*

Individual X : ……
Individual Y : ……

(iii) Explain the difference in the concentration of antibody in the blood of individual X and Y after the second injection. *[3 marks]*

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4. Two individuals X and Y were injected to acquire immunity. The level of antibody in the blood of individual X and Y is shown in **Diagram 4.1(a)** and **Diagram 4.1(b).**

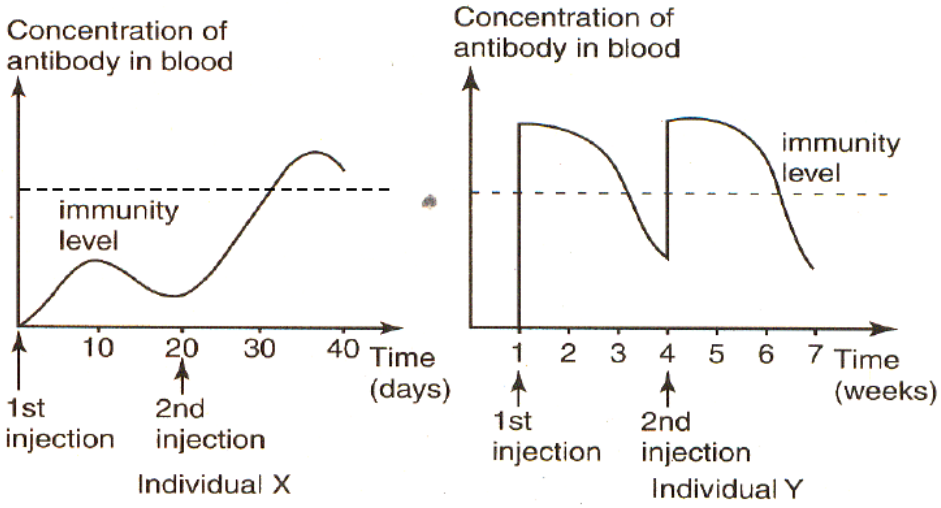

Diagram 4.1(a) and Diagram 4.1(b)

a. Name the type of immunity obtained by individual X and individual Y. *[1 mark]*

X : ……
Y : ……

b. State the importance of the second injection in for individual X and individual Y. *[1 mark]*

X : ……
Y : ……

c. Describe two differences between the type of immunity obtained by individual X and individual Y based on Diagram 4.1(a) and 4.1(b). *[2 marks]*

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d. **Diagram 4.2** shows a type of white blood cell which is important in the body defence mechanism.

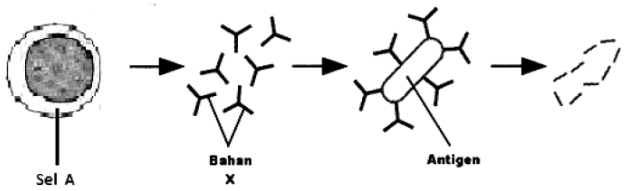

Diagram 4.2

Name the structures labelled A and X. *[2 marks]*

A : ……
X : ……

e. Explain the mechanism of body defence shown in **Diagram 4.2** *[3 marks]*

……
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……
……

f. **Table 2** shows a schedule of immunisation given for every new born until 2 years old in Malaysia.

Age	Types of Immunity	
New born	Tuberculosis (B.C.G) Hepatitis B	(First dose)
1 month	Hepatitis B	(Second dose)
3 month	Triple Antigen Polio	(First dose)
4 month	Triple Antigen Polio	(Second dose)
5 month	Triple Antigen Polio	(Second dose)
	Hepatitis B	(Third dose)
9 – 24 month	Germans measles	
1 ½ - 2 year	Triple Antigen Polio	(Third dose)

Table 2

In your opinion, justify do parents should follow the Immunisation Programs. Explain why. *[3 marks]*

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5. **Diagram 5** shows the pathway of water movement from soil to the upper part of the plant.

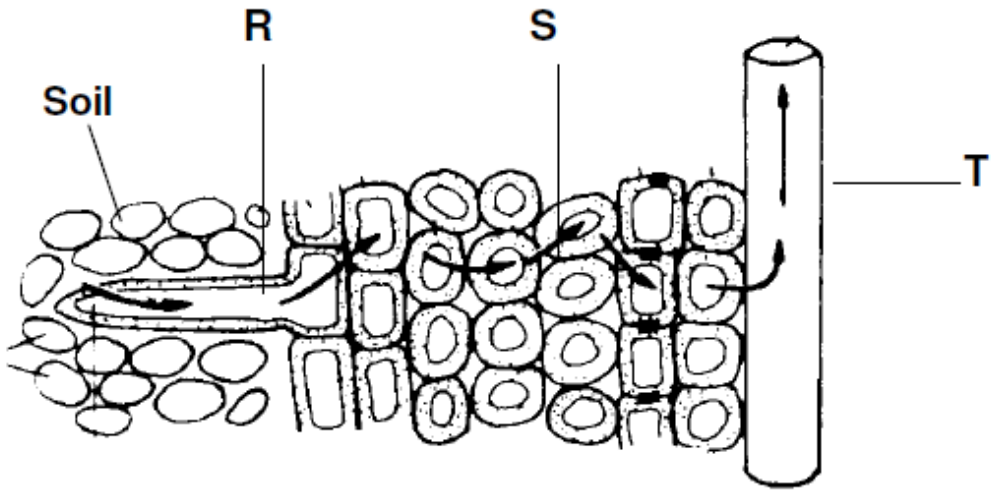


Diagram 5

(a) State one characteristics of R and its importance. *[2 marks]*

……
……
……

(b)(i) Based on **Diagram 5**, explain how water from soil move to structure T. *[4 marks]*

……
……
……
……
……

(ii) The flow of water along the T structure is carried out by capillary action. Name the forces involved to ensure the continous flow of water *[1 mark]*

……

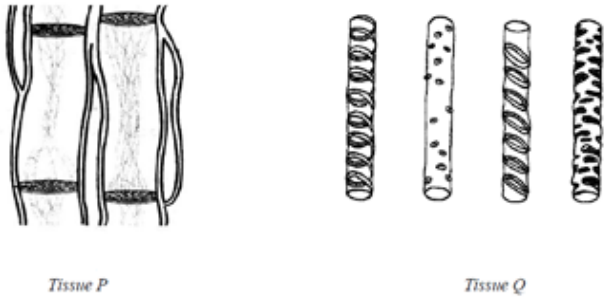
(iii) Explain how these forces in b(ii) enables the movement of water to the top of the plant. *[2 marks]*

……
……
……

(d) Describe how the plant control their water loss. *[2 marks]*

……
……
……

6. **Diagram 6.1** shows two types of tissues that involve in plant transport.



Tissue P *Tissue Q*

Diagram 6.1

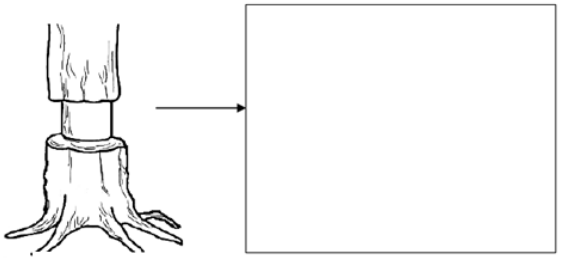
(a)(i) Name tissue P and tissue Q. *[2 marks]*

Tissue P : ……
Tissue Q : ……

(ii) Describe how tissue P is adapted to carry out its function. *[2 marks]*

……
……
……

(b) **Diagram 6.2** shows the part of the stem of a tree where the ring of bark has been removed. The tree is watered everyday.



Beginning *After three month*

Diagram 6.2

(i) Complete **Diagram 6.2** by drawing in box provided, to show the tree after three months of the ring bark removed. *[2 marks]*

(ii) Explain your answer in (b)(i). *[3 marks]*

……
……
……

(c) Suggest three ways how to prevent the potted plant from wilting due to hot weather. *[3 marks]*

1. ……
2. ……
3. ……

ESSAY QUESTIONS

1(a) **Diagram 1** shows three types of blood vessels that made up the human circulatory system.

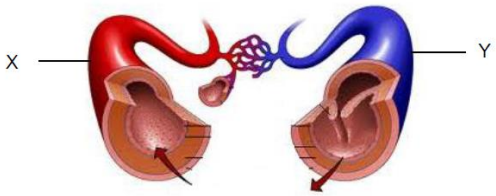


Diagram 1

(i) Compare and contrast between blood vessels X and Y. *[5 marks]*
(ii) Circulatory system plays a big role in transport. Besides that, it also has an important function in our body's defence mechanism against pathogens.
Justify how the first line defence protects our body against pathogens. *[5 marks]*

2(a) **Diagram 2.1** shows the lymphatic system and blood circulatory system.

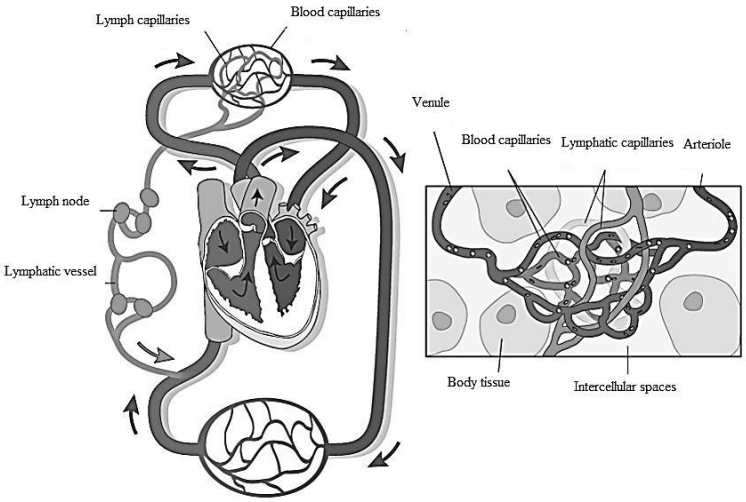


Diagram 2.1

(i) Explain the formation of the fluid in the intercellular spaces. *[4 marks]*
(ii) Explain how lymphatic system complements the blood circulatory system. *[8 marks]*

(b) Jusoh is a poor farmer who lives in a rural area. There are many mosquitoes that act as vectors of parasitic worms. He does not wear any shoes while doing his daily work. After one year, his leg become swollen as in **Diagram 2.2**

Diagram 2.2

Based on the above statement, explain how the condition happen and suggest ways that can help to prevent the disease. *[8 marks]*

3. AIDS (Acquired Immune Deficiency Syndrome) is cause by HIV (Human Immunodeficiency Virus). The virus can be transmitted by sexual intercourse with the infected person.
   Discuss the importance of the HIV test to ensure the virus is not transmitted to their children *[5 marks]*

4. **Diagram 3** shows the coronary artery bypass in the heart.

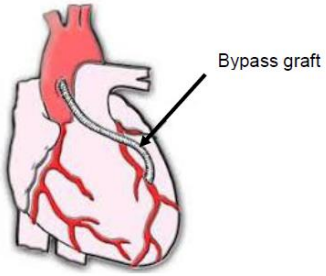


Diagram 3

(a) In your opinion, justify why the procedure has to be carried out. *[5 marks]*
(b) Suggest what can be done as preventive measures to avoid blockage of the coronary artery *[5 marks]*

5. **Diagram 4** shows the cross section of plant organs that involved in transportation of substances in a green plant.

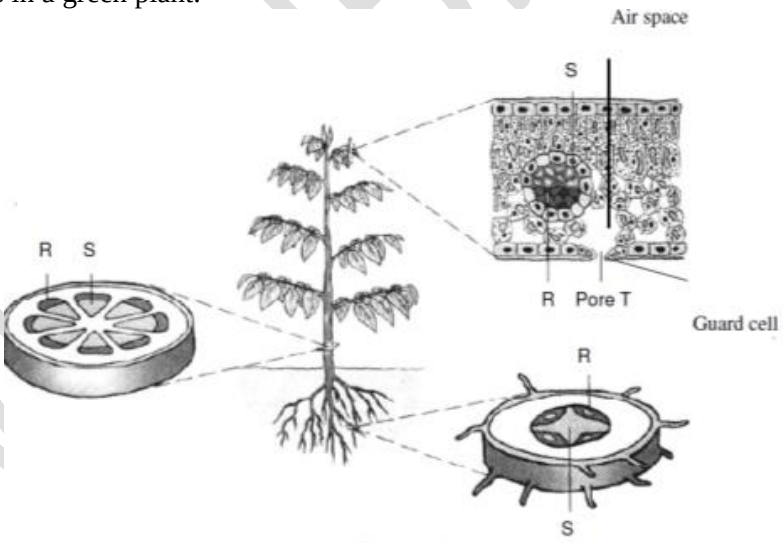


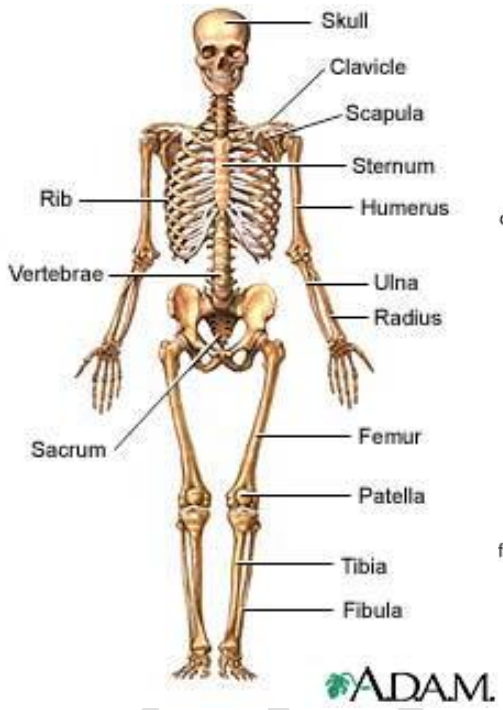
Diagram 4

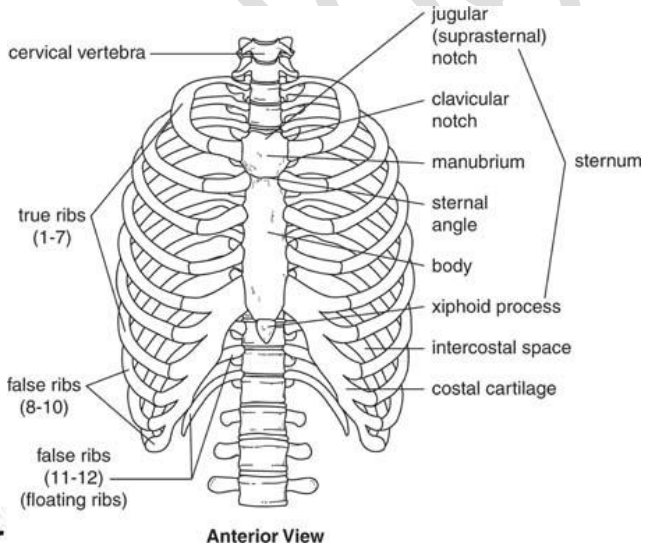
(a) Explain the movement of water molecules from air space through pore T *[2 marks]*
(b) The size of pore T is controlled by two guard cells.
Explain the process which occurs in the opening of pore T. *[4 marks]*
(c) The plant is grown in an area which is exposed to hot weather during the day.
Explain the adaptations of the plant in order to survive in the environment *[4 marks]*
(d) R and S are vascular tissues. Explain how R and S are involved in the movement of substances in plants. *[5 marks]*
(e) Discuss the importance of transportation of water in plants *[5 marks]*

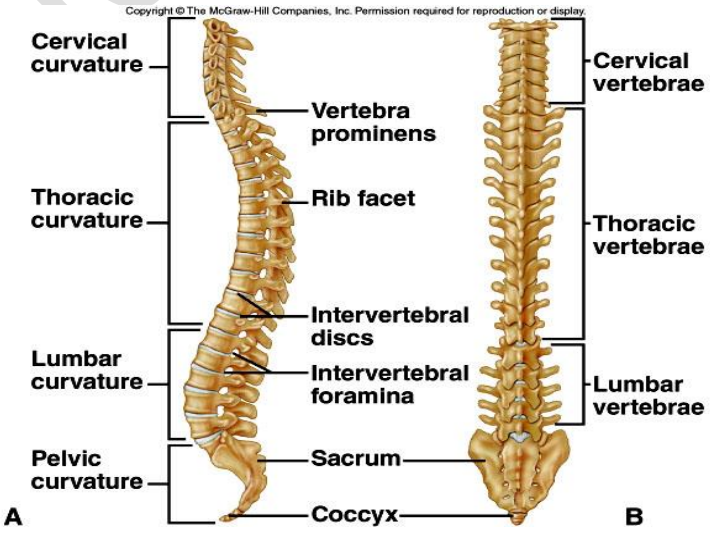
2 SUPPORT & LOCOMOTION

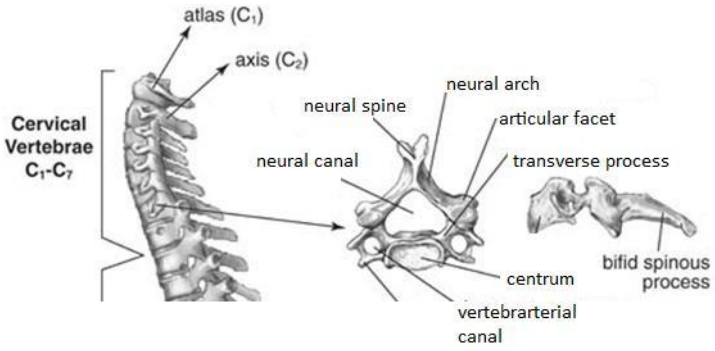
2.1 Support and Locomotion in Humans and Animals
2.2 Appreciating a Healthy Musculoskeletal System
2.3 Support in Plants

QUICK NOTES & REVISIONS



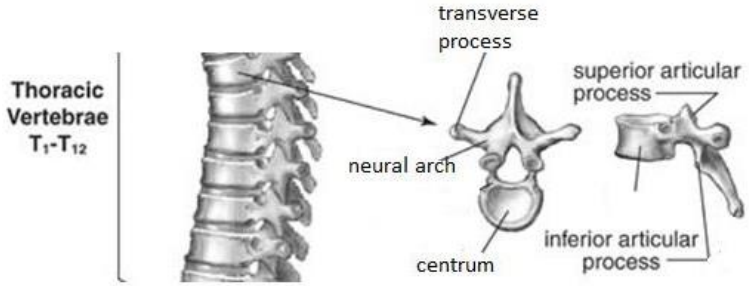






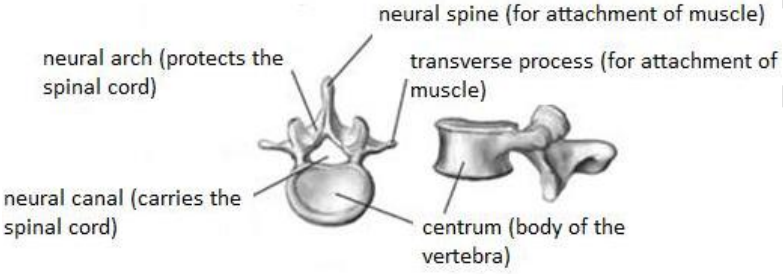
3rd – 7th cervical vertebrae

- smallest & lightest vertebrae
- thinner centrum & smaller neural spine
- transverse process has a vertebrarterial canal



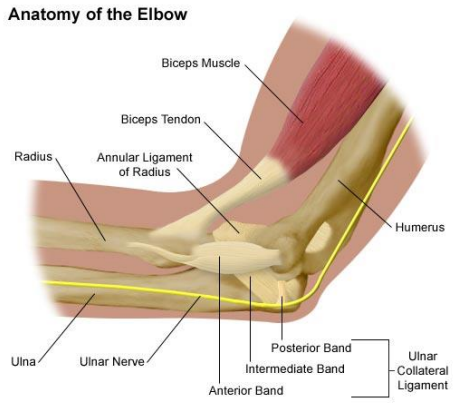
Thoracic vertebrae:

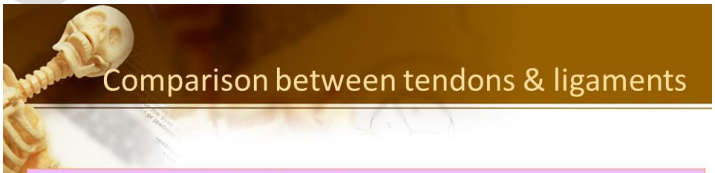
1. Heart shape centrum
2. Small circular neural canal
3. Long neural spine which point downwards



Lumbar vertebrae

- triangular neural canal
- large broad transverse processes
- short broad neural spine



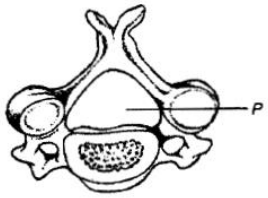


Similarities between tendons & ligaments
- **Connect two types of tissues together**
- **Are made of collagen tissue**

TENDONS	Aspect of comparison	LIGAMENTS
Muscle to bone	Types of tissues connected	Bone to bone
Absent	Presence of elastin	Present
Inelastic	Elasticity	Elastic

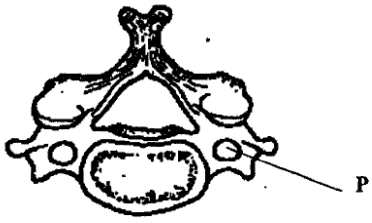
OBJECTIVES QUESTIONS

1. Diagram 1 shows a human cervical vertebra.



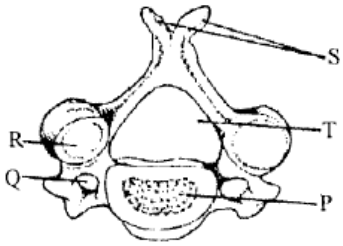
Which of the following is the function of the part labelled P?
A Enclosed the spinal cord
B For muscle attachment
C Protect blood vessels
D Absorbed pressure

2. Diagram 2 shows a typical cervical vertebra.



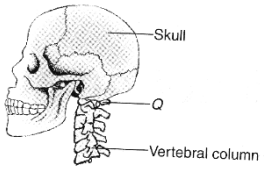
What is P?
A Centrum
B Neural spine
C Neural canal
D Vertebra arterial canal

3. Diagram 3 shows the anterior view of the cervical vertebra. Which of the following parts labelled P, Q, R, S and T, are also found in both the thoracic and the lumbar vertebrae?



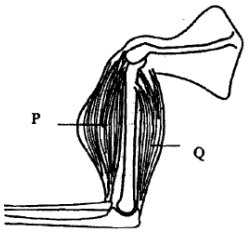
A P, S and T only
B Q, R and T only
C P, R, S and T only
D P, Q, R, S and T only

4. Diagram 4 shows the joint between the skull and the first vertebra of the neck.



What is the special feature of Q?
A Q is articulated with the jaw
B Q allows the skull and the vertebra to rotate against each other in one plane
C Q allows limited universal movement forwards and backwards
D It is fused to the skull and movement occurs only in the neck

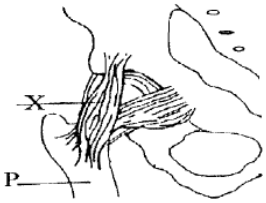
5. Diagram 5 shows the structure of human forearm



Which of the following action of P and Q will cause the arm bend?

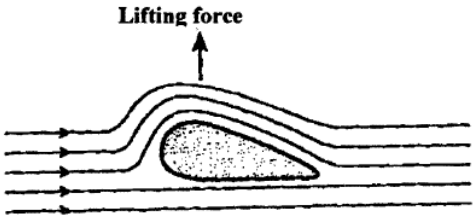
	P	Q
A	Contracts	Relaxes
B	Contracts	Contracts
C	Relaxes	Contracts
D	Relaxes	Relaxes

6. Diagram 6 shows part of a joint at human pelvic girdle. Which of the following will be caused by an injury that cuts X?



A P will break
B The surface of P will wear off
C P will dislodge from the socket
D The bone density of P will decrease

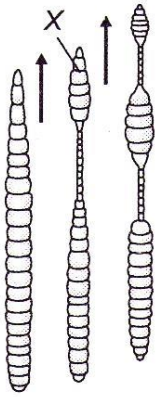
7. Diagram 7 shows the shape of an aerofoil



Which part of the bird has this shape?

A Head
B Body
C Wing
D Tail

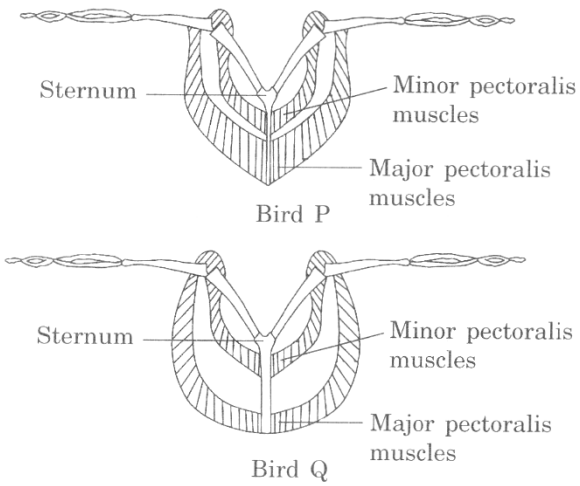
8. The diagram 8 shows locomotion in an earthworm.



In order for the earthworm to move in the direction shown, the muscles at X must be under certain conditions. What are the conditions of the muscles at X?

A The longitudinal muscles contract while the circular muscles relax
B The circular muscles contract while the longitudinal muscles relax
C Both the circular muscles and the longitudinal muscles contract
D Only the longitudinal muscles at X contract

9. Diagram 9 shows a pair of breast muscles of two birds. The major pectoralis muscle of bird P is normal while the major pectoralis muscle of bird Q is abnormal.



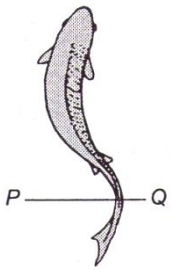
What is the effect of the abnormality on bird Q?

A It can fly higher
B The upward movement of the wing is weaker
C The downward movement of the wings is weaker
D The upwards and downward movements of the wings are more rapid while flying

10. Which of the following fins helps the fish to overcome pitching when swimming?

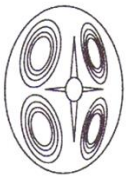
A Dorsal fin
B Ventral fin
C Pectoral fin
D Caudal fin

11. Diagram 10 shows the movement of a fish in water.



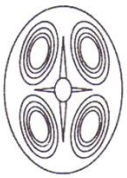
What are the conditions of the myotome muscles across PQ?

A

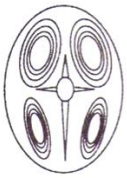


C

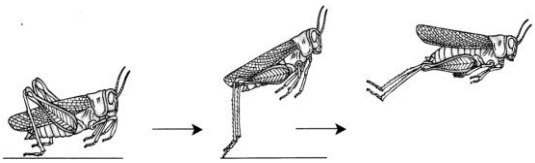
B



D



12. Diagram 11 shows the stages of a grasshopper jumping.



Which statements are correct?

I. At rest, the flexor muscle contracts.
II. The hind leg is folded in a Z shape
III. Energy is stored in the tendon of the rear leg
IV. During the jump, the extensor muscle contracts.

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

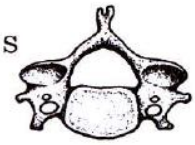
13. Diagram 13 shows human bones

P

Q

R

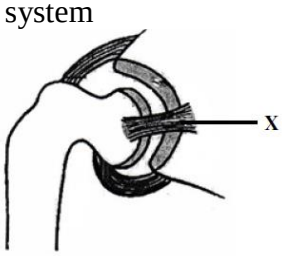
S



Which bones are parts of the appendicular skeleton?

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

14. Diagram 14 shows a joint in human skeletal system



Which is the function of X?

A Secretes fluid to lubricate the joint
B Reduces friction between the bones
C Prevents the bones from being dislocated
D Joins the bones to the muscles

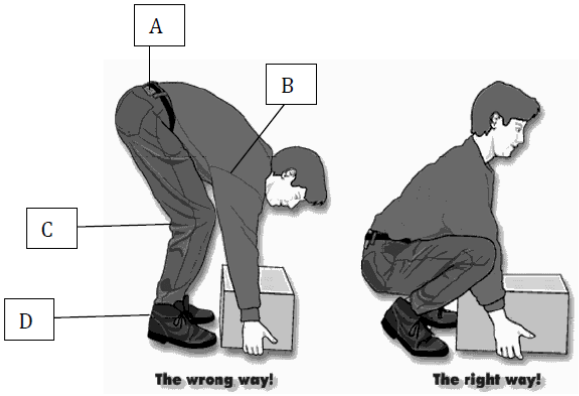
15. Which of the two bones that form a hinge joint?

A The femur and the tibia
B The humerus and the radius
C The humerus and the scapula
D The femur and the pelvic girdle

16. Mei Ling has a disorder which causes her bones to become thinner, brittle and more porous. What is the disorder that Mei Ling has?

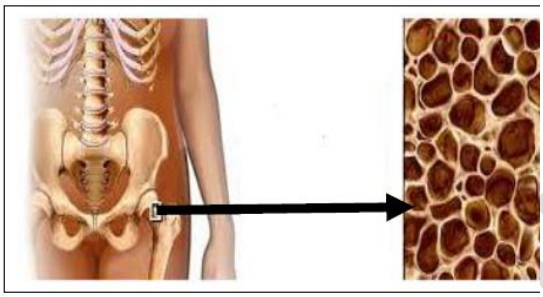
A A muscle cramp
B Arthritis
C Osteoporosis
D Muscular dystrophy

17. Diagram 15 shows the wrong way and the right way to lift a heavy object. Which of the following part of the body will have the highest risk to suffer from injury?



18. Mei Ling has a disorder which causes her bones to become thinner, brittle and more porous. What is the disorder that Mei Ling has?
A A muscle cramp
B Arthritis
C Osteoporosis
D Muscular dystrophy

19. Diagram 16 shows a disease in an elderly female, her bone become porous due to lack of certain hormones and nutrients.

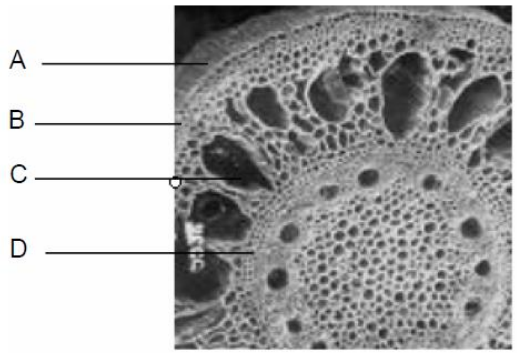


What are these hormone and nutrient?
A Progesterone and ferum
B Progesterone and calcium
C Oestrogen and ferum
D Oestrogen and calcium

20. Which of the following are adaptations of aquatic plants to float?

I Xylem tissues
II Turgidity of cells
III Aerenchyma tissues
IV Large air space
A I and II only
B I and III only
C III and IV only
D II, III and IV only

21. Which of the following tissue helps to support an aquatic plant?



STRUCTURE QUESTIONS

1. **Diagram 1** shows a part of human body limb that involved in movement.

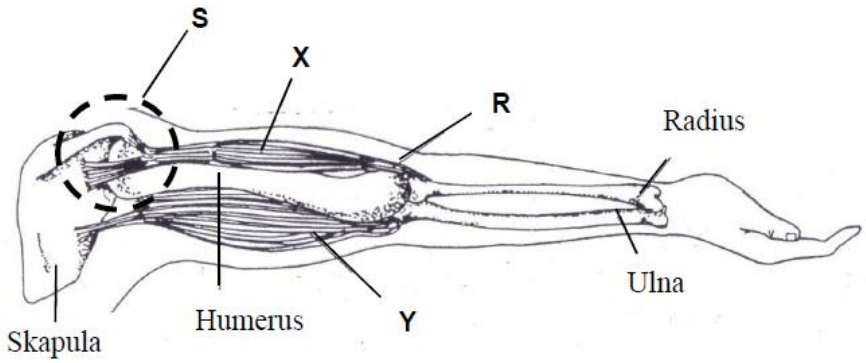


Diagram 1

(a) Name the structure tissue R and the type of joint S. *[2 marks]*

(i) Tissue R : ……
(ii) Joint S : ……

(b) Explain the role of muscle X and Y, tissue R for hand movement in **Diagram 1**. *[3 marks]*

……
……
……
……..

(c)(i) In a football match, Ahmad fell causing his radius bone is fractured. Based on **Diagram 1**, explain the effect of that condition on arm bending movement. *[3 marks]*
……
……
……

(ii) During a medical check-up, a doctor diagnoses Ahmad radius bone fractured due to osteoporosis problem. Explain way to overcome the problem. *[2 marks]*

……
……
……

(d) Based on **Diagram 1,** explain the two importance of the skeletal system in the movements *[2 marks]*

1. ……..

2. ……

2. **Diagram 2.1** shows a structure of human arm.

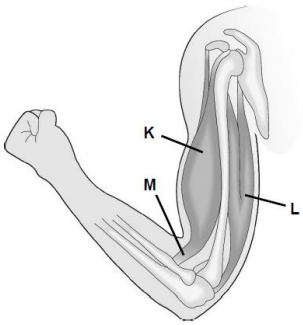


Diagram 2.1

(a)(i) Name the part labelled K and M. *[2 marks]*

K: ……
M:…….

(ii) State one characteristics of M. *[2 marks]*

……

(iii) Explain the roles K, L and M in bending the arm. *[3 marks]*

……
……
……
……..

(b) K and L need sufficient blood supply to function efficiently. Explain why? *[2 marks]*

……
……
……
……..

(c) Encik Ahmad has a son who suffers from a disease that related to impaired musculoskeletal system.

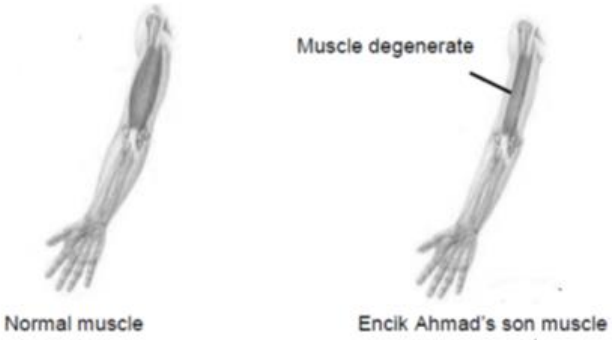


Diagram 2

(i) Name the disease suffered by Encik Ahmad's son. *[1 mark]*

……

(ii) Explain why this disease mainly affects boys. *[3 marks]*

……
……
……

3. **Diagram 3.1** shows a human vertebra.

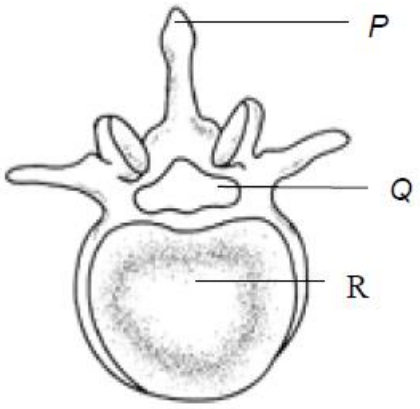


Diagram 3.1

(a) Name the part labelled P and R. *[1 mark]*

……..

(b) State the function of Q. *[1 mark]*

……..

(c)(i) State one type of mineral that is essential for the strength of this vertebra. *[1 mark]*

……

(ii) Explain how the lack of mineral stated in (c)(i) leads to osteoporosis. *[2 marks]*

……
……
……..

(iii) Suggest one way on how to reduce the risk of this disease. *[1 mark]*

……

(e) **Diagram 3.2(a)** shows the cross section of a water hyacinth stem and figure 3.2(b) shows the cross section of a woody plant.

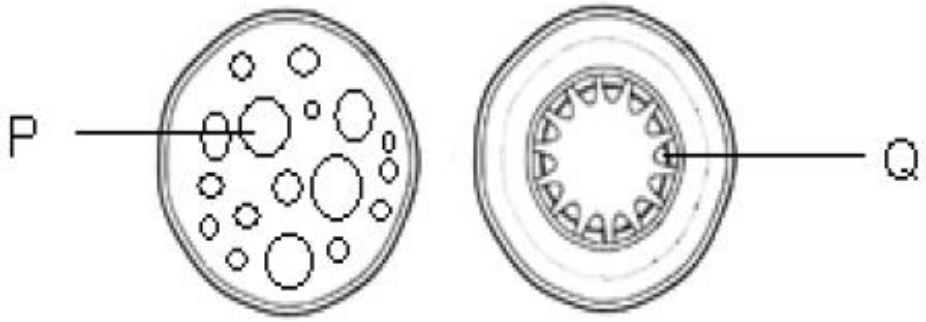


Diagram 3.2(a) **Diagram 3.2(b)**

(i) What is structure P? *[1 mark]*

……..

(ii) Explain how structure P helps the plant in support. *[3 marks]*

...……
……
……

(f) Describe how woody plant is supported by structure Q in Diagram 3.2(b). *[2 marks]*

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4. **Diagram 4.1** shows the movement of an earthworm.
Diagram 4.2 shows the arrangement of flight muscles in a bird.

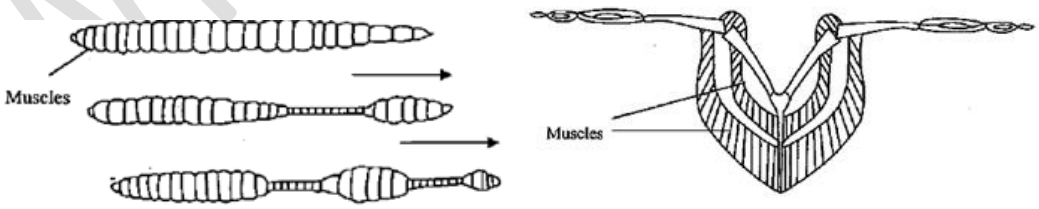


Diagram 4.1 **Diagram 4.2**

(a) Name two types muscles that are involved in the movement of an earthworm. *[2 marks]*

1. ……
2. ……

(b) Explain the muscles action for the forward movement of an earthworm. *[3 marks]*

……

……

……

……

(c)(i) Label pectoralis major muscles in **Diagram 4.2** *[1 mark]*

(ii) Name the organelle that is found in abundance in the pectoralis major muscles. *[1 mark]*

……

(iii) Explain why the pectoralis major muscles have an abundance of this organelle. *[2 marks]*

……

……

……

(d) Explain why the bones of a female bird that lays eggs are more brittle as its age increases. *[3 marks]*

……

……

……

……

ESSAY QUESTIONS

1(a) **Diagram 1.1** shows the structure of a fish. **Diagram 1.2** is the cross section of the fish showing the myotomes.

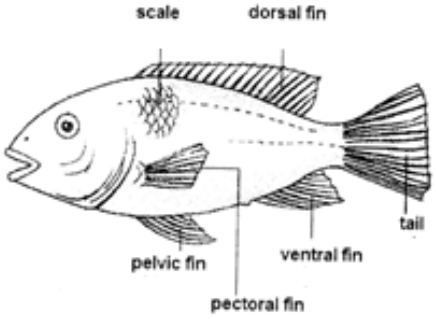


Diagram 1.1

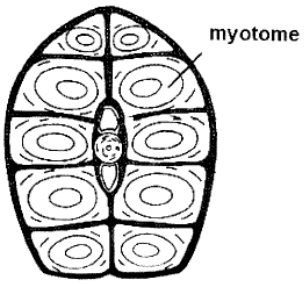


Diagram 1.2

Based on **Diagram 1.1** and **Diagram 1.2,** explain how these structures help the fish to move. *[6 marks]*

(b) **Diagram 1.3** shows the movement of a fish in the water.

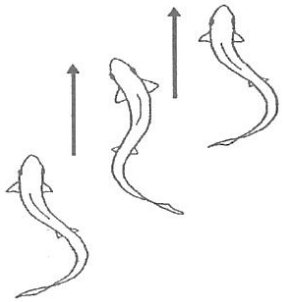


Diagram 1.3

Based on Diagram ,

(i) Explain the adaptations of fish to enable them to move in water. *[4 marks]*

(ii) Describe the mechanisms of locomotion of fish. *[4 marks]*

(c)

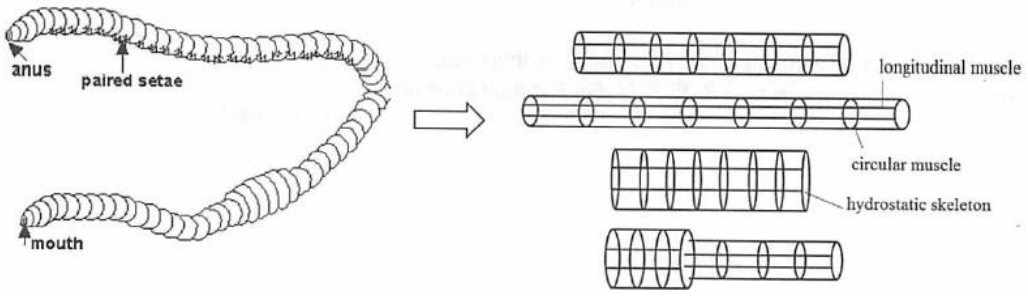


Diagram 1.4

Explain how the structure in the earthworm involve in their movement as shown in **Diagram 1.4** *[6 marks]*

2. **Diagram 2.1** shows a forearm of humans.

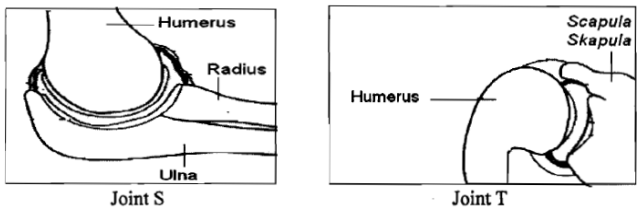


Diagram 2.1

(a) Explain the similarities and difference between joint S and T. *[8 marks]*

(b) **Diagram 2.2** shows the structure of a human arm.
Based on diagram, explain the role of S and T in movement of the arm. *[6 marks]*

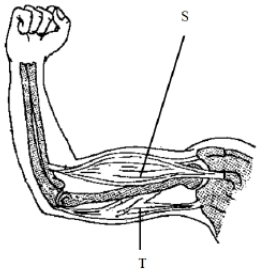


Diagram 2.2

(c) **Diagram 2.3** shows two types of vertebrae in human backbone

Diagram 2.3

State the differences ins structure between the vertebrae P and Q *[4 marks]*

3(a) Diagram 3.1(a) and diagram 3.1(b) show to diseases that are related to musculoskeletal system.

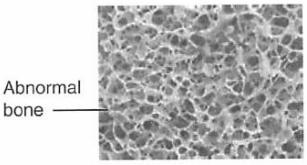


Diagram 3.1 (a)

Diagram 3.1(b)

Describe both diseases *[4 marks]*

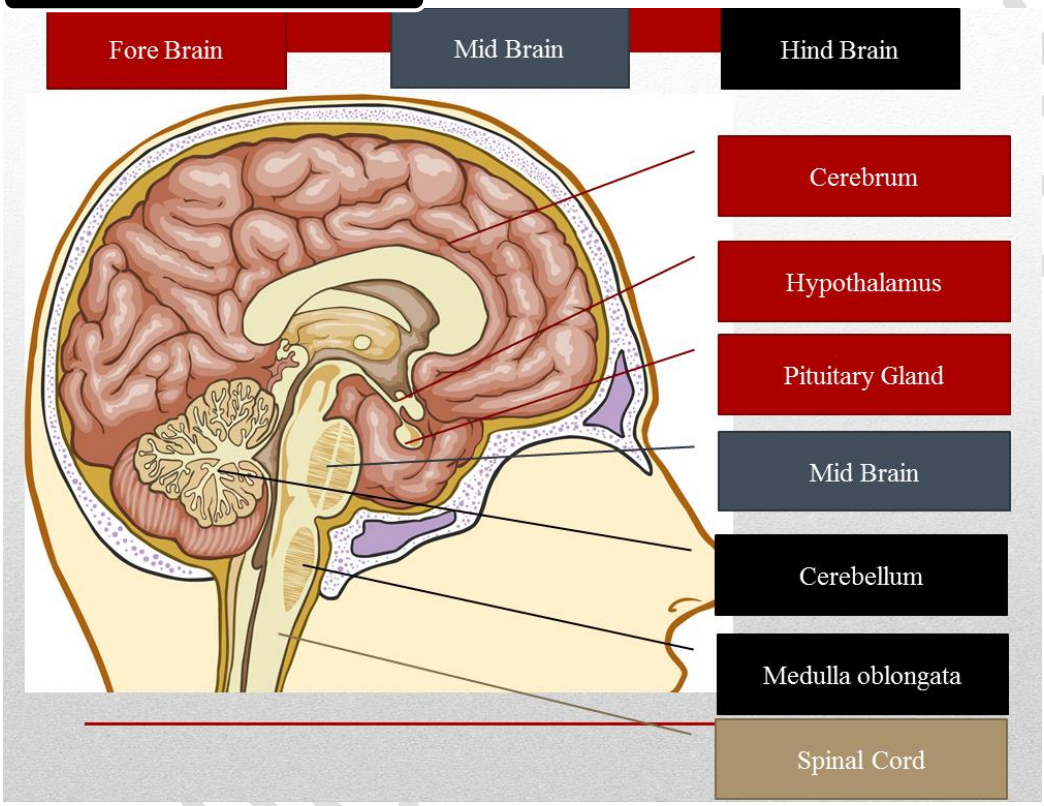
(b)

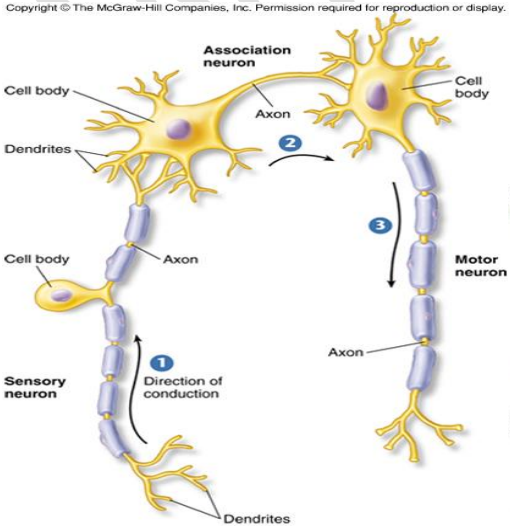
A man has swollen ankle and is painful during movement after having a habit of taking high protein diet and practicing unhealthy lifestyle.

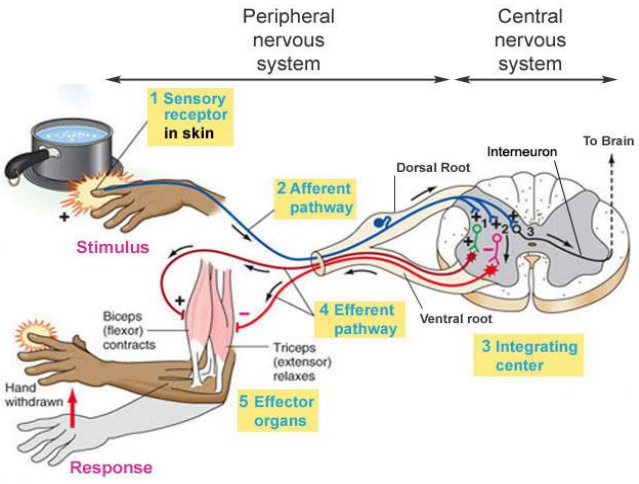
Based on your biological knowledges, discuss the statement above. *[10 marks]*

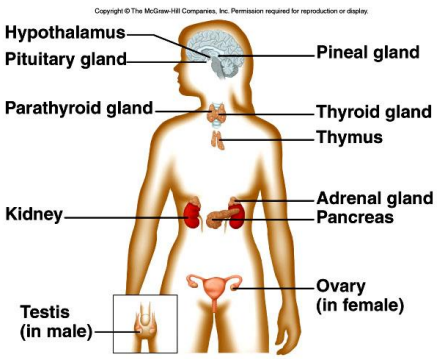
3 COORDINATION & RESPONSE

QUICK NOTES & REVISIONS









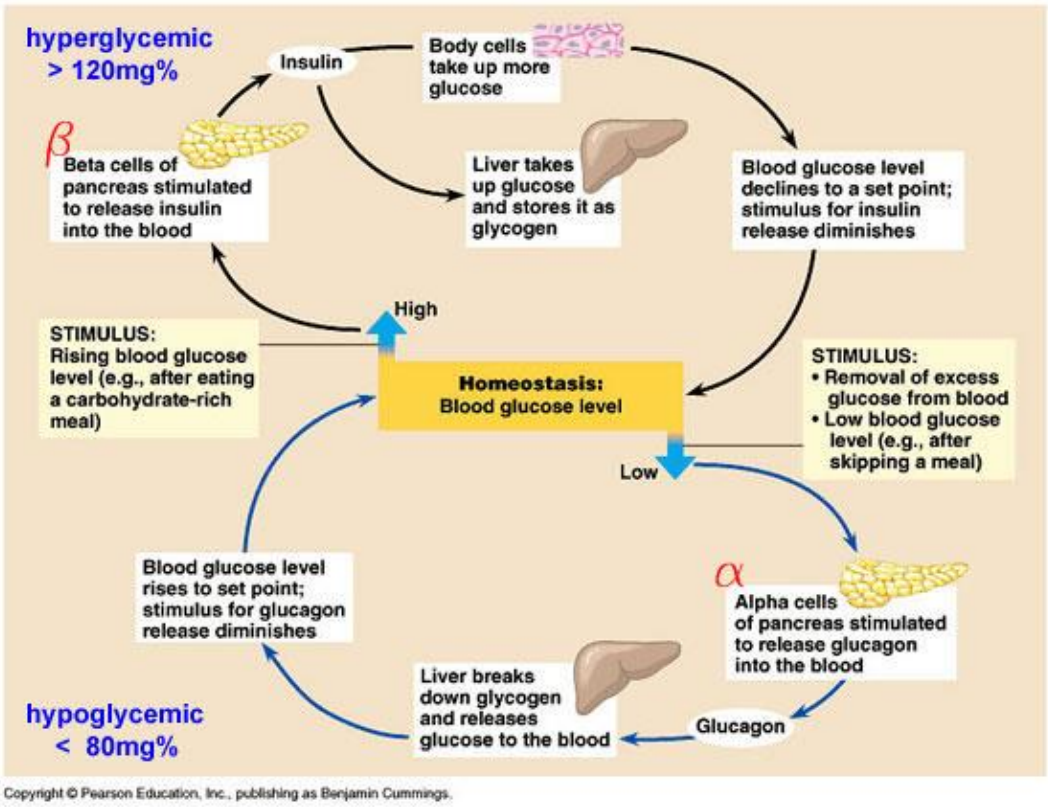
Endocrine Gland	Hormone	Function
Pituitary Gland	Antidiuretic hormone (ADH)	Stimulates kidneys to reabsorb water from the collecting tubules
	Follicle-stimulating hormone (FSH)	Stimulates production of mature eggs & sperms
	Luteinising hormone (LH)	Stimulates ovulation & corpus luteum formation in females & production of sex hormones in males
	Thyroid-stimulating hormone (TSH)	Stimulates the synthesis & release of thyroxine from the thyroid gland
	Growth hormone	Stimulates protein synthesis & growth

Endocrine Gland	Hormone	Function
Thyroid gland	Thyroxine	•Regulates the body's metabolism • Helps in normal physical & mental development

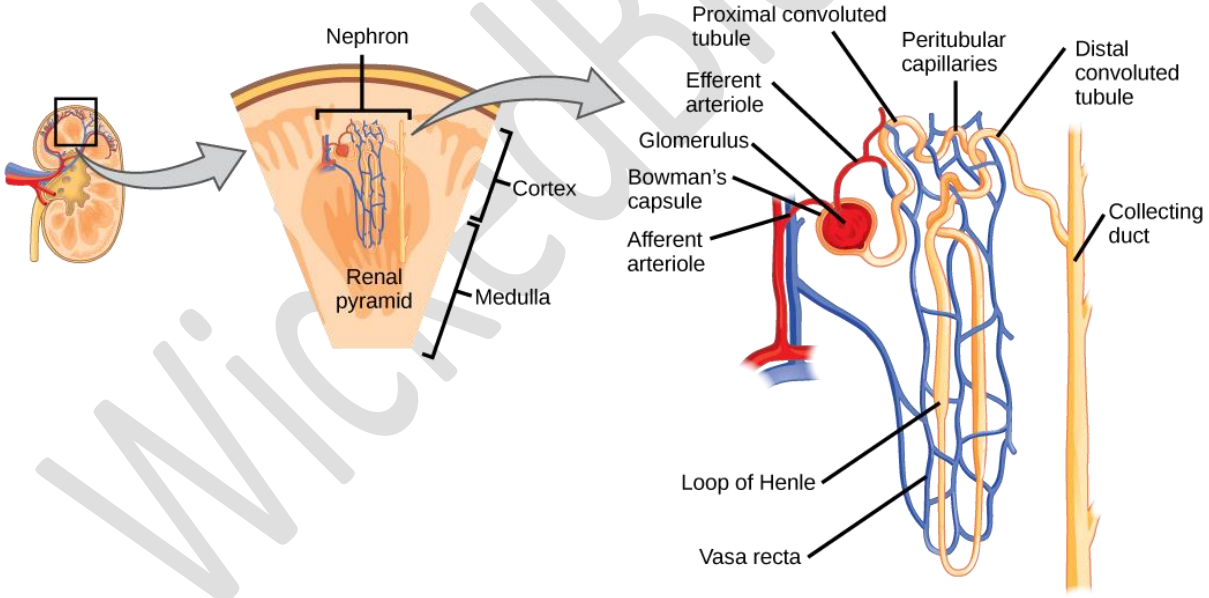
Endocrine Gland	Hormone	Function
Ovaries	Estrogen	• Stimulates the development of eggs & development of female reproductive organs • Stimulates the development of secondary sexual characteristics
	Progesterone	• Prepares the uterus for implantation of a developing embryo

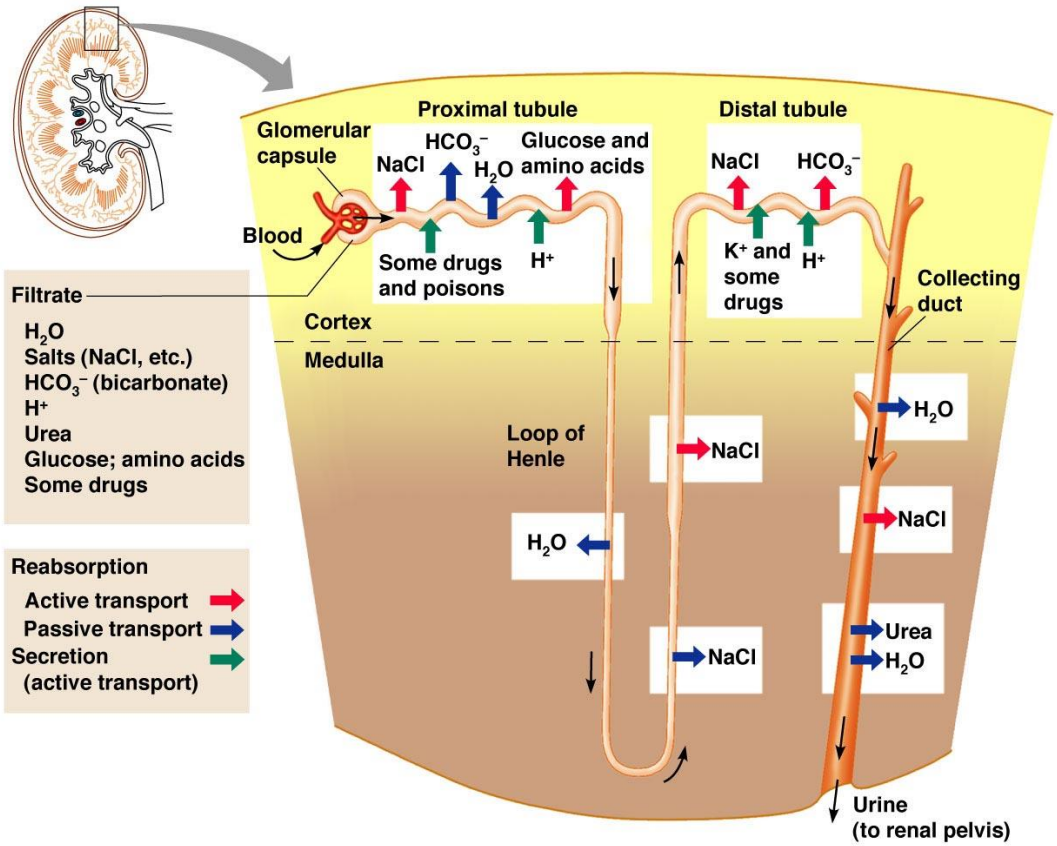
Endocrine Gland	Hormone	Function
Adrenal gland	Adrenaline	Increases heart rate, breathing rate, blood pressure, metabolic rate, blood flow to the muscles & glucose level in the blood
	Aldosterone	Regulates the reabsorption of sodium ions in the kidney

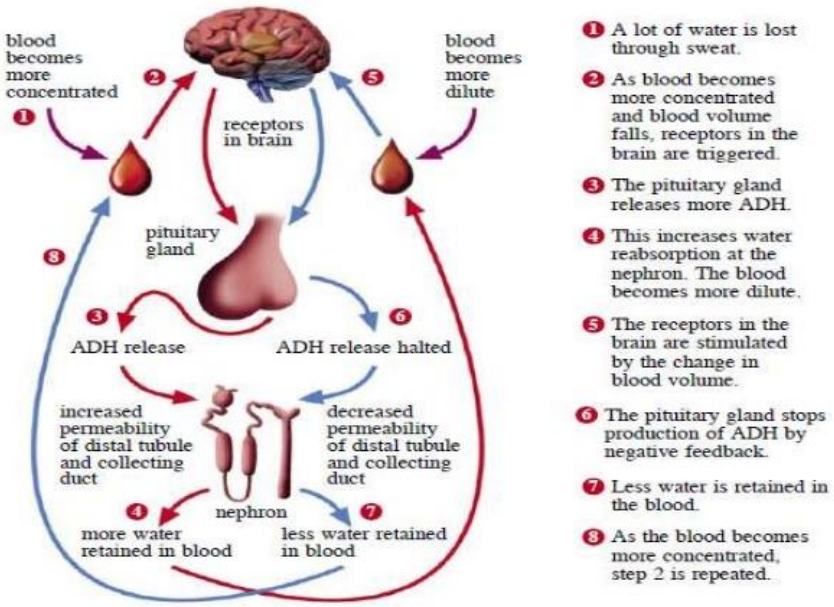
Endocrine Gland	Hormone	Function
Testes	Testosterone	• Stimulates sperm production and development of testes • Stimulates development of secondary asexual characteristics in males



Characteristics	Nervous system	Endocrine system
Type of message	Nerve impulse-electrochemical	Hormone-chemical
Transport	Via nerve fibers	Via the blood stream
Speed of transmission	Rapid	Slow
Areas of response	Limited to places with nerve supply	All over the body-one hormone may affect several target organs at the same time
Nature of the response	Causes muscle to contract or glands to secrete	Causes changes in the metabolic activity
Duration of effect	Short-lived and reversible	Long lasting





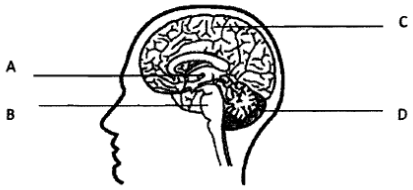


The role of ADH in osmoregulation.

Ian Matmungal 24

OBJECTIVES QUESTIONS

1. Diagram 1 shows the main parts of the brain.

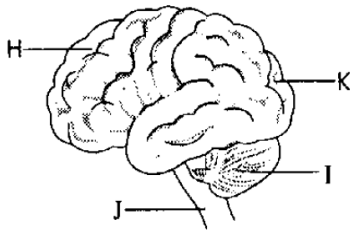


Which part controls the breathing rate?

2. A boy is paralysed because of an injury to his head. Which part of his brain is damaged?

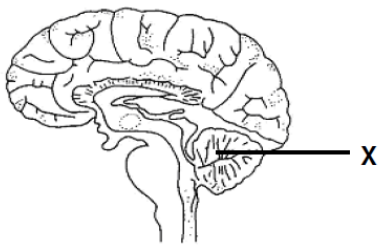
A Cerebrum
B Cerebellum
C Hypothalamus
D Medulla oblongata

3. Diagram 2 shows the main parts of a brain.



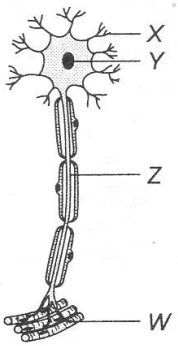
Which part controls the equilibrium of the body?
A H
B I
C J
D K

4. Diagram 3 shows the structure of human brain.



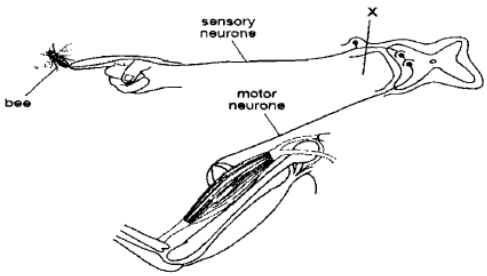
What is X?
A Cerebrum
B Cerebellum
C Spinal cord
D Medulla oblongata

5. The diagram 4 shows a type of neurone.



Which statements about the neurone are correct?
I Y contains a nucleus.
II Z conducts nerve impulses to Y
III W transmits signal to the effector
IV X receives signals from the interneurone
A I, II and III only
B I, II and IV only
C I, III and IV only
D II, III and IV only

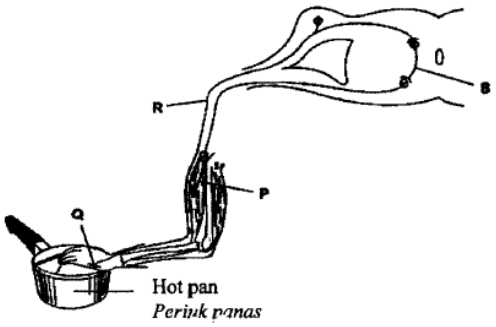
6. Diagram 5 shows part of a man's nervous system that has been cut at X.



A bee stings his finger, as shown. What will be the effects on the man?

	Pain felt	Arm moved
A	No	No
B	No	Yes
C	Yes	No
D	Yes	No

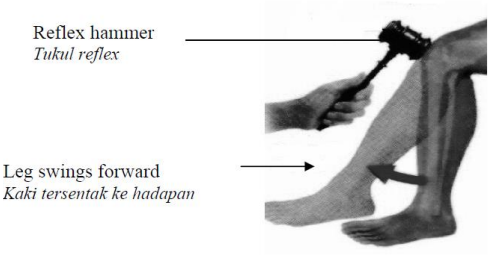
7. Diagram 6 shows the structures involved in reflex action.



Which of the following shows the correct sequence for the above action?

A P → Q → R→ S
B P → S → R → Q
C Q → R →S → P
D Q → S → P → R

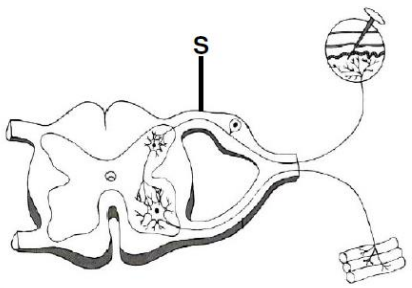
8. Diagram 7 shows a knee jerk action.



Which of the following is the correct direction of impulse when the knee jerk test has been done?

A Receptor → afferent neurone → interneuron → efferent neurone → effector
B Receptor → afferent neurone → efferent neurone → effector
C Effector → afferent neurone → efferent neurone → receptor
D Receptor → efferent neurone → interneuron → afferent neurone → effector

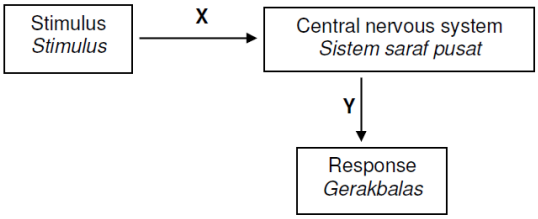
9. Diagram 8 shows a reflex arc.



What is S?

A Ventral root
B Ganglion
C Grey matter
D Dorsal root

10. The diagram 9 shows the pathway involved in detecting and responding to changes in the internal environment.



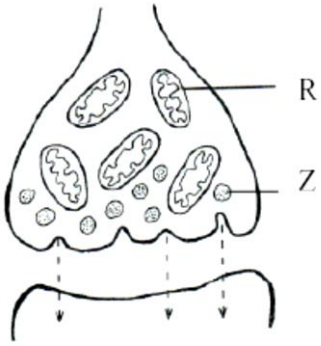
What are represented by X and Y?

	X	Y
A	Afferent pathway	Afferent pathway
B	Efferent pathway	Afferent pathway
C	Effector	Receptor
D	Receptor	Effector

11. Table 1 shows the information about the endocrine system and the nervous system. Which of the following is the correct difference between the endocrine system and the nervous system?

	Endocrine system	**Nervous system**
A	Effect last longer	Effect disappear very fast
B	Localised effects	More widespread effects
C	Information carried in electrical form	Information carried in chemical form
D	Control by cerebrum	Control by cerebellum

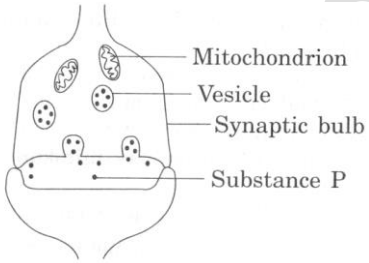
12. Diagram 10 shows the structure of a synapse



What are the roles played by the parts labelled R and Z?

	R	Z
A	Release neurotransmitter	Transmits impulse across the synapse
B	Release neurotransmitter	Release energy to transmit impulse
C	Release energy to transmit impulse	Release neurotransmitter
D	Transmits impulse across the synapse	Release neurotransmitter

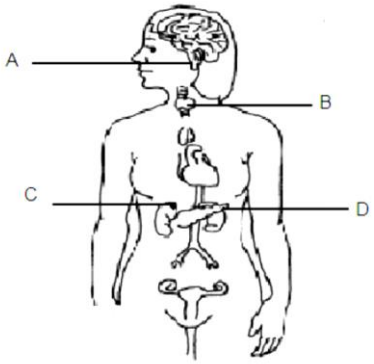
13. Diagram 11 shows a synapse at the nerve ending.



What is substance P?

A Acetycholine
B Oxytocin
C Adrenaline
D Prolactin

14. Diagram 12 shows the human endocrine system.



Which of the glands **A, B, C** or **D** is involved when an individual is in stressful situation?

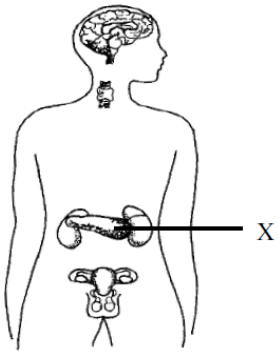
15. The following describe hormone X.

- Produced by corpus lutuem and placenta
- Promotes growth of endometrium and prevents menstruation

What is X?

A Oestrogen
B Progesterone
C Luteinising hormone
D Follicle stimulating hormone

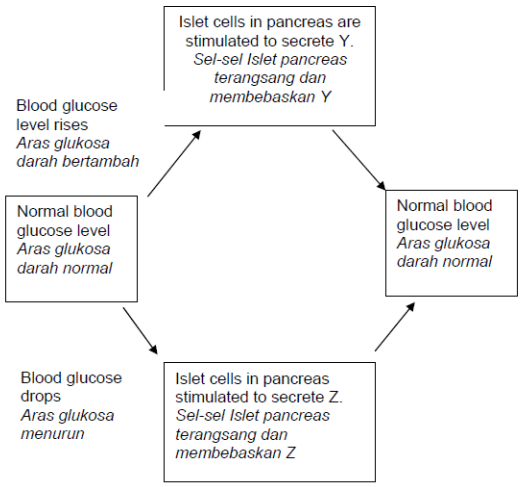
16. Diagram 13 shows endocrine system of a man.



Organ X is malfunction. What is the effect of this malfunction to his health?

A Rate of physical development
B Blood sugar level increases
C Blood osmotic pressure decreases
D Metabolic rate increases

17. Diagram 14 shows the regulation of blood glucose level in the human body.



Which of the following are Y and Z?

	Y	Z
A	Glucagon	Insulin
B	Insulin	Adrenaline
C	Insulin	Glucagon
D	Adrenaline	Insulin

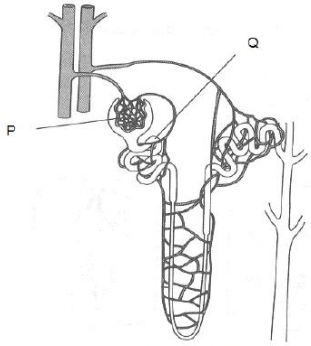
18. The following is the information of the urine composition of four individuals.

Individual	**Concentration of urea in the urine**	**Water content in the urine**
P	Low	High
Q	Low	Low
R	High	High
S	High	Low

Which individual is most likely to have been eating a lot of protein on a hot, dry day?

A P
B Q
C R
D S

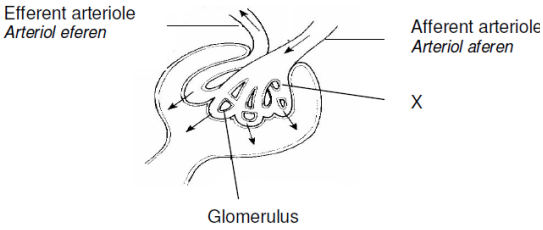
19. Diagram 15 shows a human nephron



What happens to the blood at P and to the amino acids at Q?

	P	Q
A	Reabsorption	Active transport
B	Secretion	Ultrafiltration
C	Ultrafiltration	Reabsorption
D	Ultrafiltration	Active transport

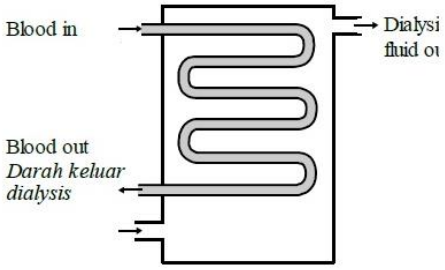
20. Diagram16 shows ultrafiltration that occurs in kidney



What are the substances that can move across X?

A Fibrinogen
B Erythrocyte
C Leucocyte
D Amino Acid

21. Diagram 17 below represents a dialysis machine.



Which substances in the dialysis fluid must be at the same concentration as that in blood?

A Amino acid and urea
B Glucose and amino acid
C Glucose and urea
D Urea and salts

22. A farmer wants to sell mangoes from his farm. The farmers with hormone X to ensure that all the mangoes ripen at the same time. What is hormone X?
A Auxin
B Ethylene
C Cytokinin
D Gibberelin

23. Diagram 18(a) shows three coleoptiles X, Y and Z which are exposed to sunlight.

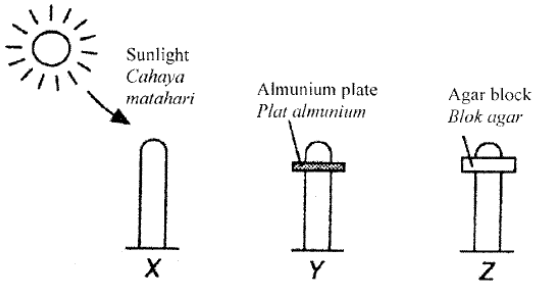
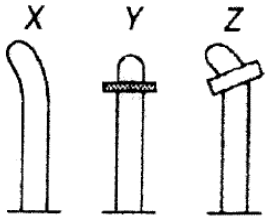


Diagram 18(b) shows the results after two days.

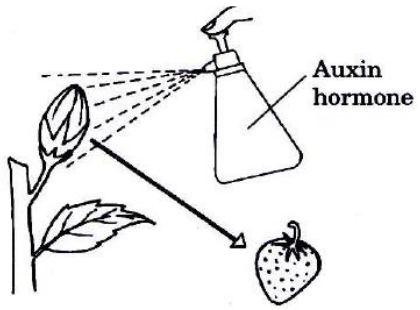


Which of the following explains the responses?

I Auxin is produced at the tip of the coleoptile
II Auxin builds up in the area exposed to sunlight
III The aluminium plate inhibits the movement of auxin to the elongation region
IV Agar blocks allows the movement of auxin to the elongation region

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

24. Diagram 19 shows a method of producing fruits from flowering plants using auxin hormone.



What is true about the characteristics of the fruit formed?

A The fruit is sweeter
B The fruit is more succulent
C The fruit has more fibre
D The fruit does not have seed

STRUCTURE QUESTIONS

1. **Diagram 1.1 (a**) shows impulse pathway that occur in human nervous system. **Diagram 1.1 (b)** shows response that occur to the hand when it touches the flame.

.

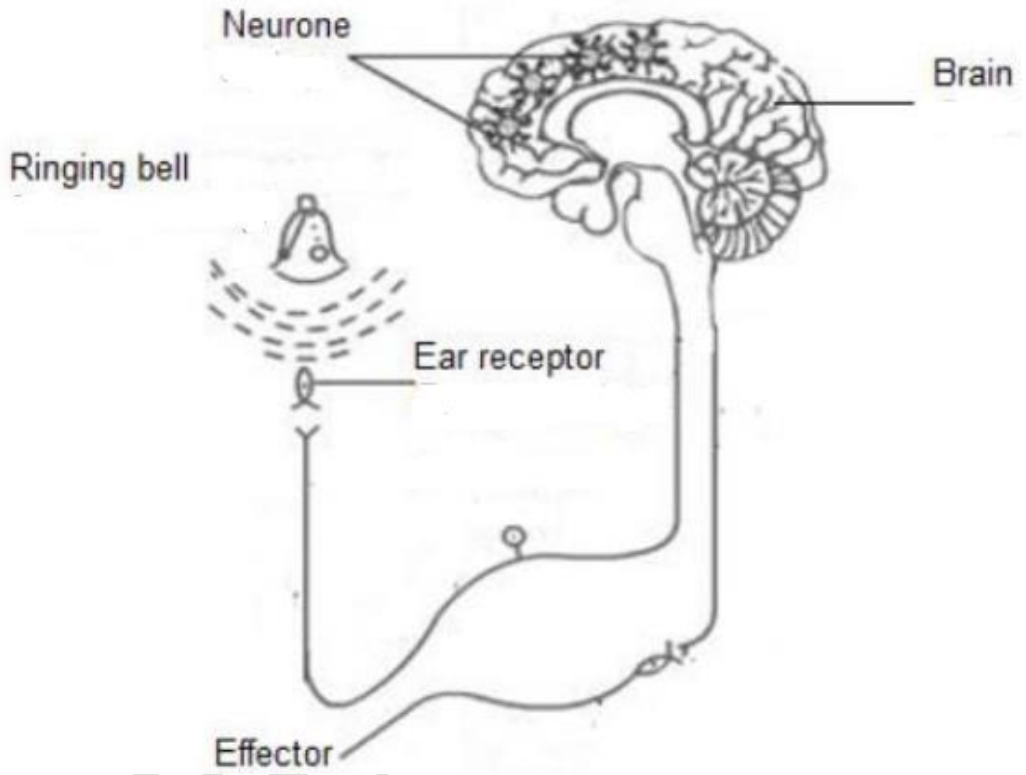


Diagram 1.1 (a)

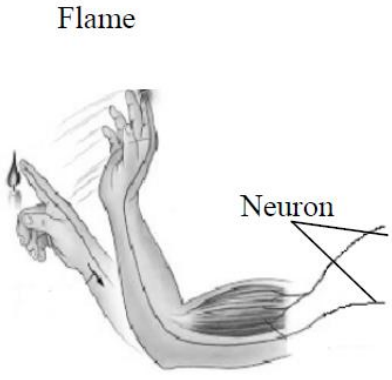


Diagram 1.1 (b)

(a) Name the types of actions in **Diagram 1.1(a)** and **1.1(b).** *[2 marks]*

Diagram 1.1(a): ……
Diagram 1.1(b): ……

(b)(i) Draw the pathway of the nerve impulses by using arrows → *[1 mark]*

(ii) Complete **Diagram 1.1 (b)** by drawing a cross section of the centres of the reflex action in a suitable box and label the neurons involves. *[2 marks]*

(c) State one similarity and one difference between responses in **Diagram 1.1 (a)** and **Diagram 1.1 (b)** *[2 marks]*

Similarity: ……

Difference: ……

(d) State one importance of responses in **Diagram 1.1 (a)** and **Diagram 1.1 (b)** *[2 marks]*

Diagram 1.1(a):

……..

……...

Diagram 1.1(b):

……...

……...

(e) Muhammad Ali was a famous boxer in the world. At the end of his life, he suffered from nerves of Parkinson's disease. The disease is caused by insufficient secretion of dopamine in the brain.

State three symptoms of this disease. *[3 marks]*

1: ……
2: ……..
3: ……

2. **Diagram 2** shows the role of the pituitary gland as 'master gland'

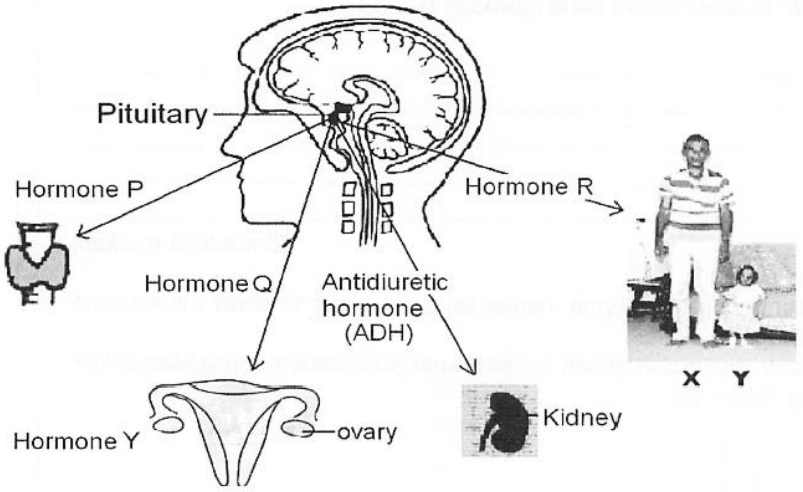


Diagram 2

(a) Name hormones P and R. *[2 marks]*.

P: ……
R : ……..

(b)(i) Hormone Q stimulates the development of follicle in the ovary and sperm in the testis. Identify hormone Q. *[1 mark]*

……

(ii) The presence of hormone Q causes the secretion of hormone Y which affects the development of uterus. Name hormone Y. *[1 mark]*

……

(c) Explain the effects if more antidiuretic hormone (ADH) is secreted to the targeted organ as shown in the **Diagram 2**. *[3 marks]*

……
……
……

(d) Based on **Diagram 2**, explain how hormone R is responsible for the difference of physical appearance of individual X and Y. *[3 marks]*

……
……
……

(e) The pituitary gland is known as 'master gland'. Explain why. *[2 marks]*

……
……
……

3. **Diagram 3.1** shows the endocrine system in the body of a human.

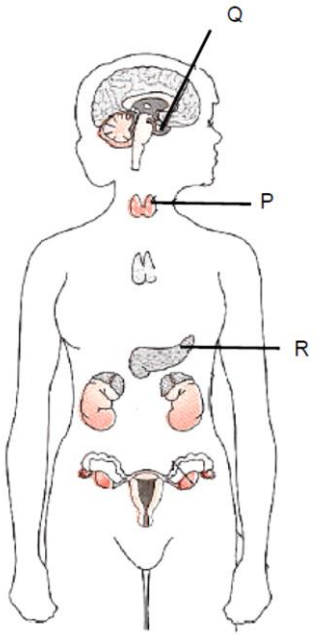


Diagram 3.1

(a)(i) Name the hormones secreted by gland P and Q. *[2 marks]*

P : ……...
Q : ……..

(ii) In **diagram 3.1**, label the adrenal gland with letter S *[1 mark]*

(b) Some people have their gland P grows two or three times its size.
(i) Name the condition mentioned above. *[1 mark]*

……

(ii) Suggest how to overcome the above problem. *[1 mark]*

……

(c) In a study carried out, an individual X drinks a glass of glucose solution. **Table 1** shows the changes in the concentration of blood glucose in individual X.

Time / min	The concentration of blood glucose / g dm $^{-1}$
0	90
30	130
60	162
90	90
120	84
150	74
180	88

Table 1

Based on **Table 1**, explain the role of gland R in regulating the person blood glucose concentration from 0 minute to 90 minutes. *[3 marks]*

……
……
……
……

(d) **Diagram 3.2** shows a person who is sweating under a hot sun.

Diagram 3.2

(i) State what will happen to his blood osmotic pressure in the person's body. *[1 mark]*

……

(ii) Explain how gland Q involves in returning the osmotic pressure of the blood to normal levels. *[3 marks]*

……
……
……

4(a) **Diagram 4.1** shows the operational machine to treat an individual with kidney failure.

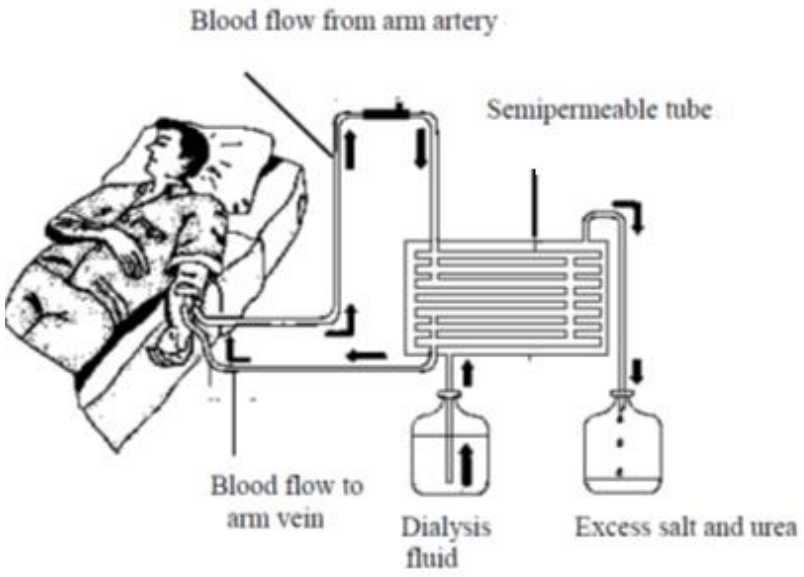


Diagram 4.1

(i) Based on **Diagram 4.1,** name the machine *[1 mark]*

……

(ii) Explain how the machine works. *[3 marks]*

……
……
……
……

(b) A teenager who sympathizes with the patient in Diagram donated one of his kidneys. When the patient recovered, he was served with salted *"sup tulang".*

(i) State its effect to volume and concentration of his urine. *[1 mark]*

……

(ii) Explain your answer in (b)(i) *[3 marks]*

……
……
……...
.....

(c) **Diagram 4.2** shows the structure of nephron in kidney

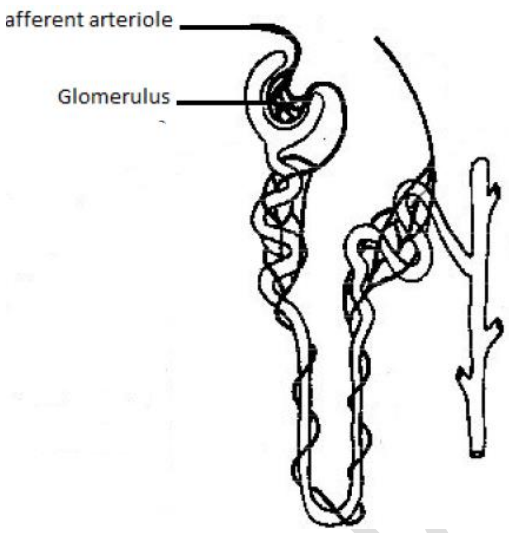


Diagram 4.2

(i) On **Diagram 4.2**, label the structure of distal convoluted tubule as X, collecting duct as Y and proximal convoluted tubule as Z. *[2 marks]*

(ii) Table 2 shows the analysis of urine composition that has crossed the kidney nephron.

Percentage of urine composition				
Glucose	Amino Acids	Water	Mineral salts	Urea
0.0	0.0	95.0	2.65	2.0

Table 2

Based on the table above, explain why no glucose and amino acid present in urine.
[2 marks]

……
……
……

5. **Diagram 5.1** below shows role of hormone X in the response on tip of shoot and tip of root in plant.

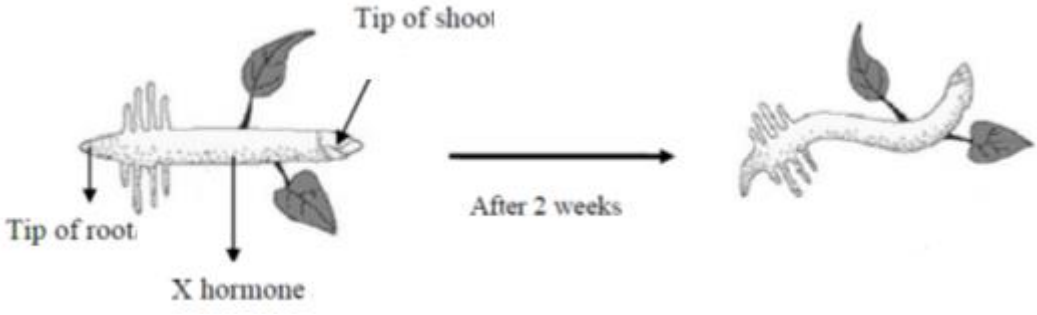


Diagram 5.1

(a)(i) Name hormone X.*[1 mark]*

……...

(ii) Based on Diagram 5.1, what is the type of response shown in the : *[2 marks]*

Tip of shoot: …….
Tip of root: ……

(c) **Diagram 5.2 (a)** shows fruit produced naturally and Diagram 5.2(b) shows fruit produced from one technique used commercially in agriculture.

Diagram 5.2 (a)

Diagram 5.2 (b)

(i) Name the technique used. *[1 mark]*

……...

(ii) Explain the differences how the fruit produced in **Diagram 5.2 (a)** and the fruits produced in **Diagram 5.2(b)** .*[3 marks]*

……
……
……
……

ESSAY QUESTIONS

1(a) **Diagram 1.1** shows the structure of synapse.

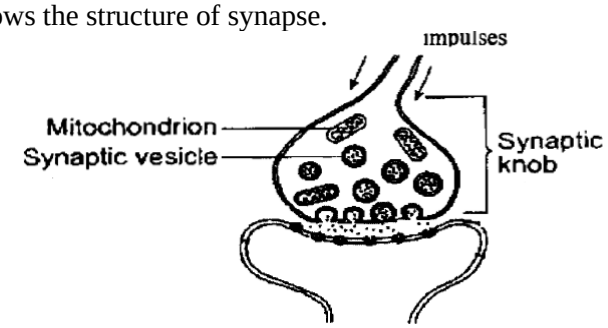


Diagram 1.1

Explain how the nerve impulse is transmitted across the synaps. *[6 marks]*

(b) Diagram 1.2 shows the pathway of a reflex action or reflex arc, when the hand accidentally touches sharp needle.

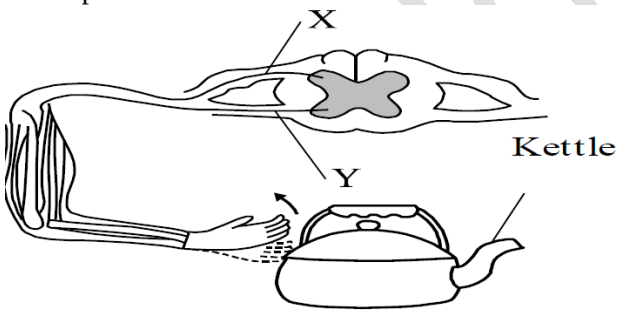


Diagram 1.2

(i) Define reflex action. *[2 marks]*
(ii) Based on Diagram 1.2, explain how reflex action functions to avoid injury. *[8 marks]*
(iii) Explain the following situation. *[6 marks]*

After an accident, individual A doesn't experience any response to hot object

2(a) Explain the differences between reflex arc in Diagram 2(a) and Diagram 2 (b) *[10 marks]*

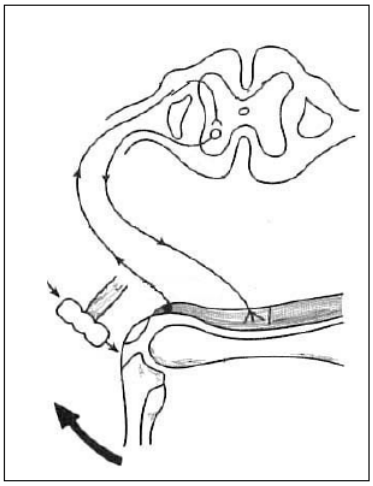


Diagram 2(a)

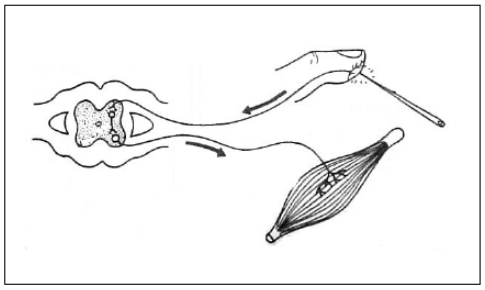


Diagram 2(b)

(b) **Table 1** shows some activities done by human

Eating	Breathing	Peristalsis	Running

Table 1

(i) Based on **Table 1,** classify the activities into voluntary action and involuntary action. *[2 marks]*

(ii) Explain the comparison and differences between voluntary action and involuntary action *[8 marks]*

3(a) The role of coordination and response are carried out by two different systems as shown in **Diagram 3.1 (a)** and **3.1 (b).**

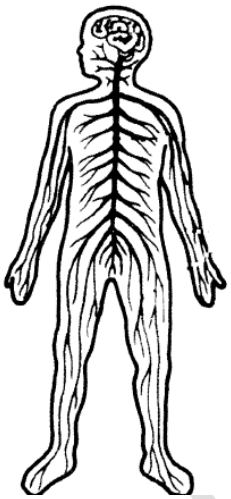


Diagram 3.1(a)

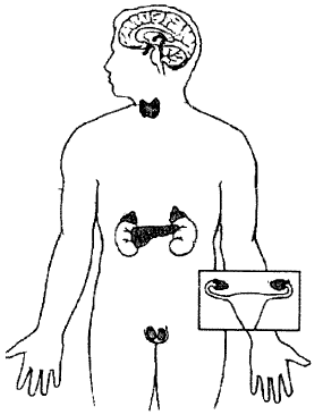


Diagram 3.1(b)

Describe both systems based on the structure and function. *[6 marks]*

(b) **Diagram 3.2** shows an emergency situation faced by Abu.

Diagram 3.2

Explain the coordination between the systems shown in **Diagram 3.1 (a)** and **3.1(b)** for Abu to respond towards the situation. *[8 marks]*

4(a) **Diagram 4.1** shows negative feedback mechanism in a regulation of blood sugar level.

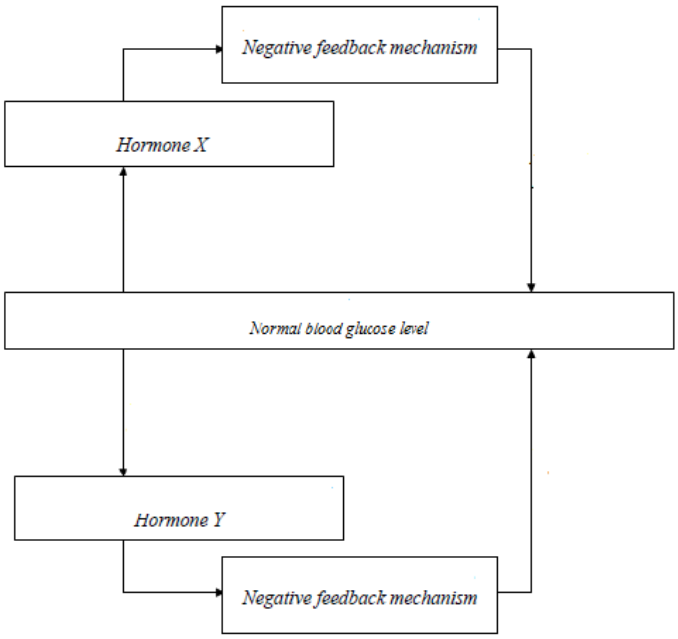


Diagram 4.1

(i) Based on **Diagram 4.1**, explain briefly the meaning of negative feedback. *[2 marks]*
(ii) Describe how hormone X and hormone Y regulate the glucose level in blood .*[8 marks]*

(b) **Diagram 4.2** shows the structure of human skin.

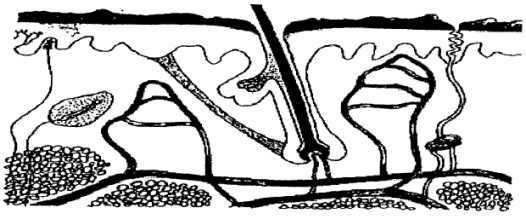


Diagram 4.2

(i) The skin has important role in regulating the human body temperature. Explain how the skin is able to maintain the body temperature during hot weather. *[5 marks]*
(ii) A man is trapped in an air-conditioned room for 12 hours without food. Explain the physiological processes which occur. *[5 marks]*

(c) **Diagram 4.3** shows part of organs in the digestive system**.**

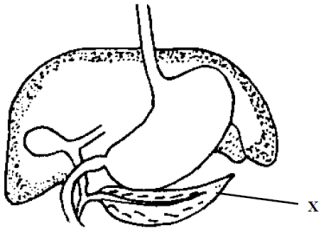


Diagram 4.3

Based on diagram , explain the role of X in the regulation of glucose level in the blood. *[4 marks]*

5. **Diagram 5** shows the role of auxins hormone towards the root tip of certain plants.

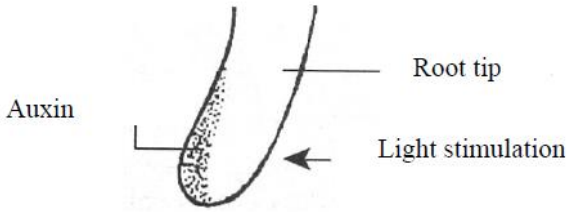


Diagram 5

(a) Explain the process shown in **Diagram 5** *[4 marks]*

(b)

Plants hormones are very important in growth and development of plants. Therefore they are used widely in the agricultural sector.

State two functions of auxin, ethylene and cytokinin. Explain the usage of these hormones in the agricultural sector. *[6 marks]*

V	I	M	X	K	M	V	E	M	O	S	O	M	O	R	H	C	O	A	O
F	R	A	N	K	L	I	N	S	M	O	E	B	R	W	U	S	N	Q	A
G	D	O	Y	I	Q	S	F	E	N	G	Z	L	V	N	S	J	Q	Y	F
S	M	R	R	C	R	A	N	M	B	I	I	J	P	R	J	I	O	Z	S
O	U	A	Y	K	Z	D	C	H	H	V	R	Y	Z	N	J	P	E	D	N
A	T	Q	X	G	E	L	M	D	R	X	P	O	Y	A	H	T	I	R	O
Q	N	C	K	L	Q	R	I	M	S	N	L	V	T	T	I	W	G	E	E
O	A	Z	O	F	N	O	S	T	A	W	E	E	N	U	B	S	O	C	G
N	N	Y	X	R	R	H	U	V	D	B	B	P	C	R	Y	Z	U	E	I
K	I	S	F	Y	B	U	Y	X	C	E	O	E	X	A	K	E	R	S	P
P	M	W	W	X	M	H	I	X	B	I	N	A	H	L	G	L	G	S	J
E	O	U	R	T	O	E	M	T	R	F	K	P	M	S	G	B	E	I	W
X	D	W	Q	A	L	L	Q	D	F	K	O	L	J	E	Y	A	N	V	N
I	F	D	J	C	D	I	U	J	U	L	Z	A	I	L	H	T	E	E	A
E	G	M	H	Y	P	X	R	E	I	A	Y	N	C	E	D	I	T	A	K
J	D	X	Y	A	L	J	P	R	E	A	N	T	A	C	D	R	I	D	Q
J	E	N	E	G	V	J	A	N	D	K	N	U	J	T	N	E	C	F	Q
F	O	D	E	S	U	O	H	N	W	O	D	E	X	I	T	H	I	H	W
I	H	D	I	E	W	W	S	H	R	W	W	E	Y	O	S	B	S	A	O
W	S	D	O	O	W	E	G	D	E	W	S	T	A	N	M	Z	T	Q	R

CHROMOSOME
DARWIN
DOMINANT
DOWN HOUSE
FRANKLIN
FRUIT FLY
GENE
GENETICIST
HELIX
HERITABLE
JUNK DNA
MENDEL
MONK
NATURAL SELECTION
NOBEL PRIZE
PEA PLANT
PIGEONS
RECESSIVE
WATSON
WEDGEWOOD

Only great minds can read this

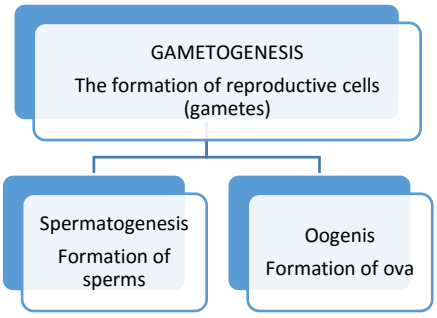
This is weird, but interesting!

fi yuo cna raed tihs, yuo hvae a sgtrane mnid too
Cna yuo rged tihs? Olny 55 plepoe out of 100 can..

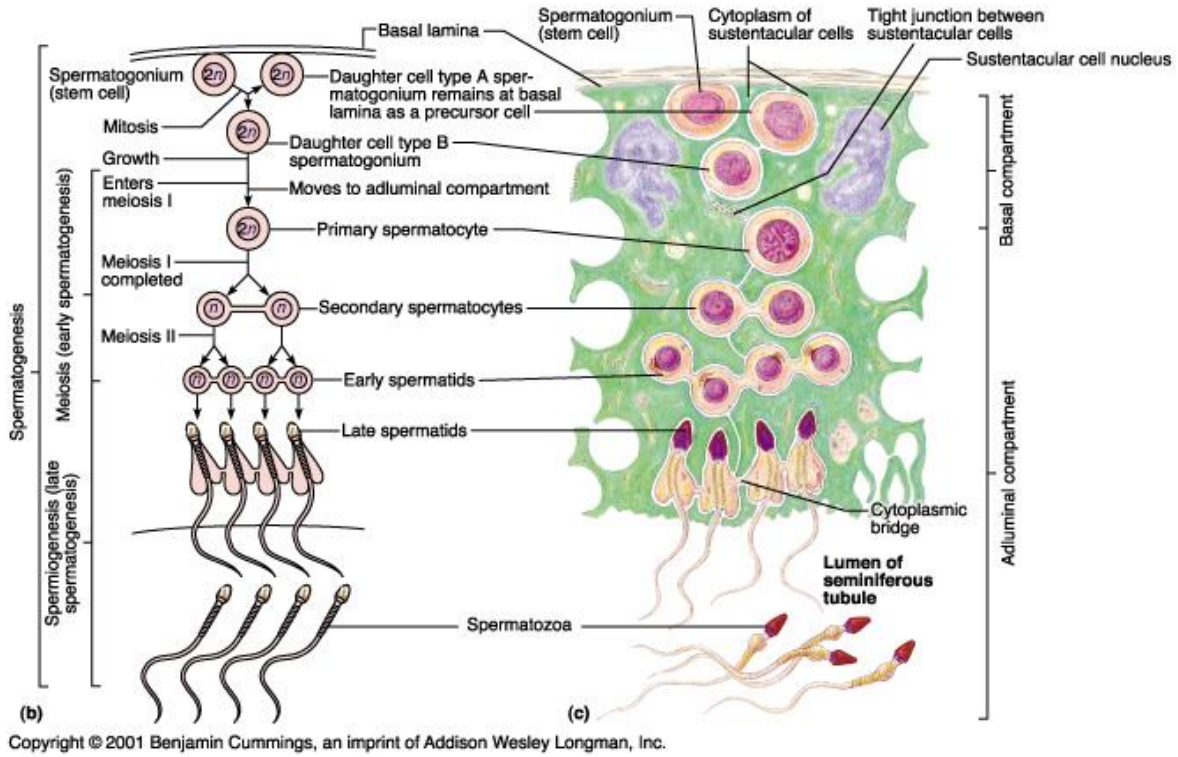
i cdnuolt blveiee taht I cluod aulaclty uesdnatnrd waht I was rdanieg. The phaonmneal pweor of the hmuan mnid, aoccdrnig to a rscheearch at Cmabrigde Uinervtisy, it dseno't mtaetr in waht oerdr the ltteres in a wrod are, the olny iproamtnt tihng is taht the frsit and lsat ltteer be in the rghit pclae. The rset can be a taotl mses and you can sitll raed it whotuit a pboerlm. Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe. Azanmig huh? yaeh and I awlyas tghuhot slpeling was ipmorantt! if you can raed tihs forwrad it

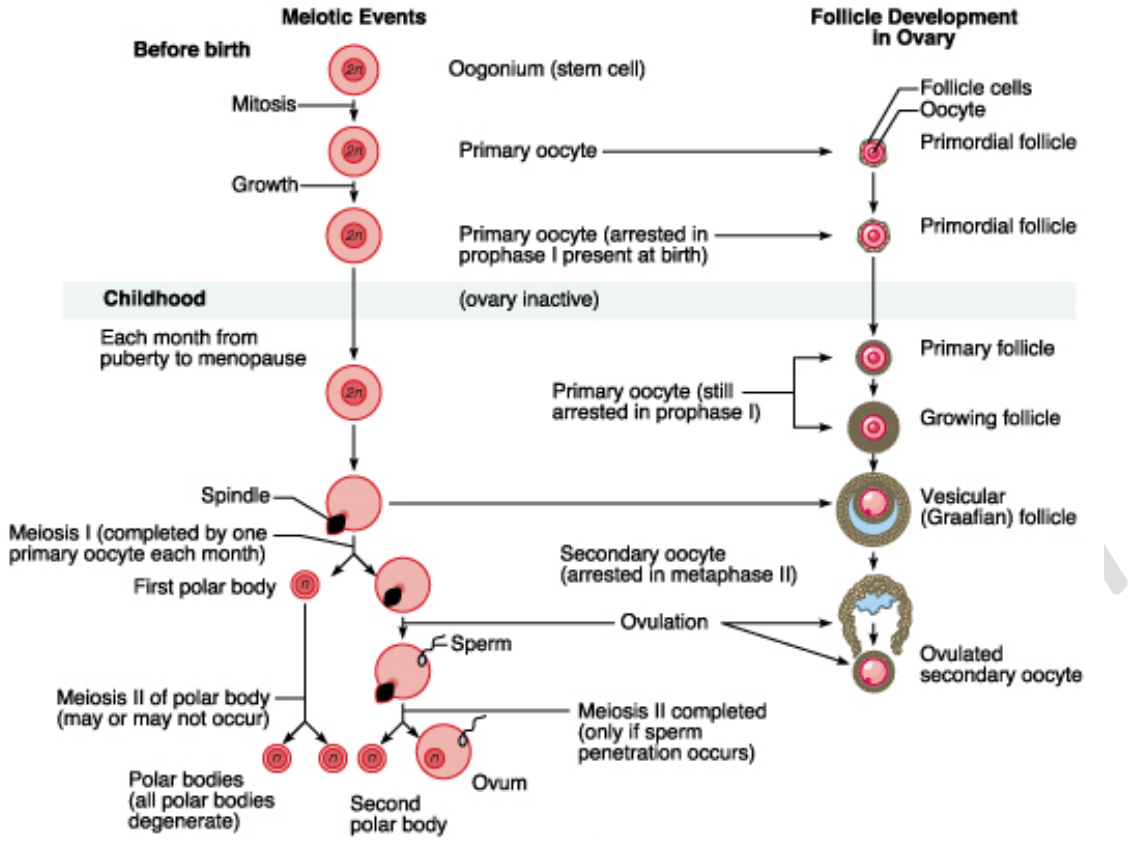
4 REPRODUCTION & GROWTH

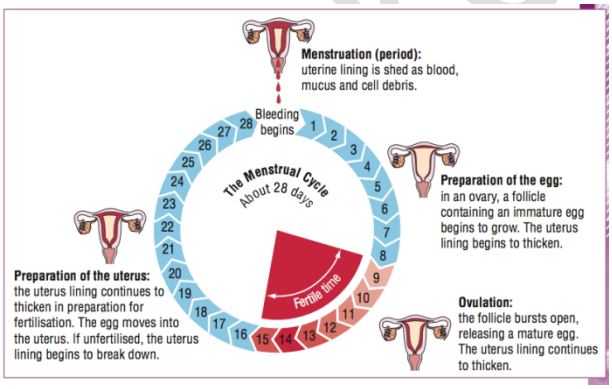
QUICK NOTES & REVISIONS

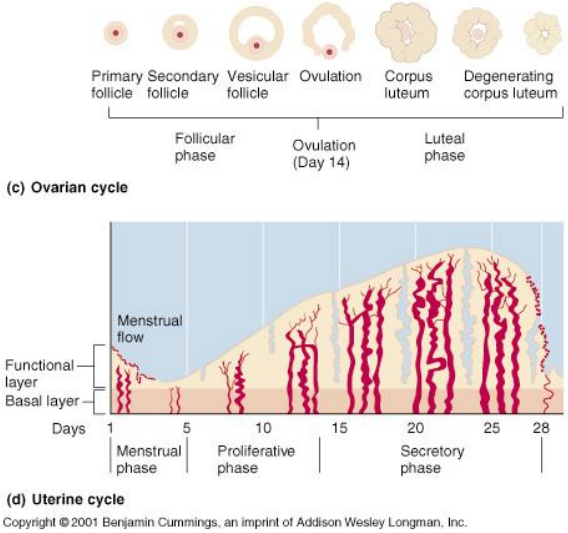


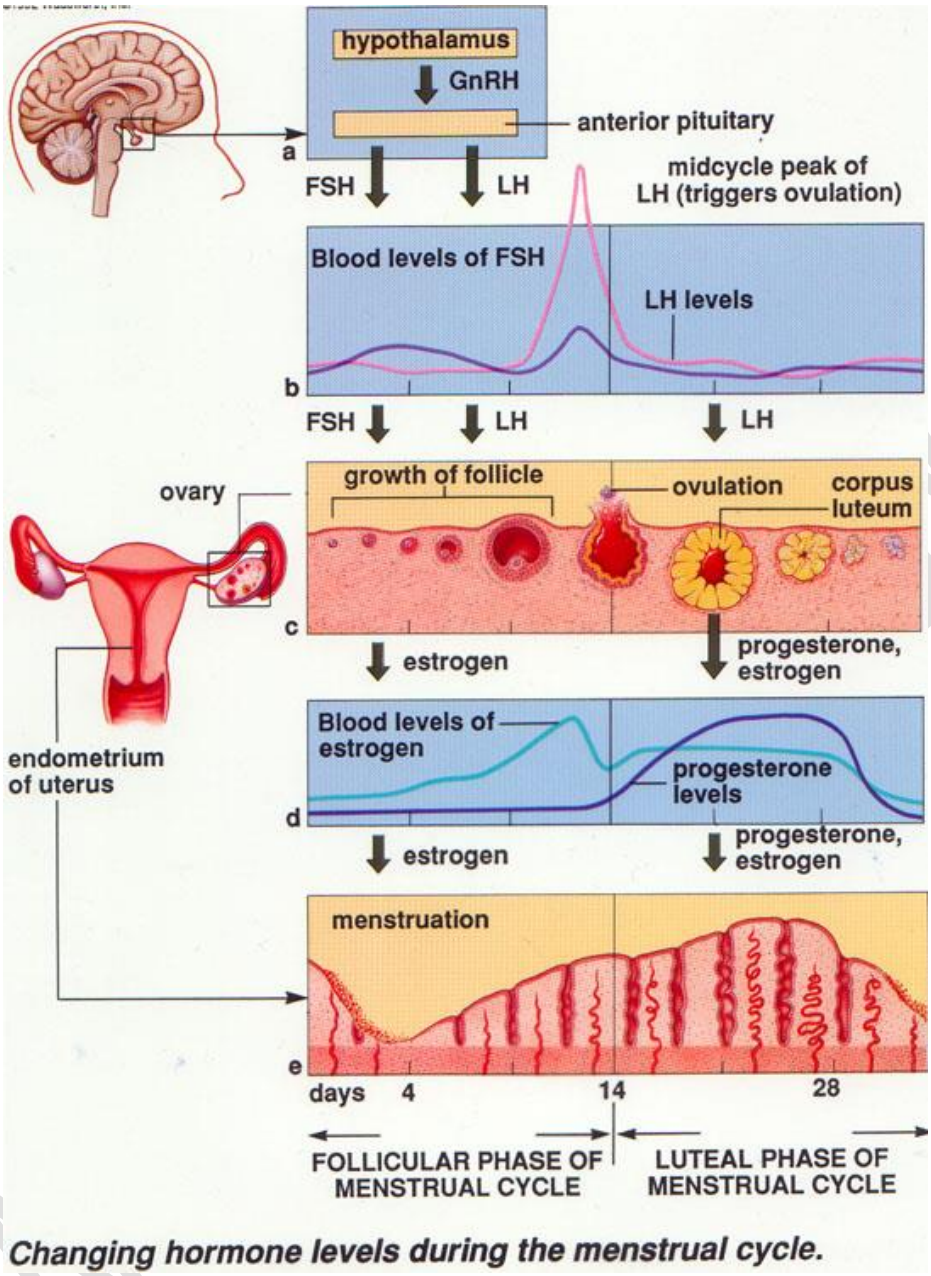
Spermatogenesis	Aspects	Oogenesis
Sperms	Gametes that are produced	Ova
Testes	Where the gametes are produced	Ovaries
Four	Number of gametes that are produced	One
Small	Size	Big
Produce two spermatocytes of the same size	Meiosis I	Produces a large secondary oocyte and a small polar body
Occurs immediately after meiosis I	Meiosis II	Occurs only if the perm penetrates the secondary oocyte



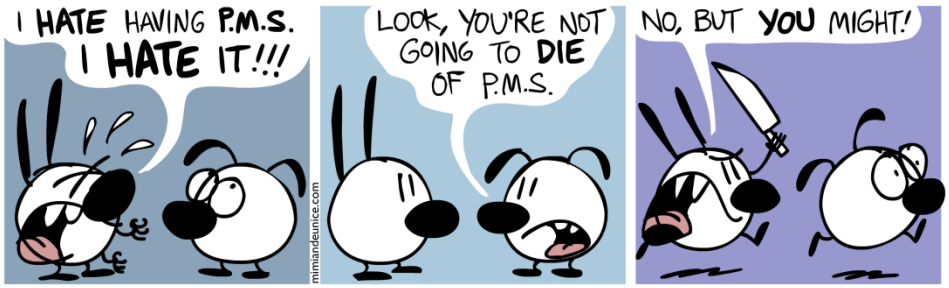


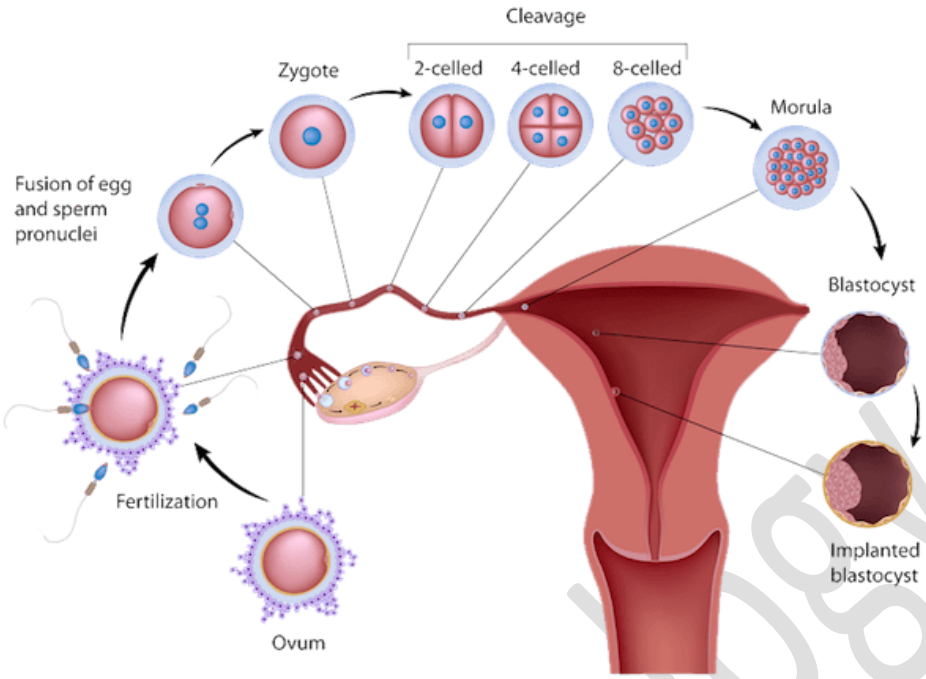


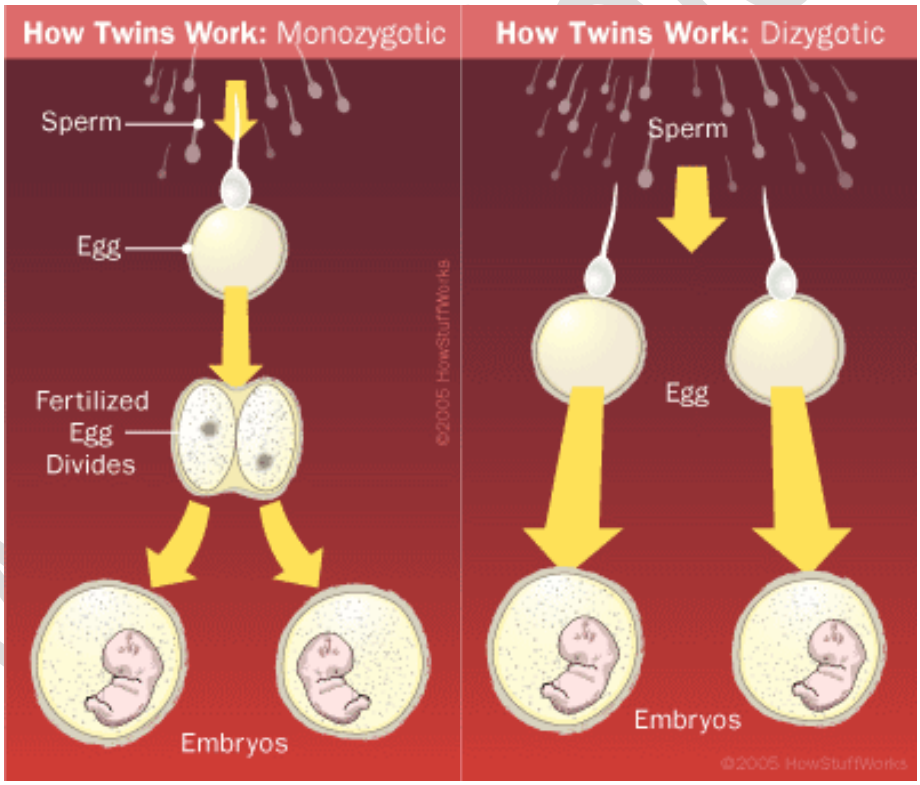


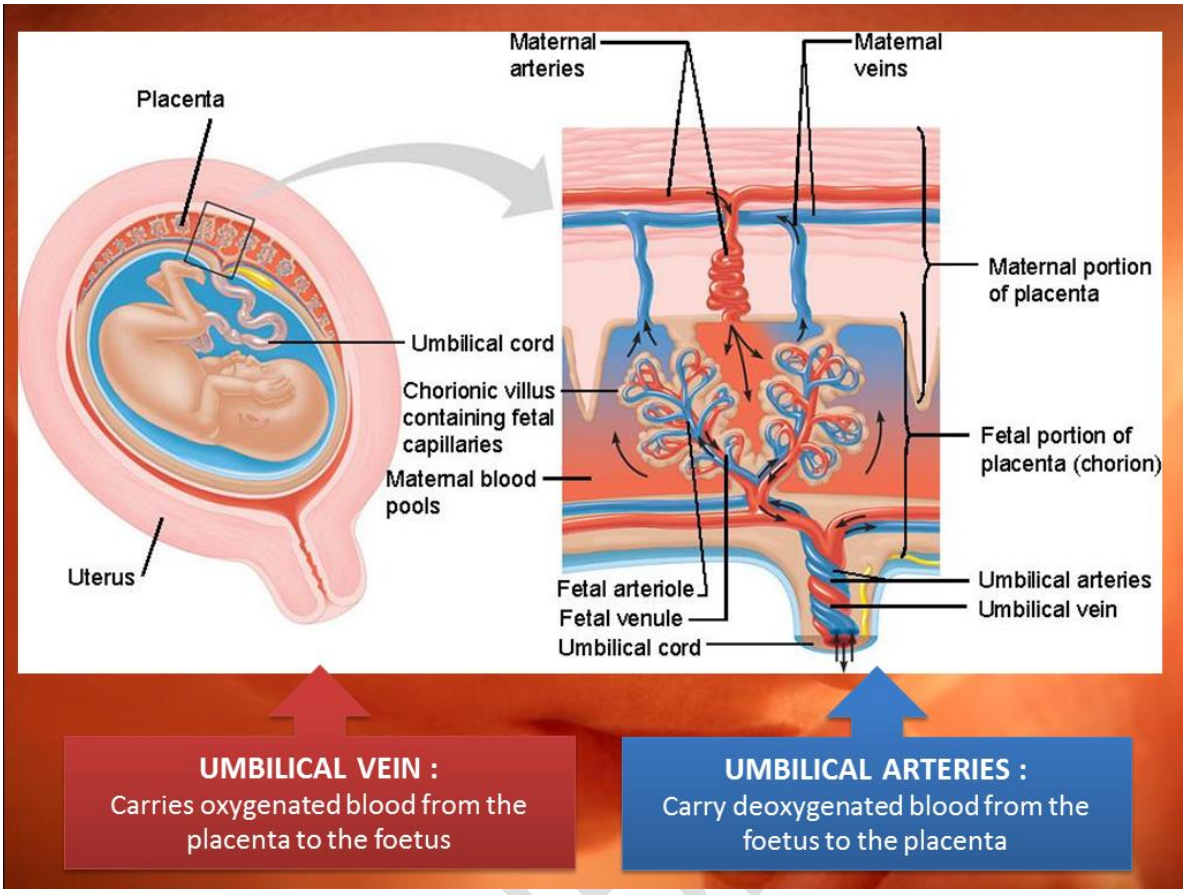


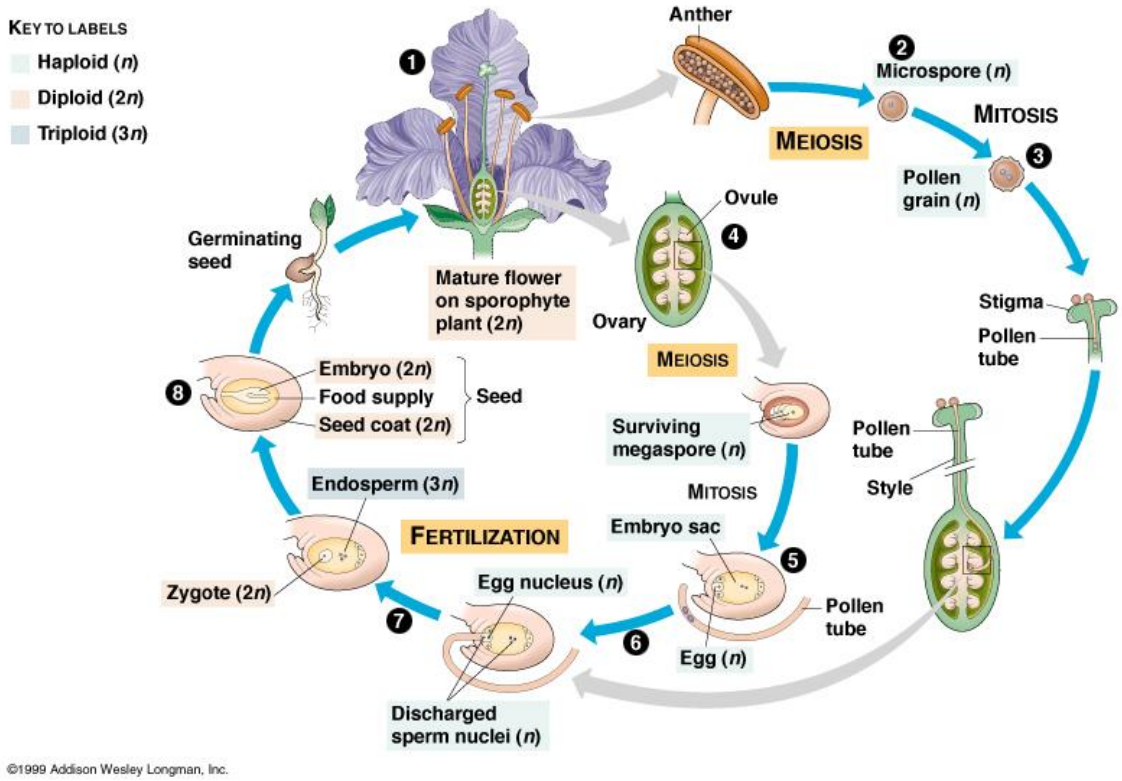
Changing hormone levels during the menstrual cycle.




Cleavage
Zygote
2-celled
4-celled
8-celled
Morula
Fusion of egg and sperm pronuclei
Blastocyst
Fertilization
Implanted blastocyst
Ovum

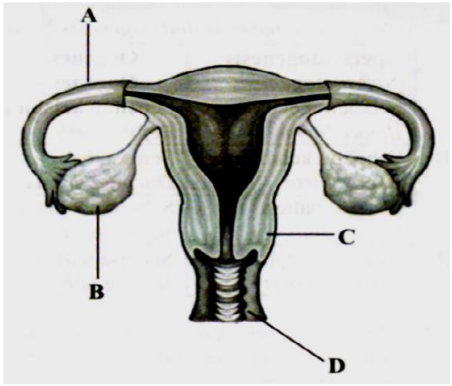

How Twins Work: Monozygotic
Sperm
Egg
Fertilized Egg Divides
Embryos
How Twins Work: Dizygotic
Sperm
Egg
Embryos


Maternal arteries
Maternal veins
Placenta
Maternal portion of placenta
Umbilical cord
Chorionic villus containing fetal capillaries
Fetal portion of placenta (chorion)
Maternal blood pools
Uterus
Fetal arteriole
Umbilical arteries
Fetal venule
Umbilical vein
Umbilical cord
UMBILICAL VEIN :
Carries oxygenated blood from the placenta to the foetus
UMBILICAL ARTERIES :
Carry deoxygenated blood from the foetus to the placenta


KEY TO LABELS
Haploid (n)
Diploid (2n)
Triploid (3n)
Anther
Microspore (n)
MEIOSIS
MITOSIS
Pollen grain (n)
Ovule
Germinating seed
Mature flower on sporophyte plant (2n)
Ovary
Stigma
Pollen tube
MEIOSIS
Embryo (2n)
Food supply
Seed coat (2n)
Seed
Surviving megaspore (n)
Pollen tube
Style
Endosperm (3n)
MITOSIS
FERTILIZATION
Embryo sac
Zygote (2n)
Egg nucleus (n)
Pollen tube
Egg (n)
Discharged sperm nuclei (n)
©1999 Addison Wesley Longman, Inc.

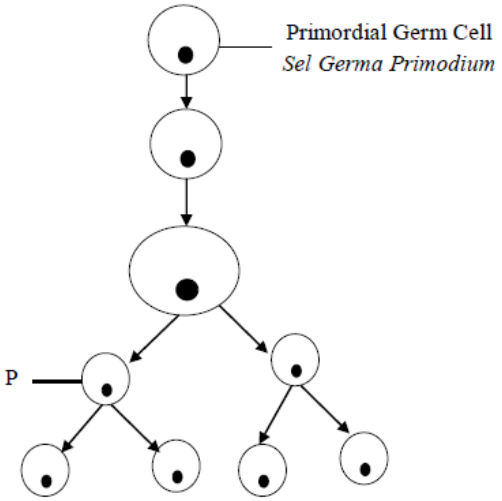
OBJECTIVES QUESTIONS

1. Diagram 1 shows the female reproductive system.



Which part labelled A, B, C or D produces haploid cells?

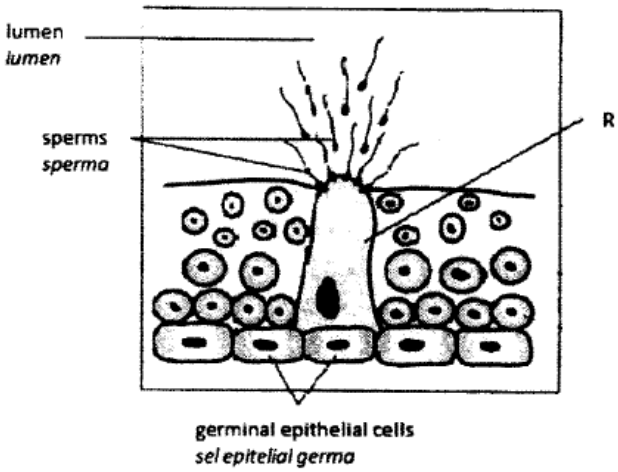
2. Diagram 2 shows a part of spermatogenesis. The number of chromosomes in the primordial germ cell is 38.



What is the number of chromosomes in cell P?

A 76
B 38
C 19
D 46

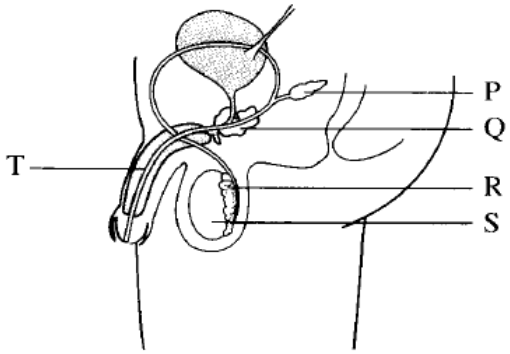
3. Diagram 3 shows the formation of sperm in the seminiferous tubule.



What is R?

A Spermatogonium
B Sertoli cell
C Primary spermatocyte
D Secondary spermatocyte

4. Diagram 4 shows a male reproductive system

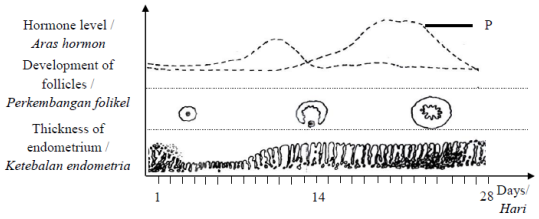


In which parts, P, Q, R, S and T are sperms produced and stored?

5. Which of the following is the formation of male gametes?

A Meiosis
B Oogenesis
C Gametogenesis
D Spermatogenesis

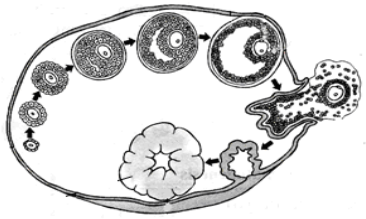
6. Diagram 5 shows changes in the hormone level during menstrual cycle.



What is hormone P?

A Oestrogen
B Progesterone
C Luteinizing hormone
D Follicle stimulating hormone

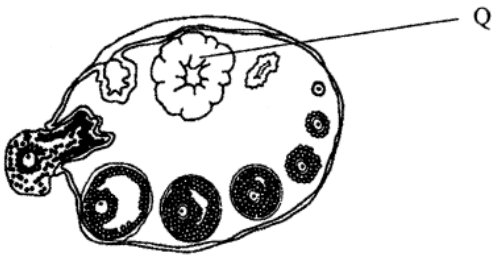
7. Diagram 6 shows the stages in the development of follicle in the ovary of human.



What is the effect to the uterine wall when L develops into M?

A It is repaired
B It breaks down
C It thickens
D Its thickness maintains

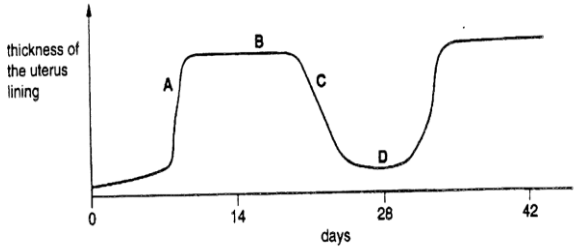
8. Diagram 7 shows stages of an ovarian cycle in ovary.



What hormone is excreted at stage Q?

A Oestrogen
B Progesterone
C Luteinising hormone
D Follicle stimulating hormone

9. Diagram 8 shows the changes in the thickness of the uterus lining of a woman during her menstrual cycle. At which time is the woman most likely to be fertile?



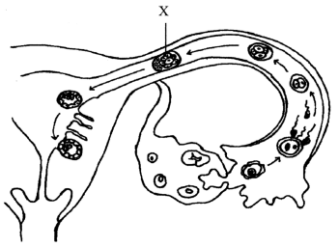
10. Table 1 shows menstrual cycle of a woman. Her menstruation start on 3rd March and her menstrual cycle are 28 days.

Week Minggu	March *Mac*						
	Sunday *Ahad*	Monday *Isnin*	Tuesday *Selasa*	Wednesday *Rabu*	Thursday *Khamis*	Friday *Jumaat*	Saturday *Sabtu*
1	-	1	2	3	4	5	6
2	7	8	9	10	11	12	13
3	14	15	16	17	18	19	20
4	21	22	23	24	25	26	27

Which week does ovulation occur?

A Week 1
B Week 2
C Week 3
D Week 4

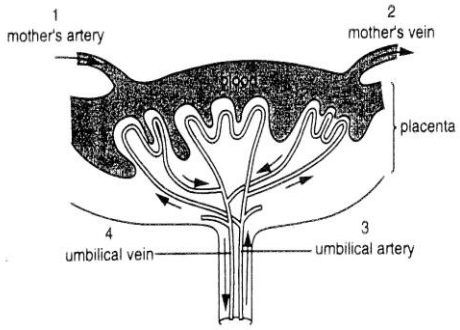
11. Diagram 9 shows the stages of development of embryo in female reproductive organ.



What is structure X?

A Zygote
B Morula
C Foetus
D Blastocyst

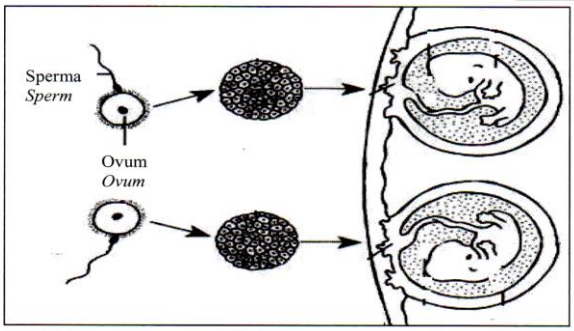
12. Diagram 10 shows part of the placenta.



In which parts does the blood contain the most oxygen and nutrients?

A 1 and 3
B 1 and 4
C 2 and 3
D 2 and 4

13. Diagram 11 shows the formation of twins.



Which of the following is correct?

	Type of twins	Sex
A	Identical twins	One girl and one boy
B	Identical twins	Both girls or both boys
C	Non identical twins	Both girls or both boys
D	Non identical twins	One girl and one boy

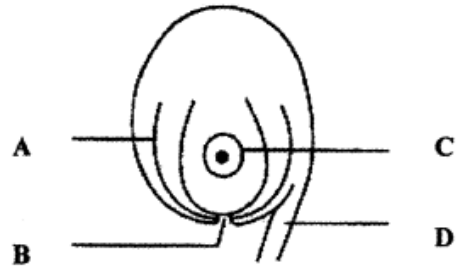
14. Health problems experienced by menopausal women is caused by the shortage of

A estrogen
B thyroxin
C progesterone
D adrenalin

15. Man P has six children and does not wish to have any more children. On the other hand, man Q has a very low sperm count but plans to have children. Which of the following methods can be used by man P and Q?

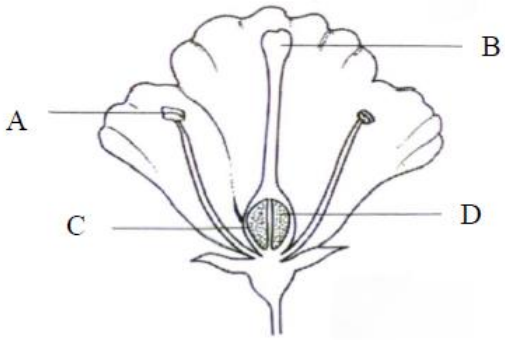
	P	Q
A	Ligation	In-vitro fertilization
B	In-vitro fertilization	Ligation
C	Sperm bank	Vasectomy
D	Vasectomy	Artificial insemination

16. Diagram 12 shows the structure of an ovule.



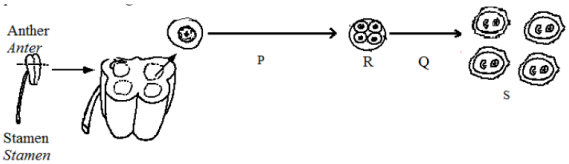
Which part develops into the testa after fertilization?

17. Diagram 13 shows a longitudinal section of a flower.



At which part A, B, C or D the developments of pollen grain take place?

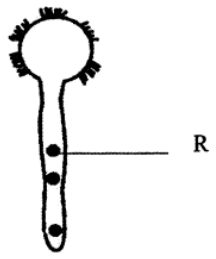
18. Diagram 14 shows process P and Q and development of structure R and S in the formation of pollen grains in an anther of a flower.



What are P, Q, R and S?

	P	Q	R	S
A	Meiosis	Mitosis	Diploid microspore	Pollen grains
B	Mitosis	Meiosis	Diploid microspore	Haploid microspore
C	Mitosis	Meiosis	Pollen grains	Diploid microspore
D	Meiosis	Mitosis	Haploid microspore	Pollen grains

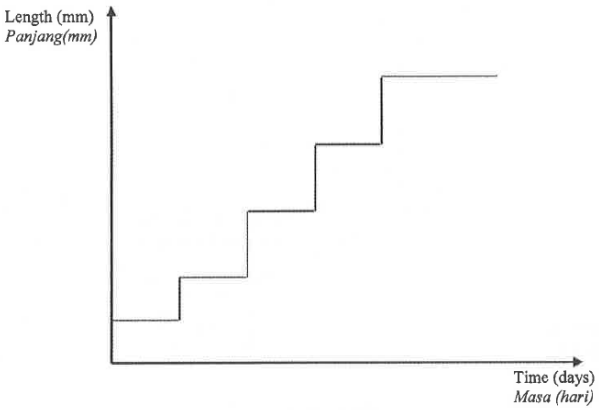
19. Diagram 15 shows germinating of pollen tube.



What is structure R?

A Generative nucleus
B Male nucleus
C Tube nucleus
D Pollen nucleus

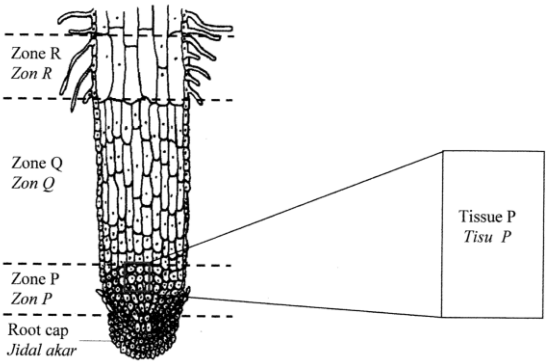
20. Diagram 16 is a graph showing growth pattern of organism K.



Which of the following represent organism K?

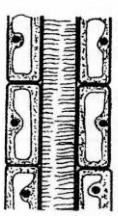
A Earthworm
B Cockroach
C Lizard
D Frog

21. Diagram 17 shows a longitudinal section of plant root tip

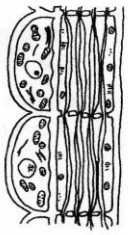


Which of the following tissues represents P?

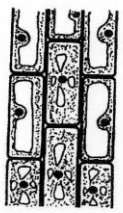
A



C

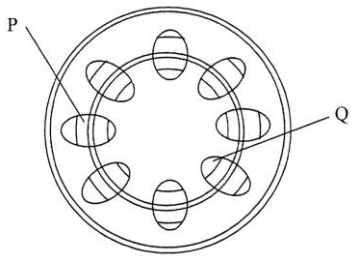


B



D

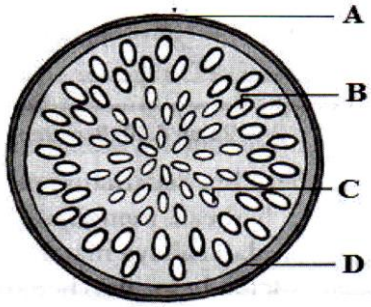
22. Diagram 18 shows the cross section of a dicotyledonous stem after secondary growth.



What are structure P and Q?

	Structure P	Structure Q
A	Secondary phloem	Primary xylem
B	Primary phloem	Secondary xylem
C	Secondary xylem	Primary phloem
D	Primary xylem	Secondary phloem

23. Diagram 19 shows a cross section of monocotyledonous stem which had secondary growth.



Which tissues are produced by secondary growth?

STRUCTURE QUESTIONS

1. **Diagram 1.1** shows a cell of an insect undergoing meiosis.

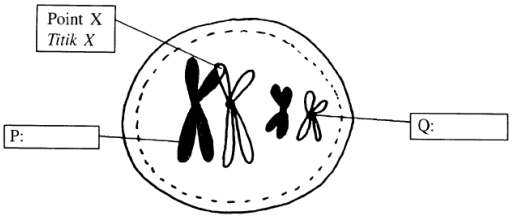


Diagram 1.1

(a) Based on **Diagram 1.1**,

(i) Name P and Q

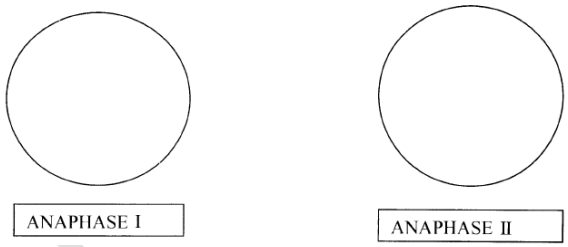
(ii) Name the phase of meiosis shown in **Diagram 1.1** *[1 mark]*

……..

(iii) Explain the process which takes place at point X. *[2 marks]*

……
……

(b) In the space below draw the chromosomal behaviour during anaphase I and anaphase II. *[2 marks]*



(c) **Diagram** 1.2 shows the spermatogenesis process in human.

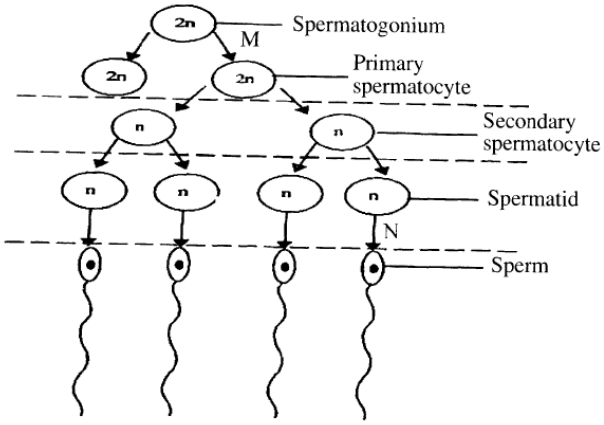


Diagram 1.2

(i) Name the organ where the spermatogenesis occurs. *[1 mark]*

……...

(ii) Based on **Diagram 1.2**, name process M and N. *[2 marks]*

M : ……
N : ……

(iii) State the chromosomal number found in: *[2 marks]*

Primary spermatocyte: ……
Sperm: ……

2. **Diagram 2** shows the changes of four types of hormone which control the menstrual cycle and follicle development in the ovaries.

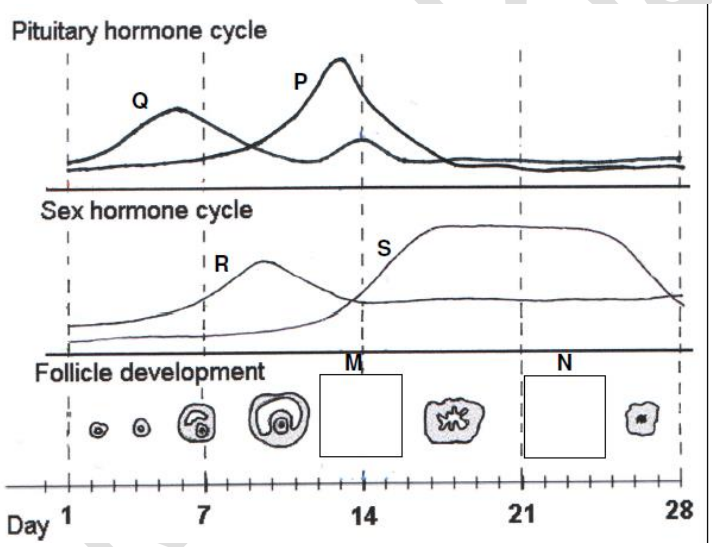


Diagram 2

(a) Based on **Diagram 2,** name the hormone labelled P and R. *[2 marks]*

P : ……
R : ……

(b) Complete the follicle development in boxes M and N in the **Diagram 2**. *[1 mark]*

(c) Based on the **Diagram 2**, explain the relationship between the structure M and the level of hormone S. *[3 marks]*

……
……
……

(d) If fertilisation occurred, the level of hormones S is maintained and the pregnancy is proceeding. Explain the importance of hormone S. *[4 marks]*

……
……
……
……

(e) If the sperm count of a husband is too low, artificial insemination can be carried out to overcome this infertility problem. Discuss the appropriate technique should be used. *[2 marks]*

……
……

3. **Diagram 3** shows the ovarian cycle in human.

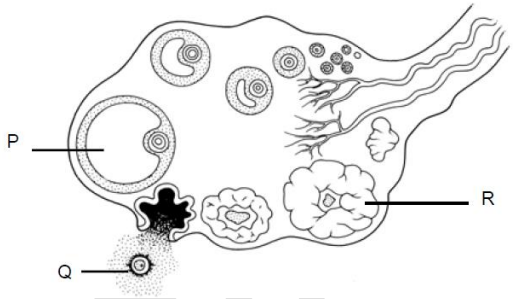


Diagram 3

(a) Name structures P and R. *[2 marks]*

P : ……..
R : …….

(b) Explain how structure Q can be released from the ovary. *[2 marks]*

……
……

(c)(i) Explain the role of R if fertilisation takes place in the fallopian tube. *[2 marks]*

……
……...

(ii) Justify how pregnant mother can maintain her pregnancy as R will degenerates after three months of pregnancy. *[2 marks]*

……
……
……..

(d) After giving birth, mothers are encouraged to give some colostrum (mother's milk) to the baby. Explain the importance of colostrum to the new-born. *[2 marks]*

……
……
……..

(e) A happily married couple unable to have children because the wife has a blockage in the Fallopian tube. Describe how the couple can overcome this condition to have their own baby. *[2 marks]*

……
……
……..

4. **Diagram 4.1** shows the human female reproductive system and **Diagram 4.2** shows the formation of twins.

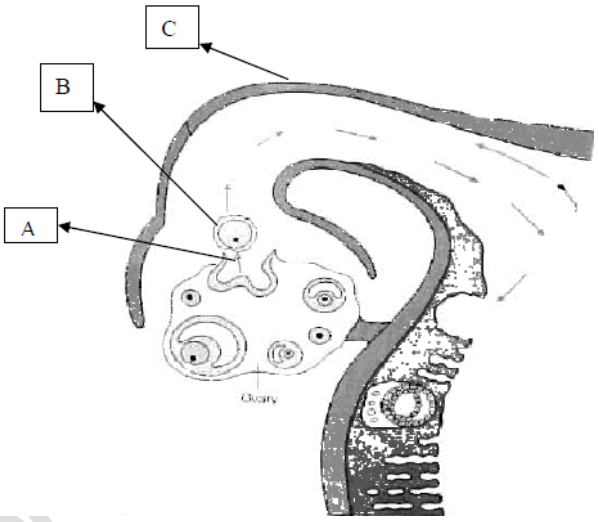


Diagram 4.1

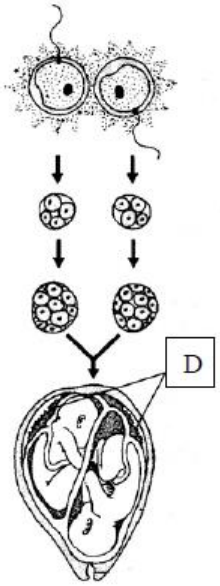


Diagram 4.2

(a) Name the structures and process *[2 marks]*

Process A : ……
Structure B : ……..
Structure C : …….

(b)(i) Nucleus of structure B and sperm fuse together to form a zygote and then divides repeatedly. What division process in involved? *[1 mark]*

……

(ii) Circle the location of fertilisation occur in **Diagram 4.1** *[1 mark]*

(iii) Describe two main stages in the development of a zygote in preparation for implantation. *[3 marks]*

……
……
……

(c) Based on **Diagram 4.2**, explain the formation of a twin *[3 marks]*

……
……
……

(d) Structure D is an important organ for develoment of foetal. State two importances of the organ. *[2 marks]*

……
……

5. Angiosperm plants like *Hibiscus rosasinensis sp*. can reproduce by sexual reproduction and asexual reproduction.

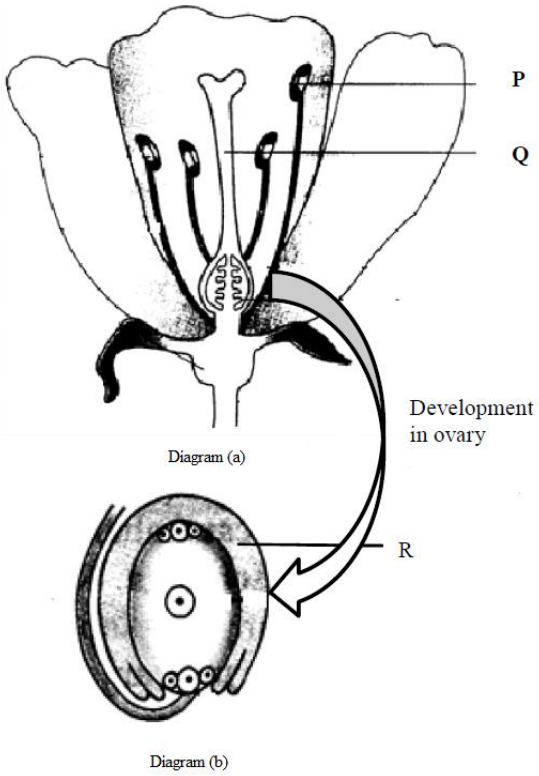


Diagram 5.1

Diagram 5.1 (a) show the structure of flower which involve in plant reproduction process.

(a)(i) Name the organisational level of flower in multicellular organism. *[1 mark]*

……...

(ii) State a difference between sexual reproduction and asexual reproduction in plants. *[1 mark]*

……

(b)(i) A diploid cell in P in **Diagram 5.1(a)** undergoes cell division to produce haploid cells of the pollen. Explain the process. *[2 marks]*

……
……

(ii) After the mature pollen formed in P, the butterfly perch the flower for sucking the honey and alight the other flower at the same tree. Based on **Diagram 5.1 (a),** explain the possibility which occur in Q structure of the other flower. *[2 marks]*

……
……

(c) Based on **Diagram 5.1 (b),** the fertilisation which occurs in R differs with in human. Explain why. *[3 marks]*

……
……
……

(d) During the development of ovule and seed in the flower, ovary develops to form fruit. Explain the important of the fruit. *[2 marks]*

……
……

6. **Diagram 6** shows longitudinal section part of a flower that involves in fertilisation

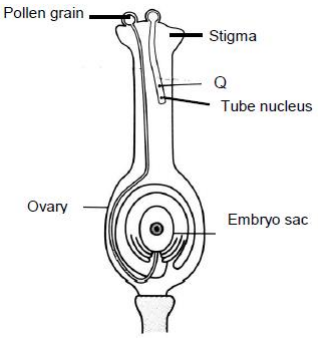


Diagram 6

(a) State the male reproductive organ and female reproductive organ of a flower. *[2 marks]*

Male reproductive organ: ……
Female reproductive organ: ……..

(b) Pollination is a process when pollen grains transfer to stigma by pollination agents such as wind, insects or animals.

(i) State a characteristics of pollen grain that help it stick to stigma during pollination. *[1mark]*

……

(ii) Describe what happen after a pollen grain stick to stigma? *[2 marks]*

……
……

(c)

Flowering plant or angiosperm is the largest group of plant on earth. The fertilisation of the flowering plant known as double fertilisation.

(i) Explain what happen to structure Q while moving toward ovule to ensure double fertilisation occurs. *[2 marks]*

……
……
……

(ii) Explain the importance of fusions between male gamete and two polar nuclei during double fertilisation for the survival of flowering plant? *[3 marks]*

……
……
……
……

(d) After double fertilisation occurs, explain what happened to ovule and integument? *[2 marks]*

……
……
……

ESSAY QUESTIONS

1. **Diagram 1.1** shows a graph of hormonal changes during the menstrual cycle and its relationship to changes in the ovaries and uterus.

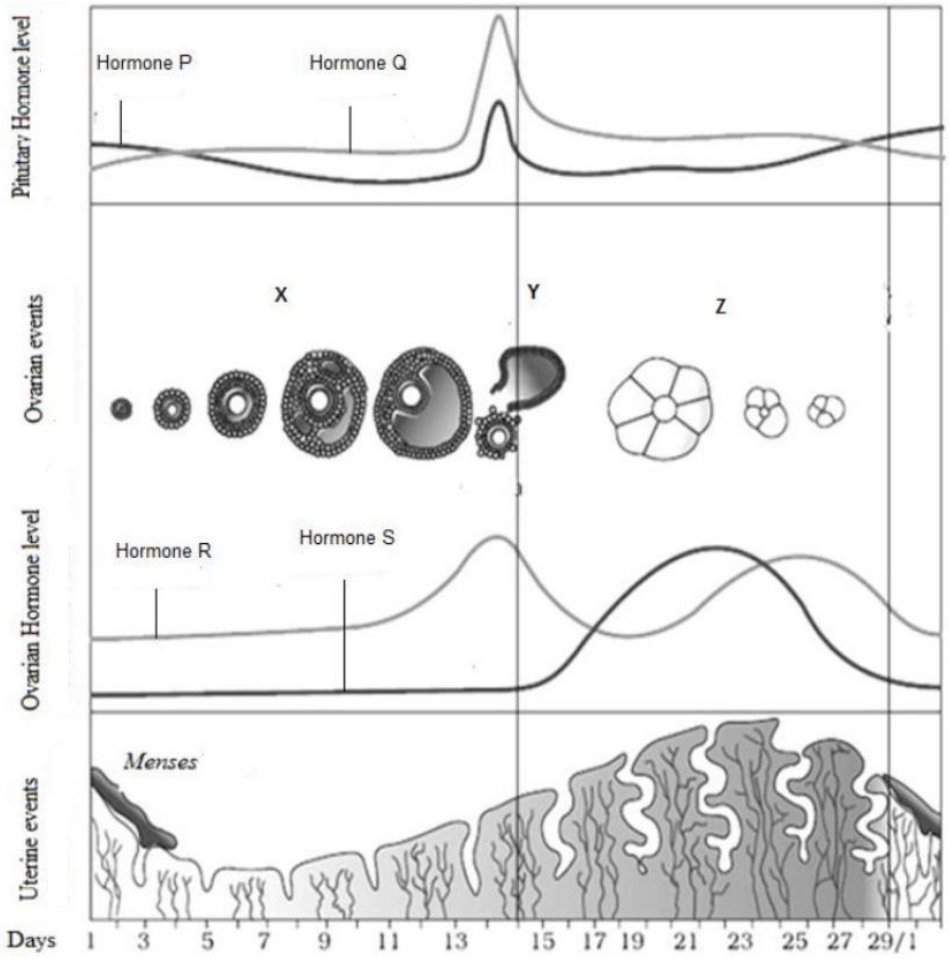


Diagram 1.1

Based on **Diagram 1.1,**

(i) Menstrual cycle is controlled by a complex interaction of hormones P, Q, R and S.Name these hormone and explain its role. *[6 marks]*

(ii) There are three events X, Y and Z occur in the ovary which effected by the hromonal levels in the regulation of menstrual cycle. Explain. *[10 marks]*

(b) **Diagram 1.2** shows the female reproductive system with Polycystic Ovary Syndrome (PCOS). Women with PCOS may have enlarged ovaries that contain small collection of follicles. *[4 marks]*

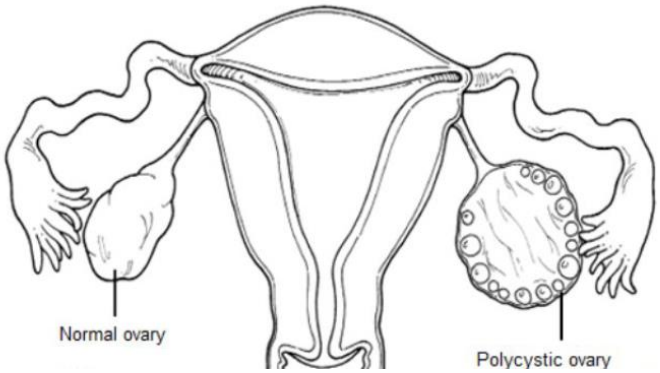


Diagram 1.2

In adolescents, infrequent or absent menstruation may occur in women with PCOS. Explain what will happened to a woman who does not experienced menstrual cycle?

2. Based on your biological knowledge in reproduction technology, explain how the couple can have children. *[10 marks]*

> A couple, Mr Zafrie and Mrs Munirah had married almost ten years but still do not have any child. After undergone an inspection, they found that the husband does not have any problem but the Fallopian tube of Mrs Munirah is blocked.

3(a) **Diagram 2.1** shows the structure of a flower, P, Q and R, are parts of a flower that plays a role in reproduction.

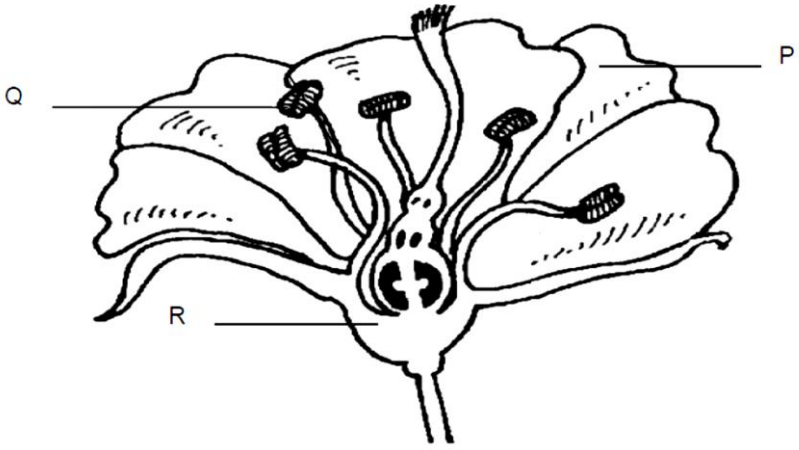
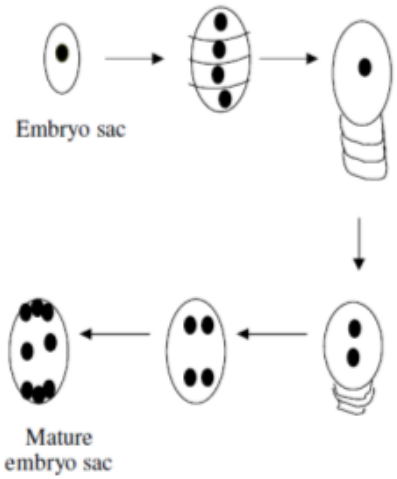


Diagram 2.1

Name the parts P,Q and R of the flower and explain how they help to ensure the survival of the plants in the ecosystem. *[6 marks]*

(b) **Diagram 2.2(a)** shows the formation of the embryo sac in the ovule, while **Diagram 2.2(b)** shows the formation of pollen grain in the anther in a flowering plant (angiosperm).



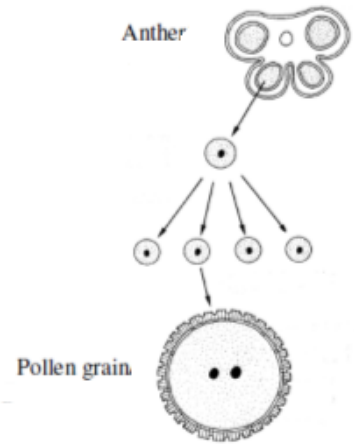


Diagram 2.2 (a) **Diagram 2.2.(b)**

Based on the above diagrams, explain how the formation of the embryo sac and pollen grain process occurs. *[10 marks]*

(c) **Diagram 2.3** shows a process that occurs in the stigma of a flower.

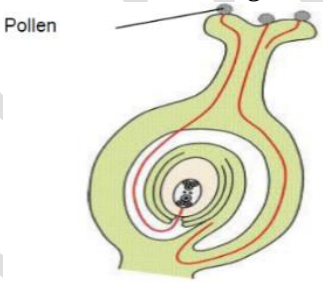


Diagram 2.3

Discuss the process that occurs to the pollen. *[4 marks]*

(d) **Diagram 2.4** shows the process of fertilisation in a flowering plants.

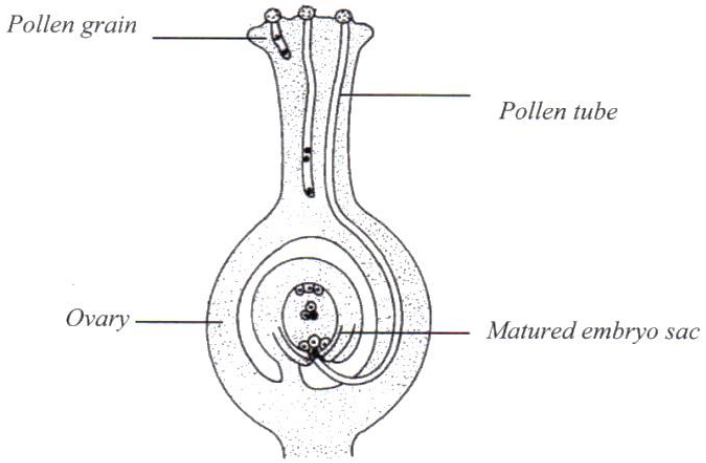


Diagram 2.4

Describe how fertilisation process in plants can ensure that the species are maintained. *[10 marks]*

4(a) **Diagram 3.1** shows the growth curve of an insect.

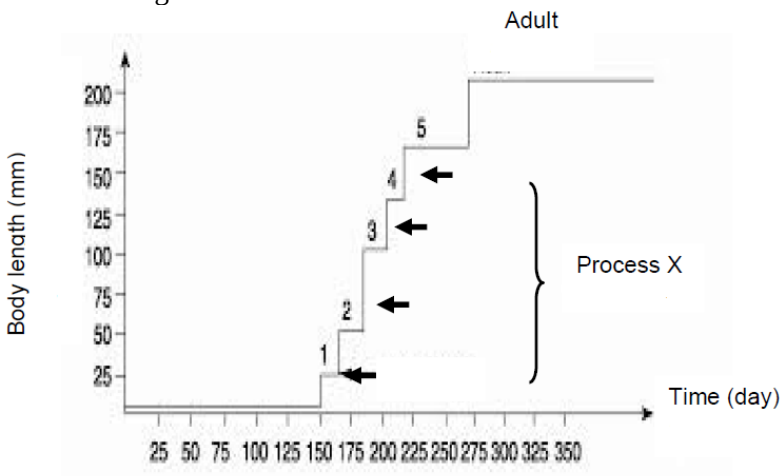


Diagram 3.1

(i) Explain process X in the growth curve. *[5 marks]*

(ii) **Diagram 3.2 (a)** and **3.2(b)** show two types of plants.

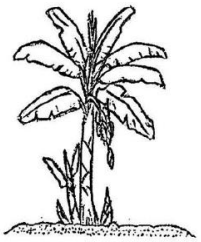
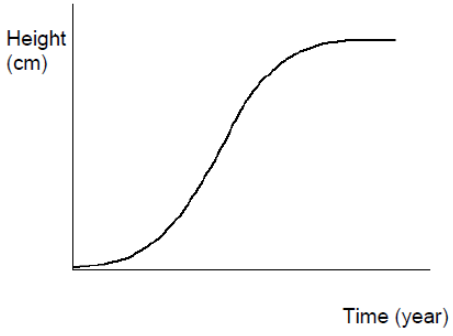


Diagram 3.2(a)

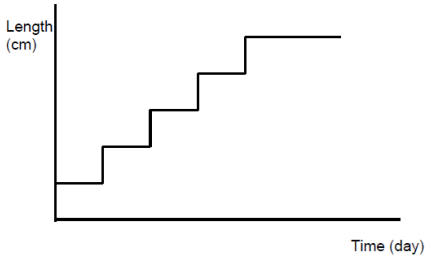
Diagram 3.3(b)

Based on thw growth curve, discuss the similarities and differences between the two plants. *[5 marks]*

(b) Graph (a) and (b), show the growth curve of human and insect.
Based on the graphs, compare the growth process in human and insect. *[10 marks]*



Graph (a)



Graph (b)

5. **Diagram 4** shows the process of secondary growth in plant.

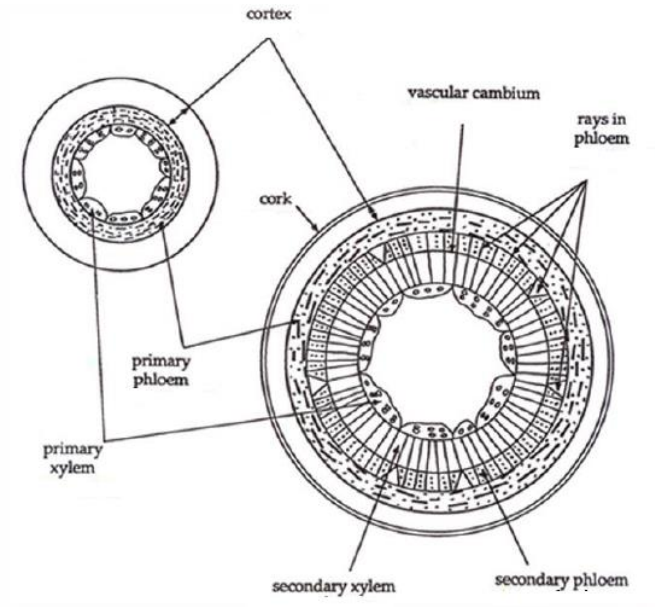


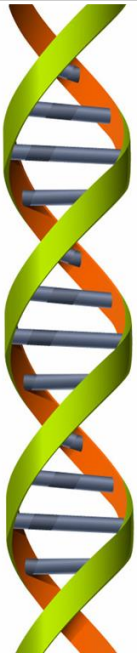
Diagram 4

(a) Based on the above diagram, explain the process of secondary growth in plant. *[6 marks]*
(b) Explain the importance of secondary growth in plants. *[4 marks]*

5 INHERITANCE

5.1 Mendel's First Law and Second Law
5.2 Understanding Inheritance
5.3 Genes and chromosomes

QUICK NOTES & REVISIONS

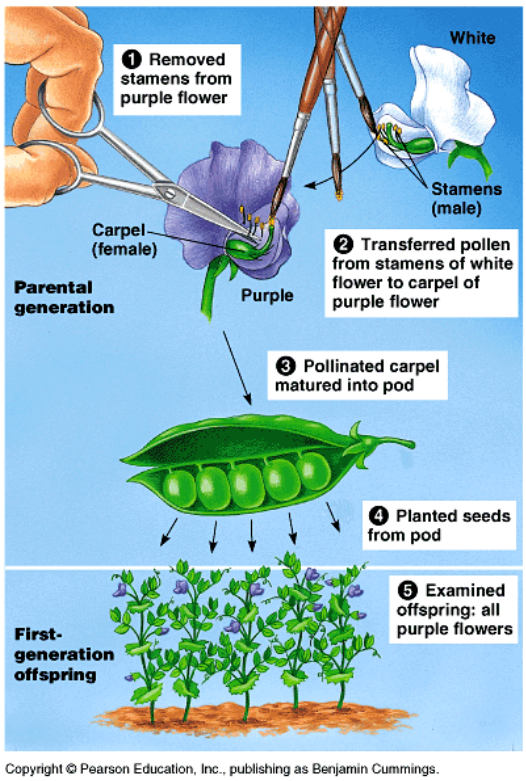


Gregor Mendel

Conducted experiments on pea plants *Pisum sativum*




Gregor Mendel



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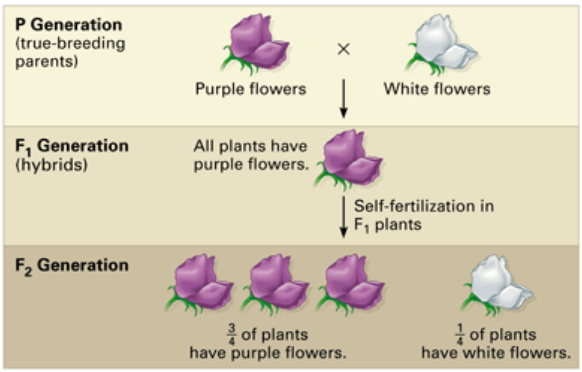
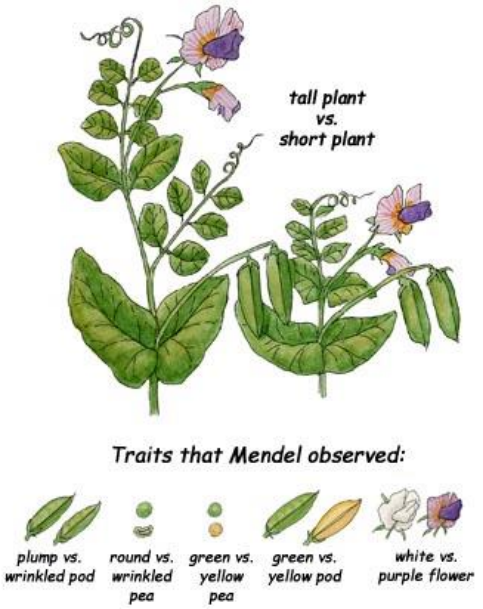
Mendel's First Law





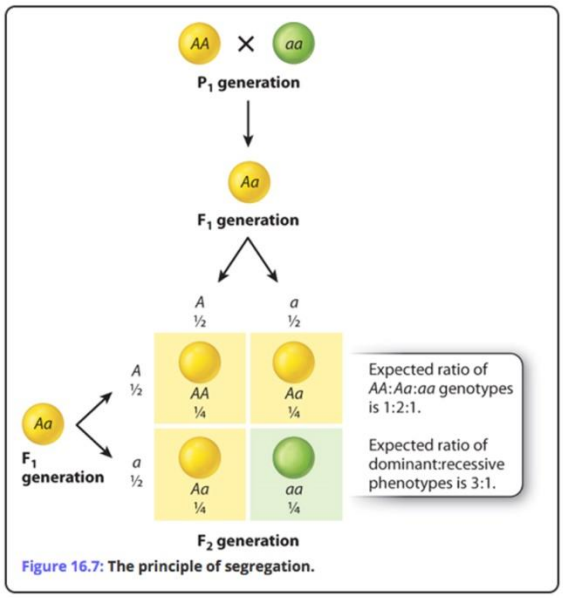
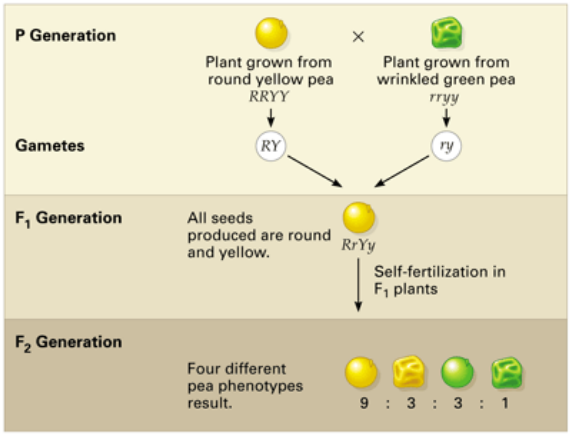
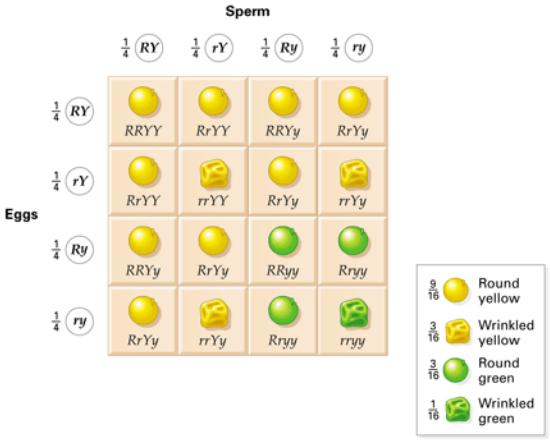
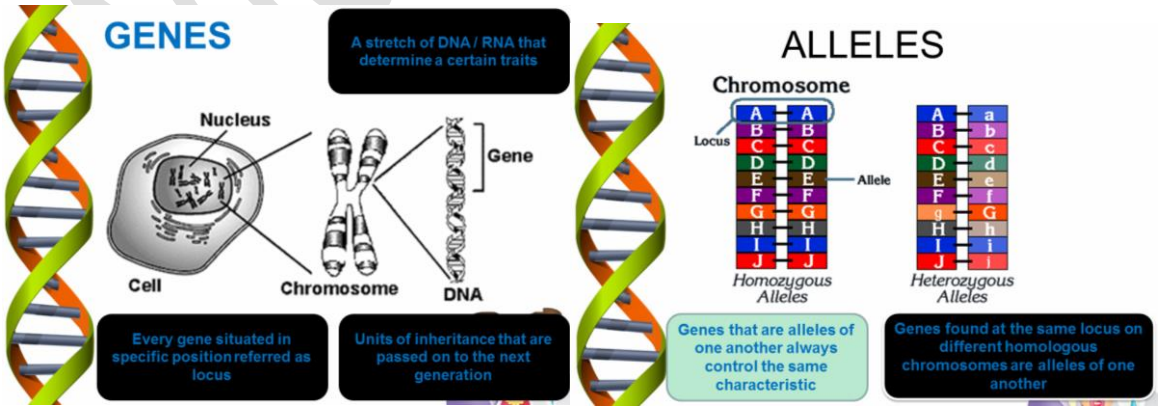


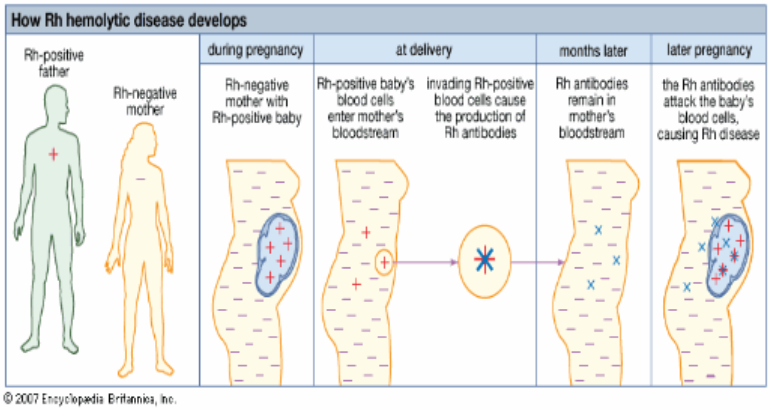
Figure 16.7: The principle of segregation.

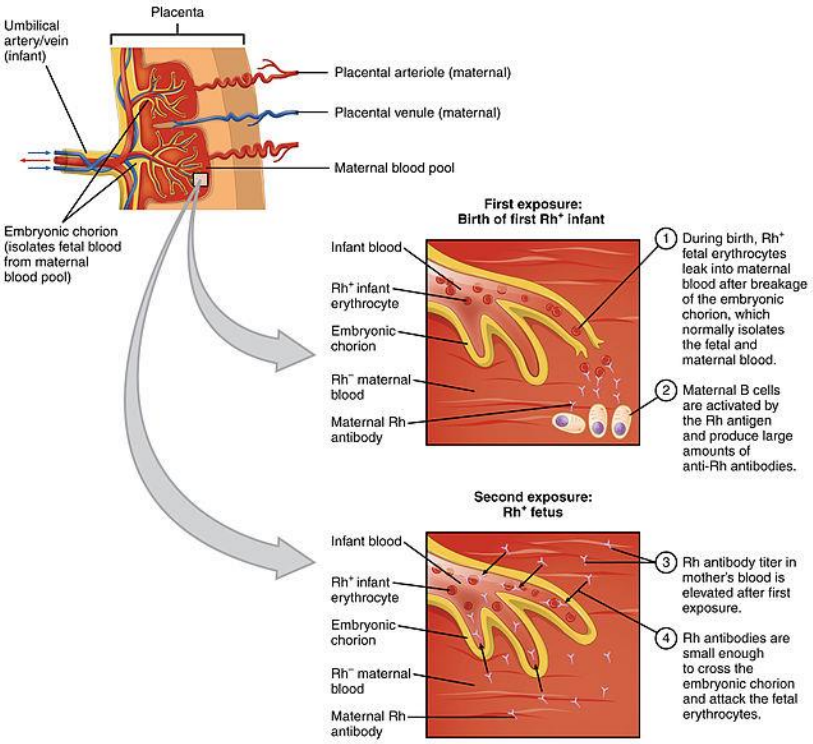
Mendel's Second Law











Sex Linked Disorder

HAEMOPHILIA

Blood disease caused by a lack of **clotting factors**

Caused by a **recessive gene (h)** found on the **X chromosome** of the human

COLOUR BLINDNESS

The inability to differentiate between **red** & **green** color

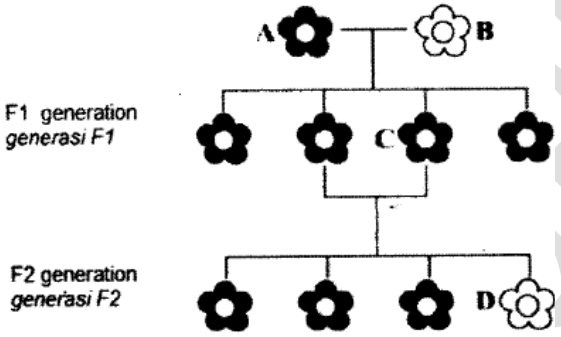
Caused by a **gene mutation** that is located on the **X chromosome**

More male than females are color blind

OBJECTIVES QUESTIONS

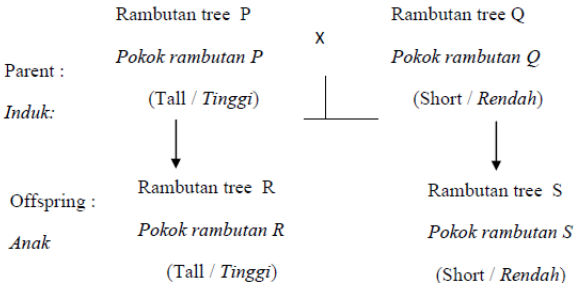
1. Which of the following is true about genotype?
   A It is a characteristic that can be seen
   B It is the genetic composition of an organism
   C It is an organism that cannot be altered
   D It contains two sets of chromosomes

2. Diagram 1 shows the inheritance of flower colour in pure breeding. Which flower, A, B, C or D is homozygous dominant?



3. The allele for curly hair in humans is dominant over straight hair. A woman with curly hair is heterozygous while her husband has straight hair. What is the probability of getting a child with curly hair?
   A 25%
   B 50%
   C 75%
   D 100%

4. Diagram 2 shows the result of the monohybrid cross between rambutan tree P and rambutan tree Q. 50% of the offspring are tall and 50% are short. Tall is dominant to short.



   If rambutan tree R is crossed with rambutan tree S, what is the percentage of the offspring which will be short?
   A 0%.
   B 25%
   C 50%
   D 75%

5. Diagram 3 shows the Punnet square used to determine the F1 generation when two tall plants were crosssed

Male gamete / Gamet jantan Female gamete / Gamet betina	T	t
T	TT	Tt
t	Tt	tt

   What is the percentage of heterozygous tall plants obtained?
   A 25%
   B 50%
   C 75%
   D 100%

6. What is the phenotype of the offsprings in F1 generation in a monohybrid cross between RR X rr?
   A 100% are Rr
   B 100% are RR
   C 100% are rr
   D 75% are Rr and 25% are rr

7. Melisa who is a carrier for colour blindness married to Aron a normal colour vision. What is the probability that their son is colour blind?
   A 0%
   B 25%
   C 50%
   D 100%

8. The following information shows the alleles belonging to a pair of married couple.

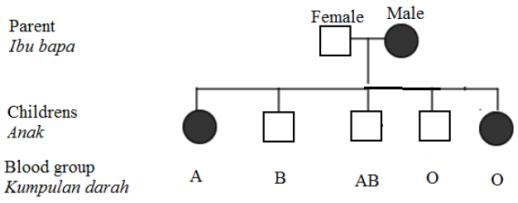
   H - Dominant allele for normal blood

   h - Recessive allele for haemophilia

   Which of the following crosses produces male progeny who are all haemophiliacs?
   A X^hY x X^HX^h
   B X^HY x X^HX^h
   C X^hY x X^HX^H
   D X^HY x X^hX^h

9. The genotype of a person blood group is I^AIO. What is his blood group?
   A O
   B A
   C B
   D AB

10. Diagram 4 shows a pedigree of blood group in a family.



   Based on the diagram, what are the possible genotypes of the parent?
   A I^BI^B and I^BI^B
   B I^AI^B and I^AI^B
   C I^AI^O and I^BI^O
   D I^AI^B and I^OI^O

11. What type of gametes can be produced by a garden pea plant heterozygous (RrYy) for seed shape and seed colour?
   A Rr and Yy
   B RY and ry
   C Ry, Yy, RY and ry
   D RY, Ry, rY and ry

12. In a disputed paternity case, the following blood group were identified.

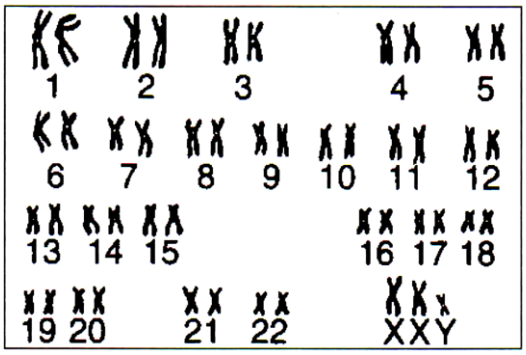
Mother	Blood group AB
Baby	Blood group A
Steven	Blood group A
John	Blood group AB

   Which combination of the following statements is correct?
   I The genotype of the baby is I^AI^O
   II The genotype of the mother is I^AI^B
   III Steven is the father of the baby
   IV Neither Steven nor John could be the father to the baby
   A I, II and IV
   B I and II
   C I, III and IV
   D I, II and III

13. Human blood can be classified into Rhesus positive (Rh+) or Rhesus negative (Rh-). A married couple has different Rhesus factors. After getting the first child who is Rhesus positive, the rest of pregnancies end with miscarriage.
   What are the rhesus factor of the parents and the miscarried foetus?

	Father	Mother	Miscarried foetus
A	Rh+	Rh-	Rh+
B	Rh+	Rh-	Rh-
C	Rh-	Rh+	Rh+
D	Rh-	Rh+	Rh-

14. Diagram 5 shows karyotype of individual Q



What is the genetic disorder for individual Q?

A Male with down syndrome
B Female with Turner Syndrome
C Man with Klinefelter's Syndrome
D Female with Klinefelter's Syndrome

15. Haemophilia is a disease caused by a recessive allele, h on chromosome X. For a mother who carries the haemophilia allele, the chances of giving birth to a child with haemophilia are the same for each pregnancy. Even though she already has a child with haemophilia, she can still give birth to another. In other case, can a non-carrier mother give birth to a haemophiliac child?

Parents: *Induk*	Amin	x	Sarah
Genotype: *Genotip*	X^hY	x	X^HX^H

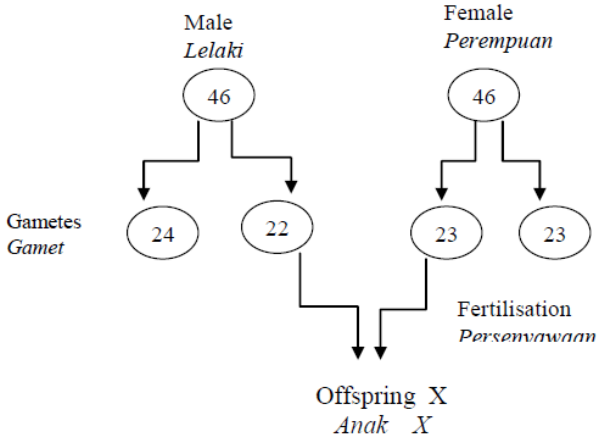
Diagram shows the genotype of a married couple, Amin and Sarah. What is the probability for this couple to get a daughter who is a haemophiliac?

A 0%
B 25%
C 50%
D 100%

16. What is the number of chromosomes in an individual with Klinefelter's Syndrome?

A 48
B 47
C 46
D 45

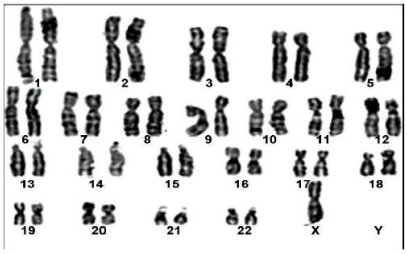
17. Diagram 6 shows a schematic diagram of a genetic disease



What is the genetic disease suffered by offspring X?

A Turner Syndrome
B Down Syndrome
C Klinefelter's Syndrome
D Sickle-cell anaemia

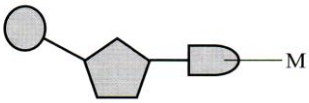
18. Diagram 7 shows a karyotype of a person with genetic abnormality.



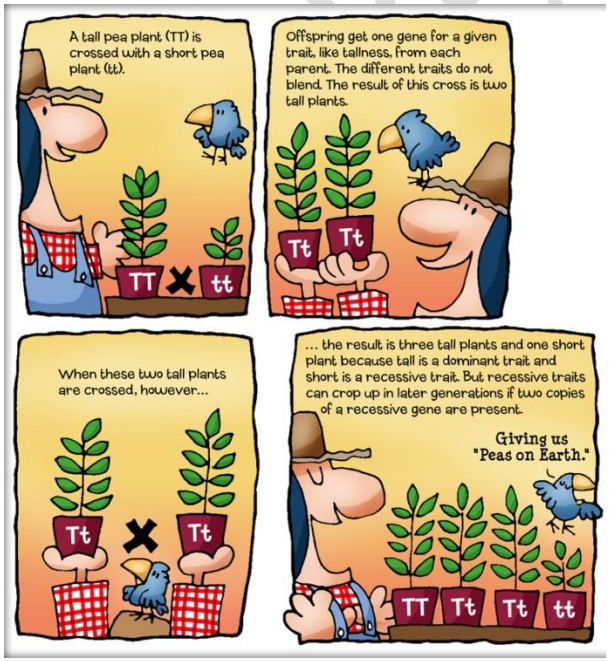
Which of the following is the phenotype of the person?

A Turner Syndrome
B Down Syndrome female
C Klinefelter's Syndrome
D Haemophiliac male

19. Diagram 8 shows a monomer of DNA
What is M?



A Nucleotide
B Phosphate group
C Nitrogenous base
D Deoxyribose sugar



STRUCTURE QUESTIONS

1. The structure on the head of a chicken (the comb) can be of different shapes. **Diagram 1** shows how two different shapes of comb were inherited. Walnut comb is dominant.

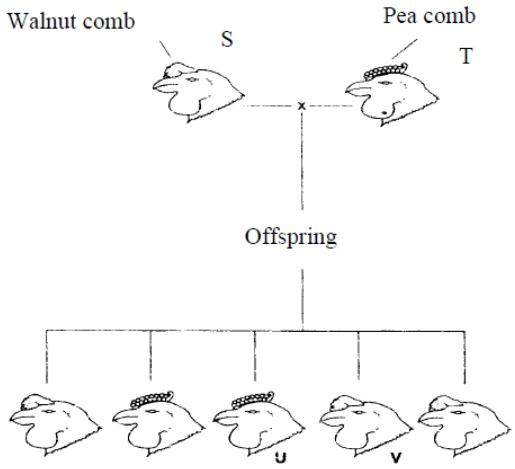


Diagram 1

Comb shape is controlled by one pair of allele. Key: W – dominant allele w - recessive allele

(a) Write the genotypes of the following chicken. *[2 marks]*

S : ……
T : ……
U : ……
V : ……

(b) Draw the schematic diagram below to show the genotype ratio if S and V were bred together. *[5 marks]*

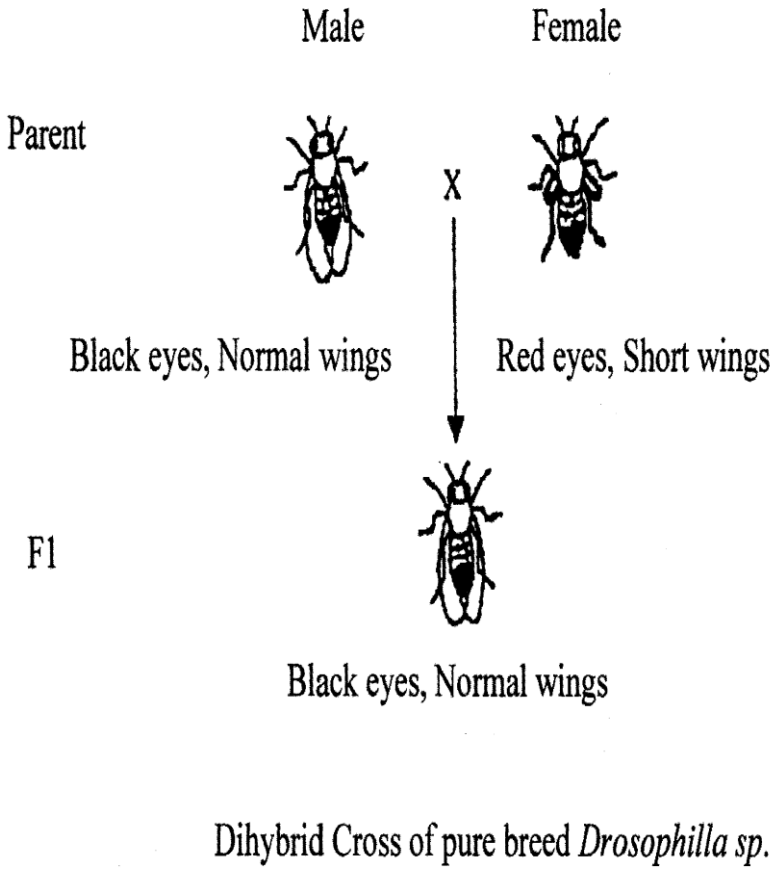
(c) Explain how we can get the phenotype ratio in (b). *[2 marks]*

……
……
……

(d) Explain how we can get chicken with pea comb if one of their parents is walnut comb? *[2 marks]*

……
……
……

2. **Diagram 2** shows a dihybrid cross of pure breed *Drosophilla sp.*



Dihybrid Cross of pure breed *Drosophilla sp.*

Diagram 2

(a) Based on **Diagram 2**,

(i) State the dominant and recessive characteristics of *Drosophilla sp. [2 marks]*

Dominant characteristics: ……
Recessive characteristics: ……

(ii) List all the gametes formed by individual in F1 By using the given letters: *[2 marks]*

M – black eyes	N – normal wings
m – red eyes	n – short wings

……
……

(b) Complete the Punnet Square below: *[2 marks]*

Gametes				

(c) Based on the Punnet Square; *[3 marks]*

(i) Determine the genotype ratio of dominant homozygous and recessive homozygous.

……

(ii) Determine the phenotype ratio for black eyes, normal wings and red eyes, short wings.

…….....

(iii) Write all the genotype for black eyes, short wings

……

(d) If F1 generation of *Drosophilla sp*, exposed to the x-rays for two weeks and then were crossed among each other, there will be *Drosophilla sp*. with green eyes in F2 generation.

(i) Name the process in the situation given *[1 mark]*

……

(ii) Based on your knowledge about genetic, explain the process occurs in (d)(i). *[2 marks]*

……
……

3. Haemophilia is a disease in which the blood does not clot normally. Diagram 3 shows a family, where the father is normal while mother is a carrier of haemophilia.

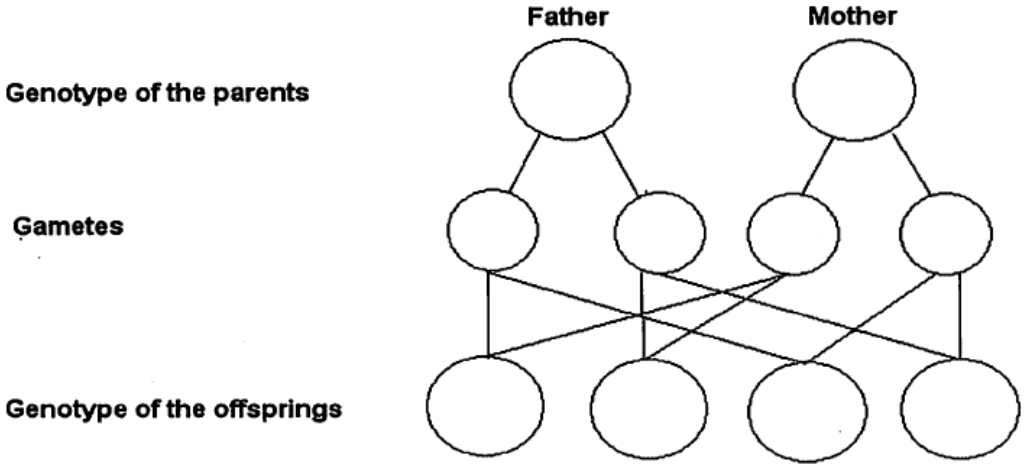


Diagram 3

(a) How is haemophilia inherited? *[2 marks]*

……
……

(b)(i) Complete the schematic diagram in **Diagram 3** to show how haemophilia is inherited in this family. *[3 marks]*

Key : **H** represent the normal allele **h** represent the haemophiliac allele

(ii) Base on your answer in b (i), what percentage of the offspring which are haemophiliacs? *[1 mark]*

……

(c) In another family of four children, the mother is heterozygous for haemophilia while the father is normal. None of the boys are haemophiliac and none of the girls are carriers of the disease. Explain how this situation could have occurred. *[3 marks]*

……
……
……
……

(d) A papaya farmer wants to produce a large number of Exotica papayas in the shortest time possible. State the best technique to use by the farmer. What is the genetic advantage of using this technique? *[2 marks]*

……
……
……
……

4. Diagram 4.1 shows the structure of a type of nucleic acid.

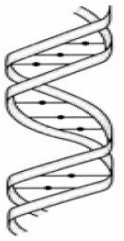


Diagram 4.1

(a) Based on Diagram 4.1, name the type of nucleic acid as shown. *[1 mark]*

……

(b) Draw and label a basic unit of structure show in Diagram 4.1.*[2 marks]*

(c) Explain the role of structure in Diagram 4.1 in determining the characteristics of organisms. *[2 marks]*

……
……
……

(d) Name another type of nucleic acid. *[1 mark]*

……

(e)(i) Complete the structure in **Diagram 4.2** *[2 marks]*

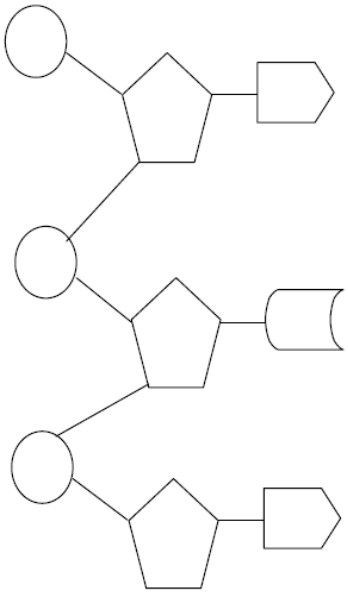


Diagram 4.2

(ii) State the component that determines the characteristics of an organism. *[1 mark]*

……

ESSAY QUESTIONS

1(a) **Diagram 1.1** shows two pairs of homologous chromosomes of a parent. A father has genotype I^AI^O and his wife has genotype I^BI^O.

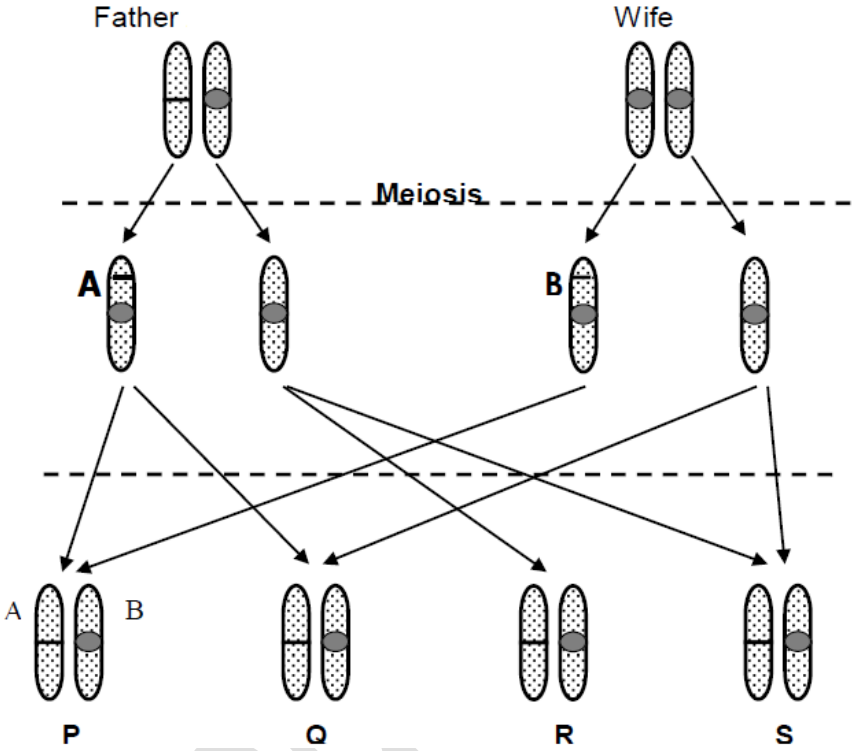


Diagram 1.1

(i) Predict the genotype and phenotype of the offspring Q, R and S. *[3 marks]*
(ii) Based on **Diagram 1.1**, explain the result using Mendel's First Law *[3 marks]*

(b) **Diagram 1.2** shows the karyotype of an individual who has experienced chromosomal mutation.

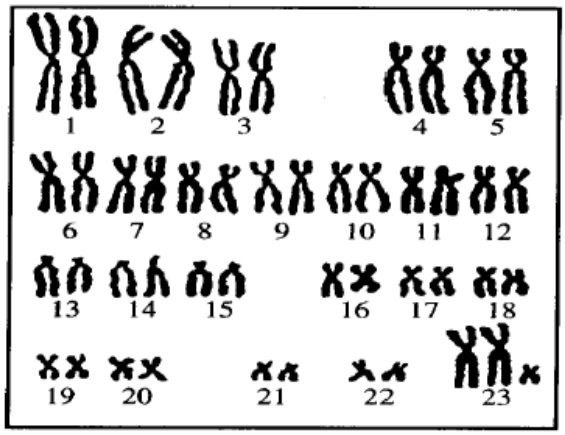


Diagram 1.2

Explain the cause of mutation in **Diagram 1.2** *[6 marks]*

2. Diagram 2 shows the inheritance of blood groups in a family. The ABO system is an example of a trait that is controlled by multiples alleles. They are allele A, allele B and allele O.

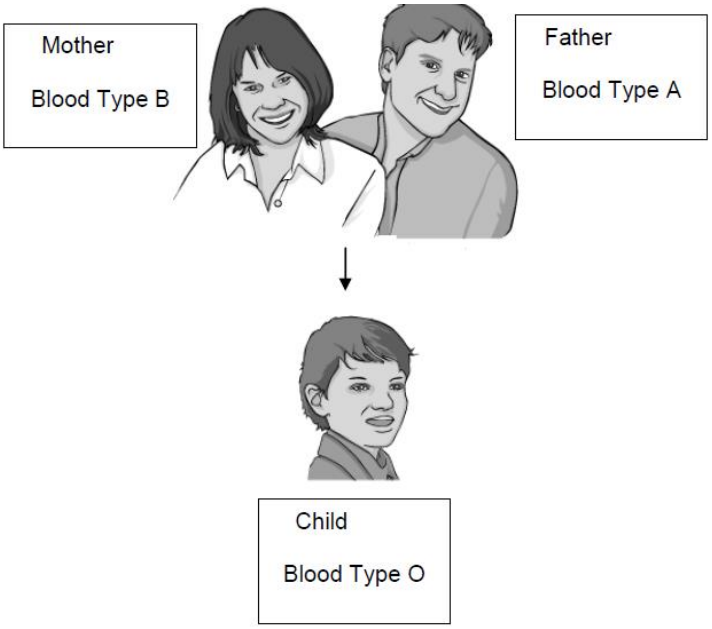


Diagram 2

(a) Using suitable symbols and schematic diagram, show how a married couple produces a child who has blood group O. *[6 marks]*

(b) Based on the characteristics in Table 1, the heterozygous pea plants from first filial generation (F1) with round and yellow seeds were self-pollinated to produce seeds for the second filial generation (F2).

Given that, R = Dominant allele for round seed r = recessive allele for wrinkled seed Y = dominant allele for yellow seed Y = recessive allele for green seed

(i) Use a Punnet square to show the inheritance of the phenotype and genotype characters of the seeds (shape and colour) from the F1 generation to the F2 generation plants.

(ii) 3600 seeds of the F2 generation were collected. Based on the results of character distribution in (i), calculate the number of seeds with differen shapes and colours in the F2 generation. *[3 marks]*

3(a) Genes are the basic units of inheritance which occupy specific locus on chromosomes. Diagram 3 shows structure of a chromosome and DNA molecule.

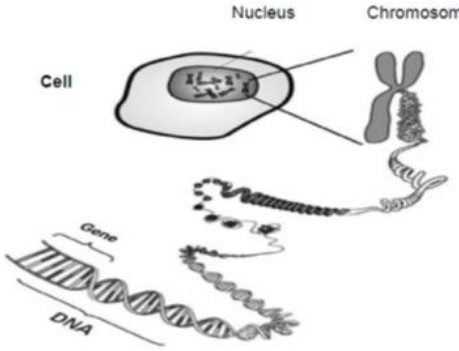


Diagram 3.1

(i) Describe characteristics of DNA. *[4 marks]*

(ii) Diagram 3.2 shows the human insulin production. Insulin production is one of the examples of genetic engineering. It can be used to treat the Diabetes Mellitus patients. Bovine somatotrophin (BST) is used commercially to increase milk production in cows and mass of beef cattle. BST production has a similar process of insulin production.

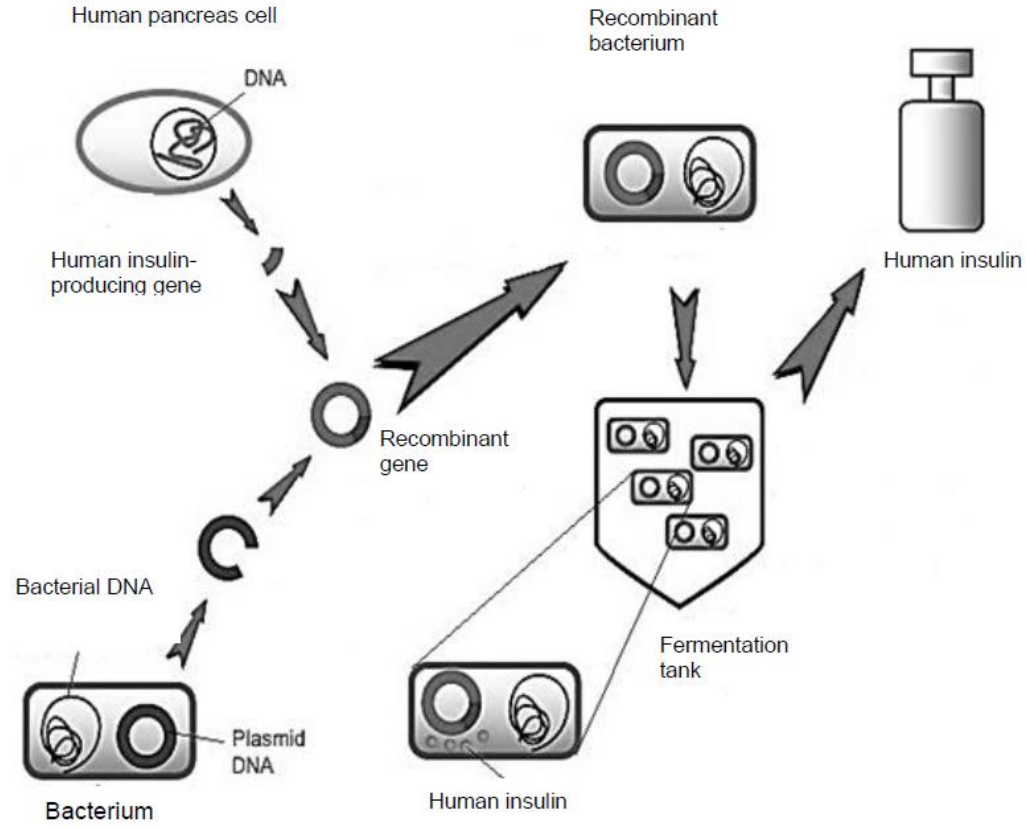


Diagram 3.2

Based on the diagram above, explain how BST can be produced by genetic engineering. *[5 marks]*

(b) Advances in genetic research in agriculture have resulted in a variety of foods that have been genetically modified. Such food intake may bring a lot of implications on health are still unknown. Based on your knowledge in Biology, write a report evaluating the pros and cons of genetically modified foods. *[5 marks]*

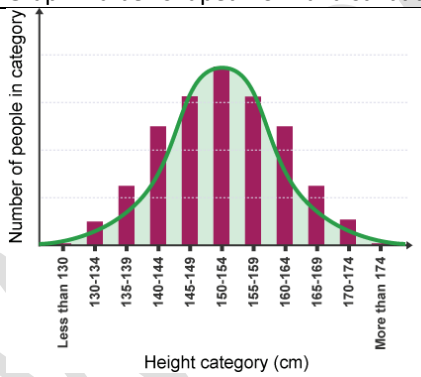
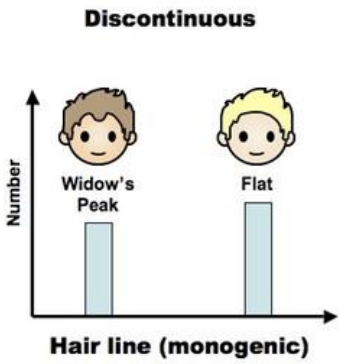
6 VARIATION

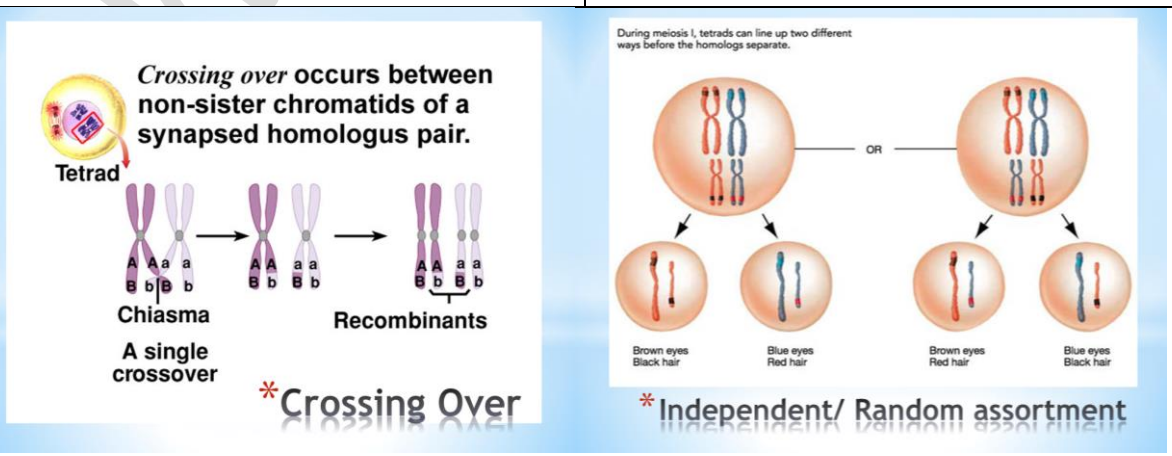
QUICK NOTES & REVISIONS

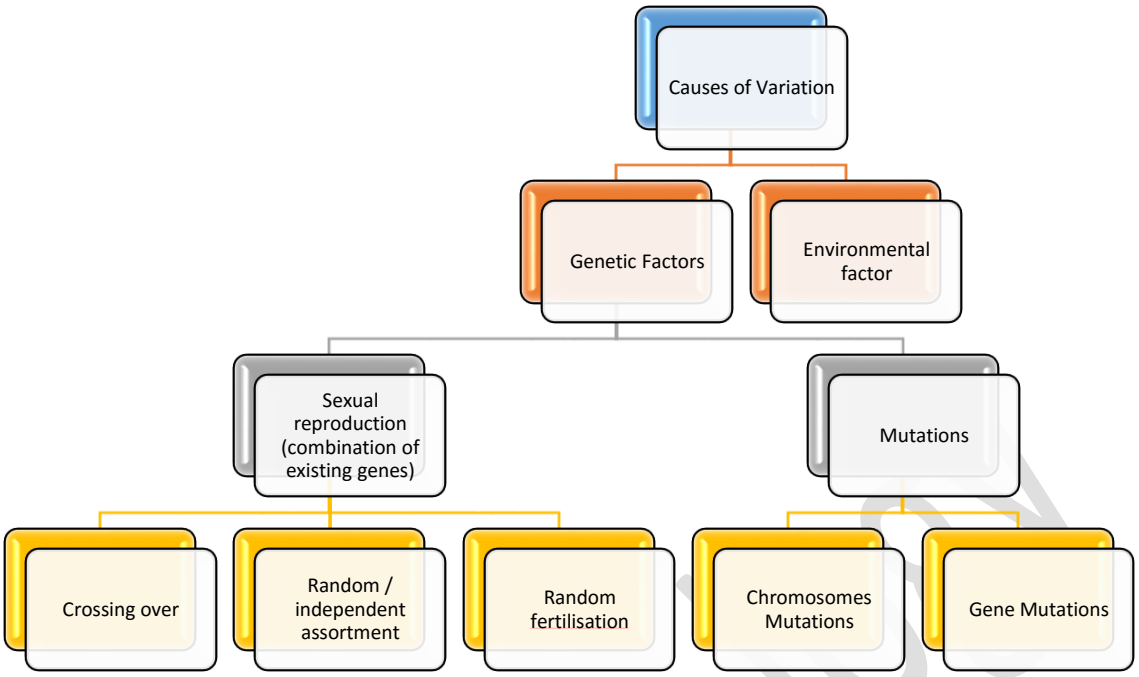
Types of Variation

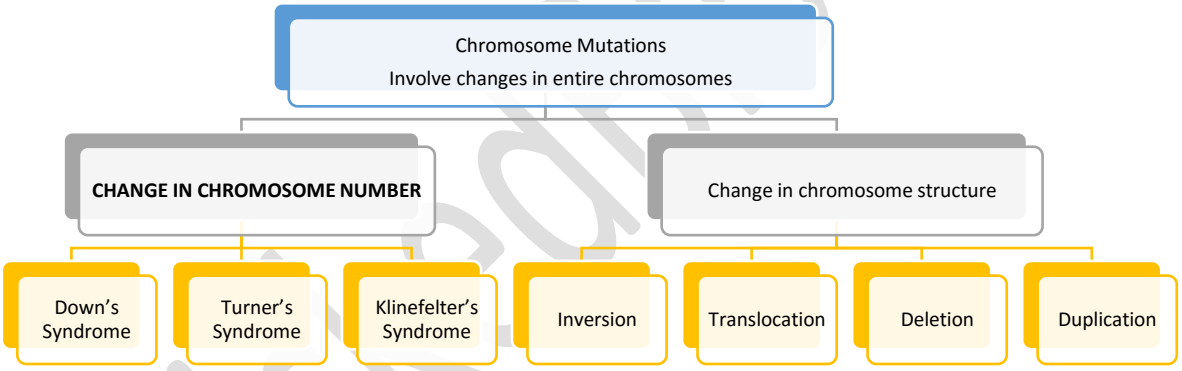
Continuous variation	Discontinuous variation
• Controlled by the combined effect of many genes **(polygenic)**	• Falls into a few distinctive phenotype/categories • Controlled by one/few genes
• Significantly affected by **environmental factors**	• The trait is either **absent or present** • **Not affected by environment**

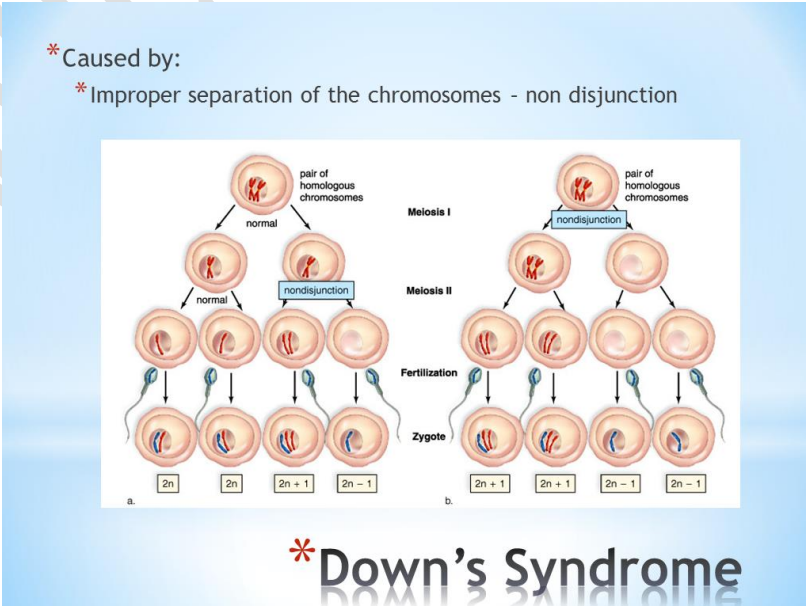
• E.g.
  • Height
  • Weight
	• E.g.
	  • Dimple cheek
	  • ABO blood group

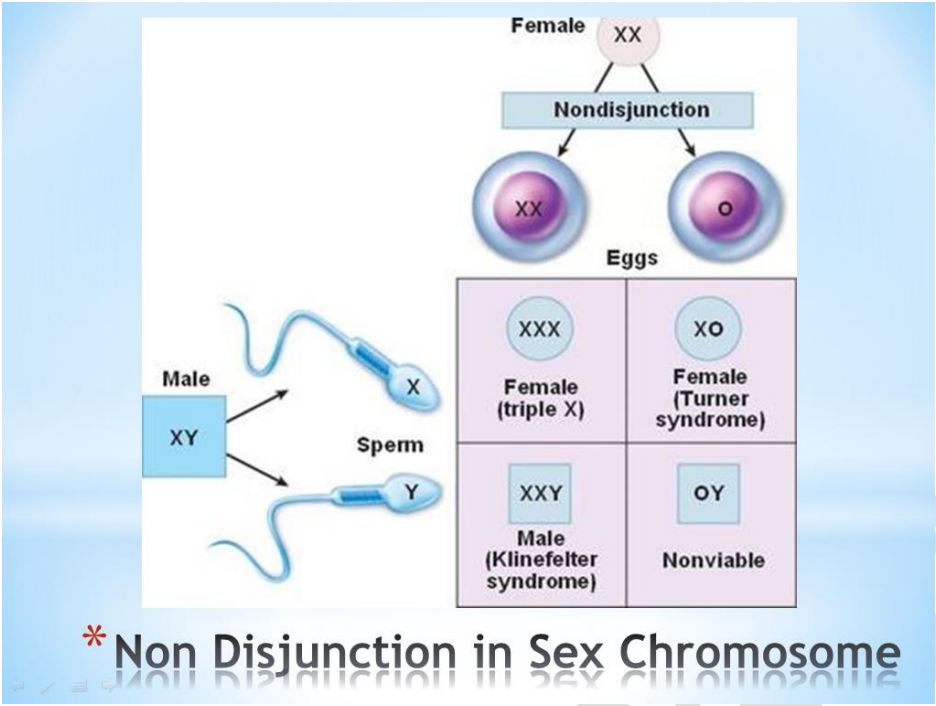
• Graph – a bell shaped normal distribution	• Graph – discrete / categorical distribution
	



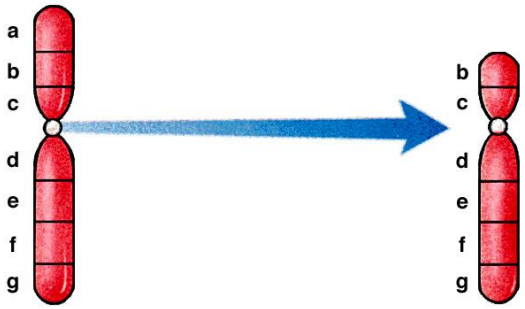

Causes of Variation
Genetic Factors
Environmental factor
Sexual reproduction (combination of existing genes)
Mutations
Crossing over
Random / independent assortment
Random fertilisation
Chromosomes Mutations
Gene Mutations


Chromosome Mutations
Involve changes in entire chromosomes
CHANGE IN CHROMOSOME NUMBER
Change in chromosome structure
Down's Syndrome
Turner's Syndrome
Klinefelter's Syndrome
Inversion
Translocation
Deletion
Duplication

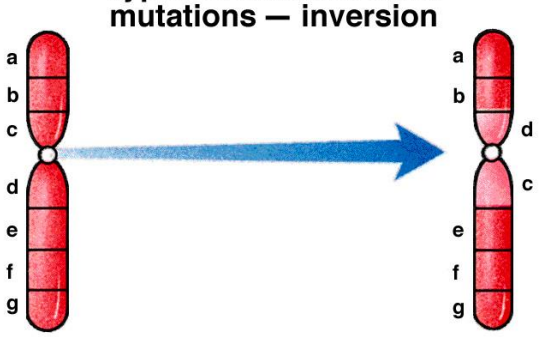

*Caused by:
*Improper separation of the chromosomes - non disjunction
pair of homologous chromosomes
normal
nondisjunction
Meiosis I
Meiosis II
Fertilization
Zygote
2n
2n + 1
2n – 1
*Down's Syndrome



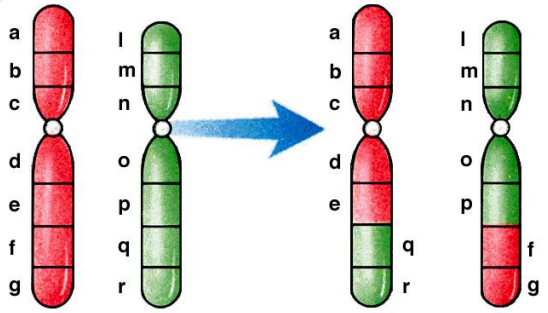
Types of chromosomal mutations — deletion



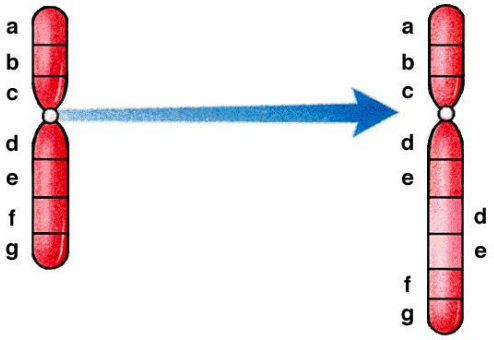
Types of chromosomal mutations — inversion



Types of chromosomal mutations — translocation



Types of chromosomal mutations — duplication

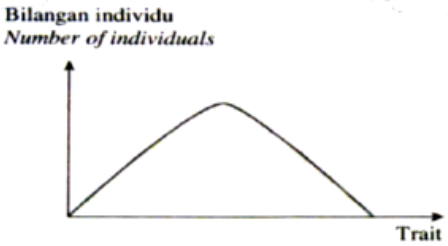


OBJECTIVES QUESTIONS

1. Which of the following is an example of discontinuous variation?
   A Height
   B Body weight
   C Skin colour
   D Shape of earlobe

2. Which of the following is continuous variation?
   A Down syndrome
   B Intelligence
   C Blood group ABO
   D Thumbprint

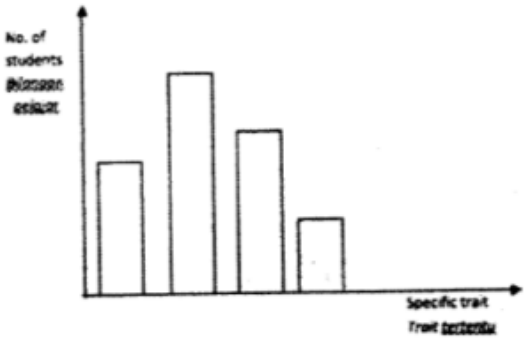
3. Diagram 1 shows the distribution of a particular human trait.



   Which of the following traits is represented in the graph?
   A Intelligence
   B Shape of earlobe
   C Blood group
   D Eye colour

4. Which of the following factors cause continuous variation in human?
   A Nutrition
   B Gene mutation
   C Certain genotype traits
   D Chromosomal mutation

5. Graph 1 shows a type of variation in a group of students.



   Which is true for the variation studied?
   A Height
   B Body weight
   C Intelligence
   D Blood group

6. Ali and Aminah gave four statements about themselves

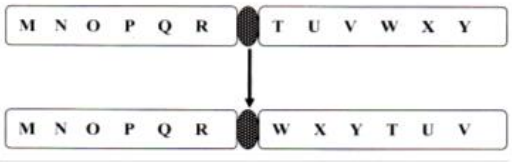
	Ali	Aminah
P	I am a boy	I am a girl
Q	I am 150cm tall	I am 153cm tall
R	I have an unattached ear lobes	I have an unattached earlobe
S	My blood group is A	My blood group is AB

   Which statements describe the characteristics that show discontionous variation?
   A P, Q and S
   B P, R and S
   C Q, R and S
   D P, Q, R and S

7. Diagram 2 shows an illustration of the gene sequence on a chromosome before and after exposure to radioactive radiation.

   This is an example of….
   A Deletion
   B Duplication
   C Inversion
   D Substitution

8. Diagram 3 shows the changes of gene sequence in a chromosome after exposure to gamma rays



What is the type of this change?
A Deletion
B Duplication
C Inversion
D Translocation

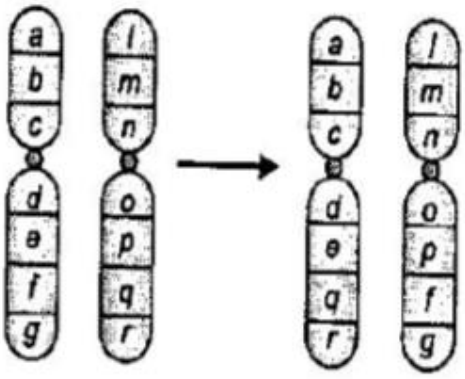
9. Mutagen is a physical or chemical agent that change the genetic material. Which of the following are mutagen?
I Sodium chloride
II Nitrogen
III Gamma rays
IV Formaldehid
A I and II
B II and IV
C I and III
D III and IV

10. The following is information about two individuals R and S.

Individual R	Weight 40kg, Height 130 cm
Individual S	Weight 80kg, Height 170 cm

Which factors caused the difference in traits between the two individuals?
A Hormone
B Mutation
C Genetic and mutation
D Environment and genetic

11. The diagram 4 shows a change in the structure of a chromosome due to an occurrence



Which of the following is the occurrence?
A Deletion
B Duplication
C Inversion
D Translocation

12. Which of the following genetic disorder is not caused by gene mutation?
A Albinism
B Down's syndrome
C Sickle cell anaemia
D Haemophilia

STRUCTURE QUESTIONS

1. **Diagram 1.1(a)** and **1.1(b)** show different types of fingerprint and a group of form five students with various body heights.

Diagram 1.1(a)

Diagram 1.1(b)

(a) State the types of variation shown by the two diagram above: *[2 marks]*

Diagram 1.1 (a): ……..
Diagram 1.2 (b):……

(b) State two differences between the two types of variation in (a) *[4 marks]*

1. ……
……
……
2. ……
……
……

(c) Explain the importance of variation. *[2 marks]*

……
……
……..

(d) Mutation is one of the factors that cause variation. **Diagram 1.2** shows two types of chromosomal mutation.

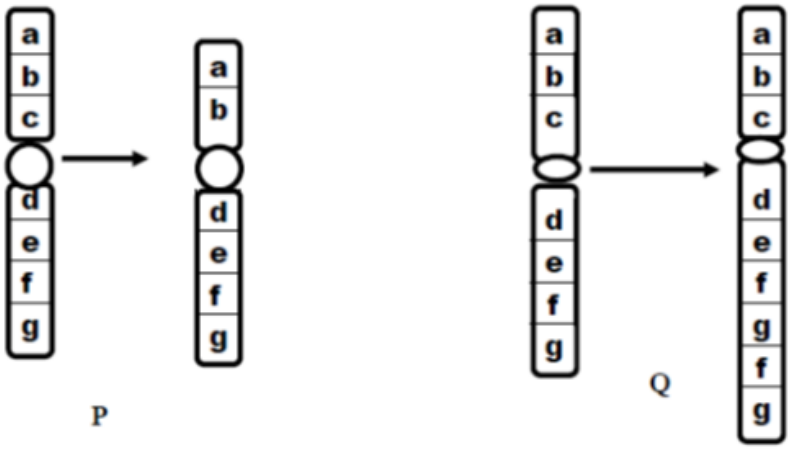


Diagram 1.2

(i) Name the processes involved in the mutation of P and Q. *[2 marks]*

P : ……
Q : ……

(ii) Explain one bad effect cause by mutation. *[2 marks]*

……
……
……

2. **Diagram 2.1** shows the inheritance of wing colour in a moth, *Biston betularia*. B represents the dominant allele for black wing while b represents the recessive allele for pale and speckled wing.

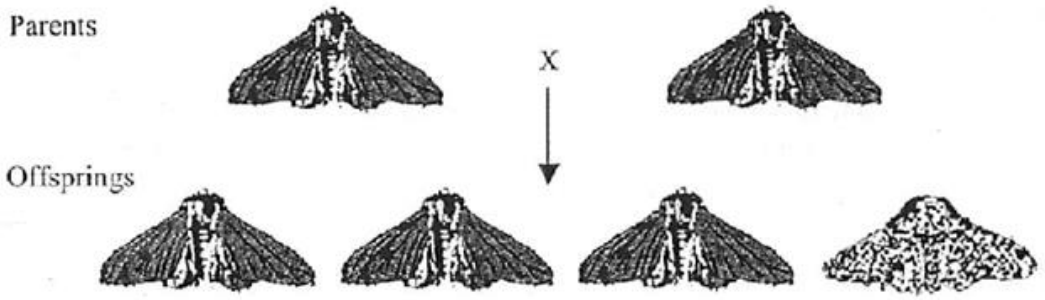


Diagram 2.1

(a) State the genotype for the black colour wing and the genotype of the pale and speckled colour wing. *[2 marks]*

Genotype for the black colour wing: ……
Genotype for the pale and speckled colour wing: ……

(b) State the dominant trait of the moth. Explain your answer. *[2 marks]*

Dominant trait: ……

Explanation:
……
……

(c) Explain how the offspring inherits the pale and speckled colour wing. *[3 marks]*

……
……
……
……

(d) State one importance of having difference in wing colour to the moth. *[1 mark]*

……

(e) **Diagram 2.2** shows the arrangement of genes P, Q, R, S and T on a chromosome. The chromosome is exposed to a type of mutagen.

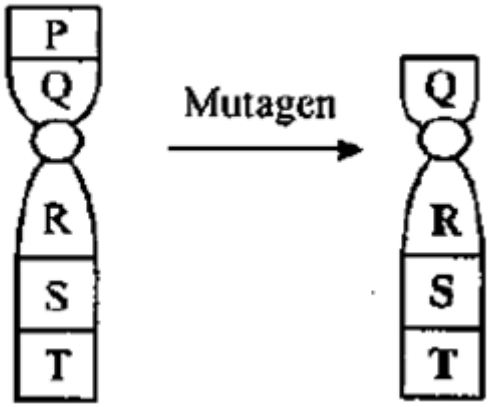


Diagram 2.2

(i) Name the process that causes the occurrence on the chromosome. *[1 mark]*

……

(ii) Explain how the mutagen causes this occurrence. *[3 marks]*

……
……
……

ESSAY QUESTIONS

1(a) Diagram 1.1 and 1.2 shows the histogram of the distribution of genetic variation in human.

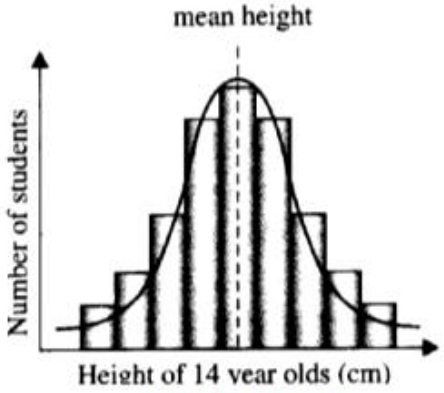


Diagram 1.1

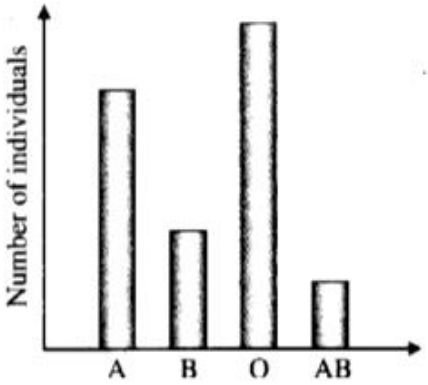


Diagram 1.2

(i) With a suitable example, explain the diffrences of the two types of variation. *[7 marks]*
(ii) What is the importance of variation to organism? *[3 marks]*

(b) Diagram 1.3 and 1.4 shows the genetic factors that produced variation in organism.

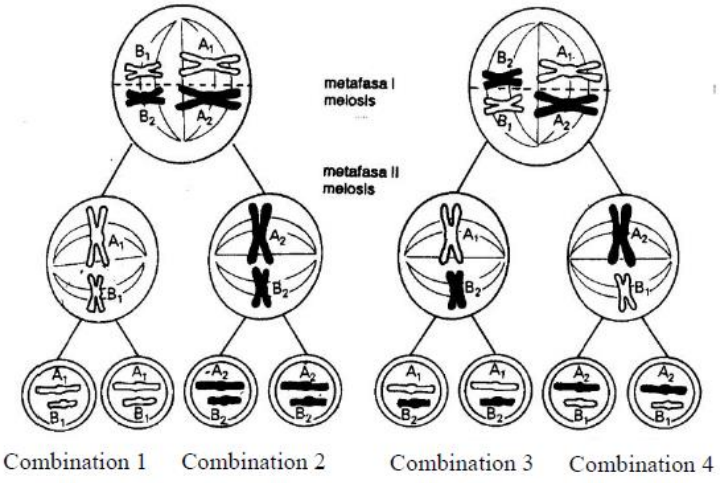


Diagram 1.3

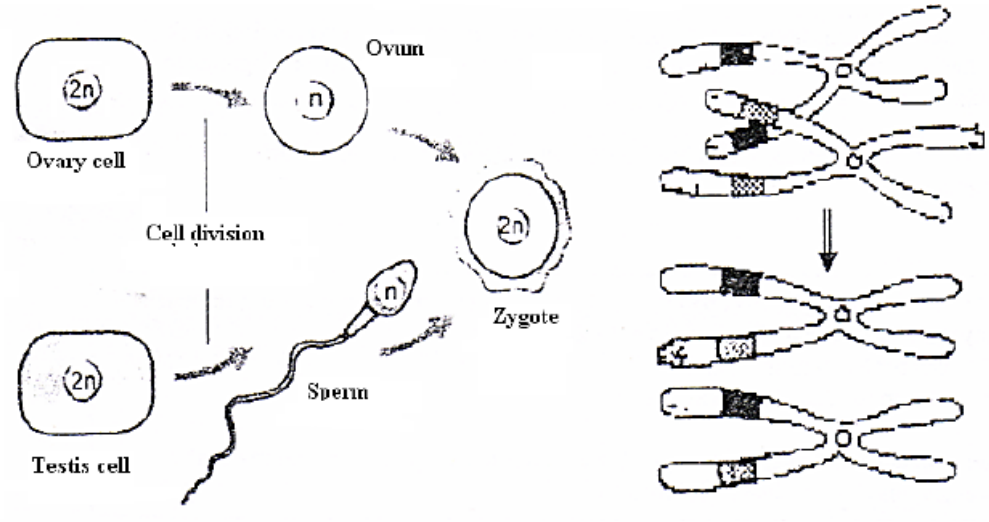


Diagram 1.4

Explain how these factors will cause variation among the organisms .*[10 marks]*

2(a) Two parents who are both thin and are able to roll their tongue have a son who is fat and is able to roll his tongue. Explain how this happens. *[10 marks]*

(b) Diagram 2 shows the colour variation in a species of moth, Biston betularia in polluted environment. Due to natural selection, the white coloured moth's become extinct as well as time passed.

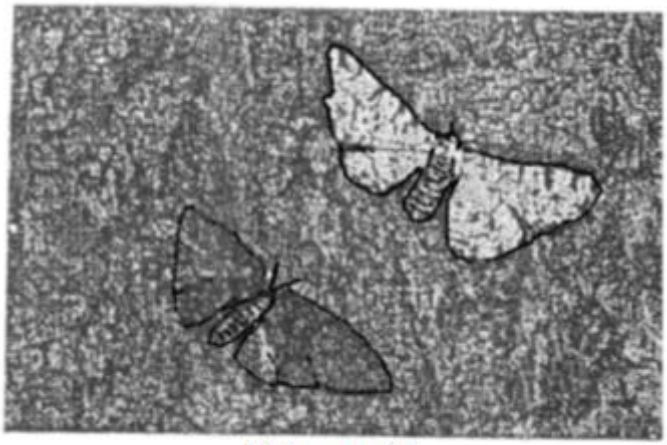
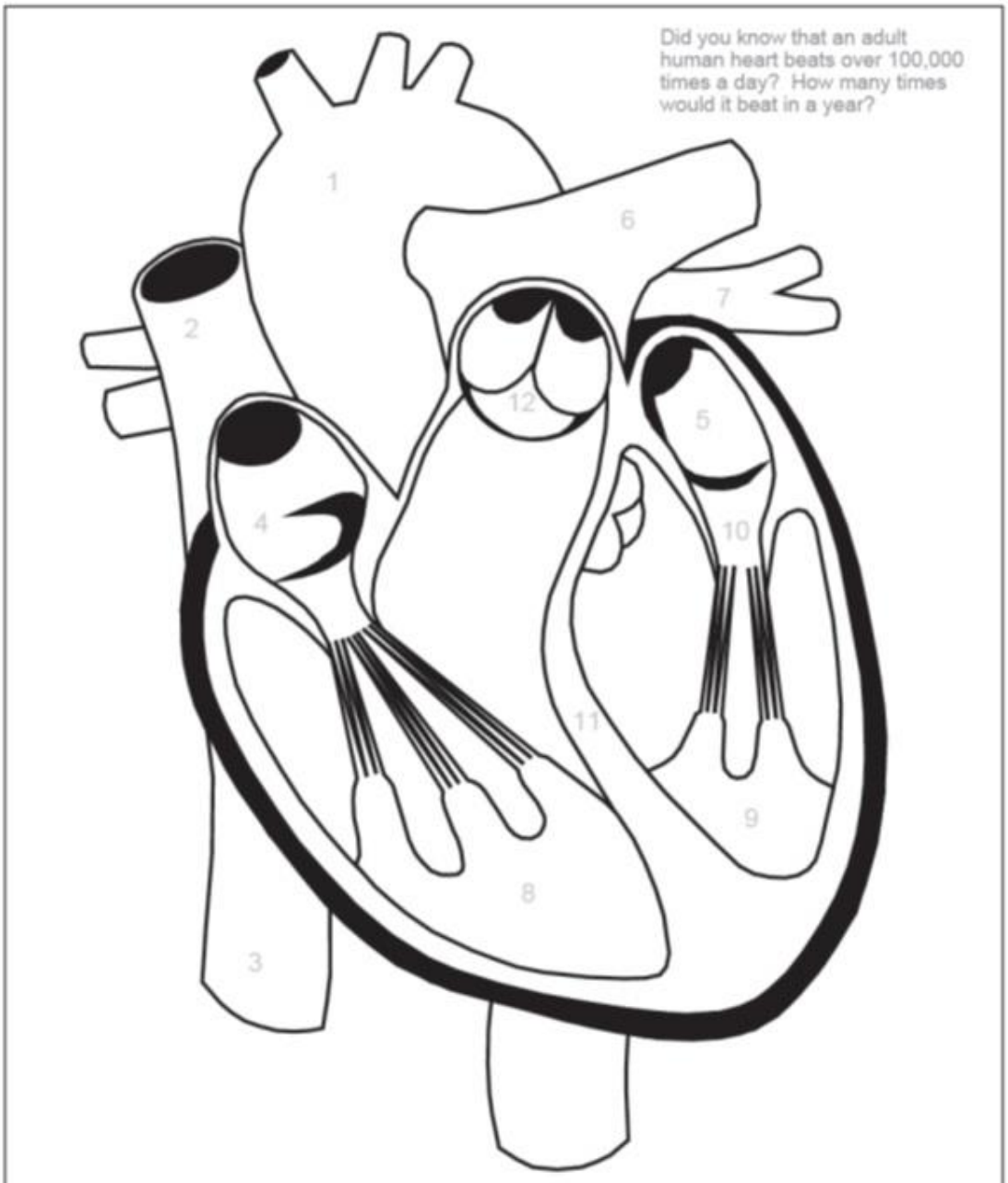


Diagram 2

Based on diagram, explain the meaning of natural selection *[4 marks]*



Ask A Biologist coloring page | **Web address**: askabiologist.asu.edu/activities/coloring Human Heart

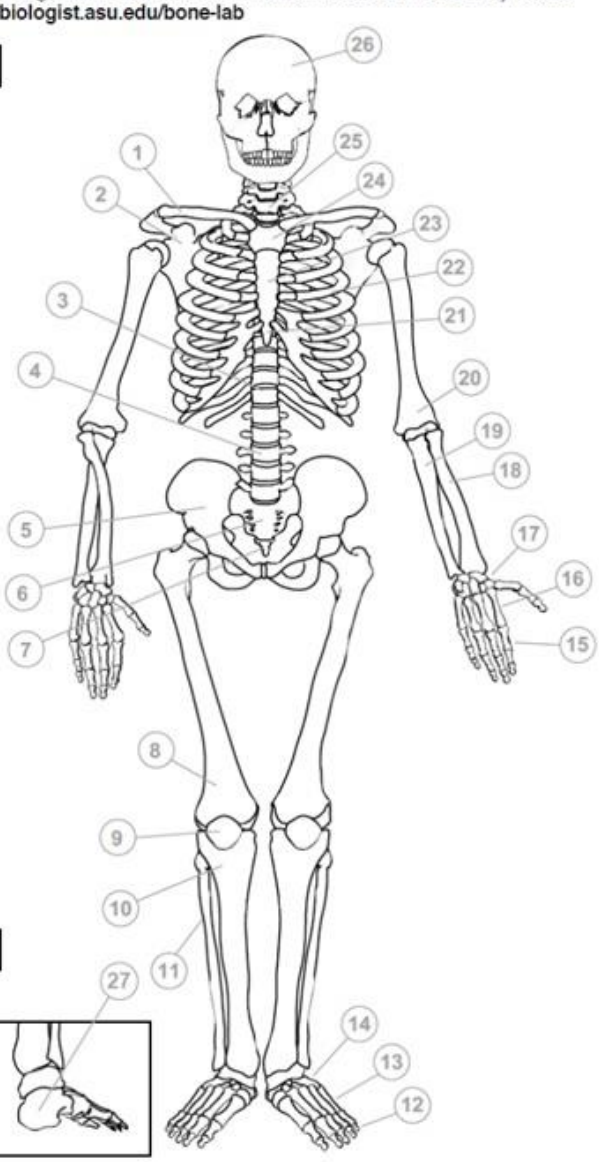
Human Skeleton Anatomy Activity

Our bodies are more than they appear on the outside. Did you know that they are made up of over 200 bones?

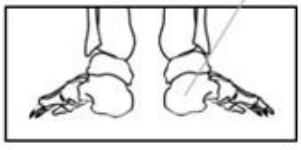
In this worksheet, we are going to review some of the major bones within the body. The parts of the skeleton have been labeled. Your challenge is to write the correct name for each part.

If you want to have more fun learning about bones, try our Bone Lab. You can use our interactive tools and games to learn about the human skeleton and our busy bones.
Visit us at askabiologist.asu.edu/bone-lab

Front View



Back View



1 _____
2 _____
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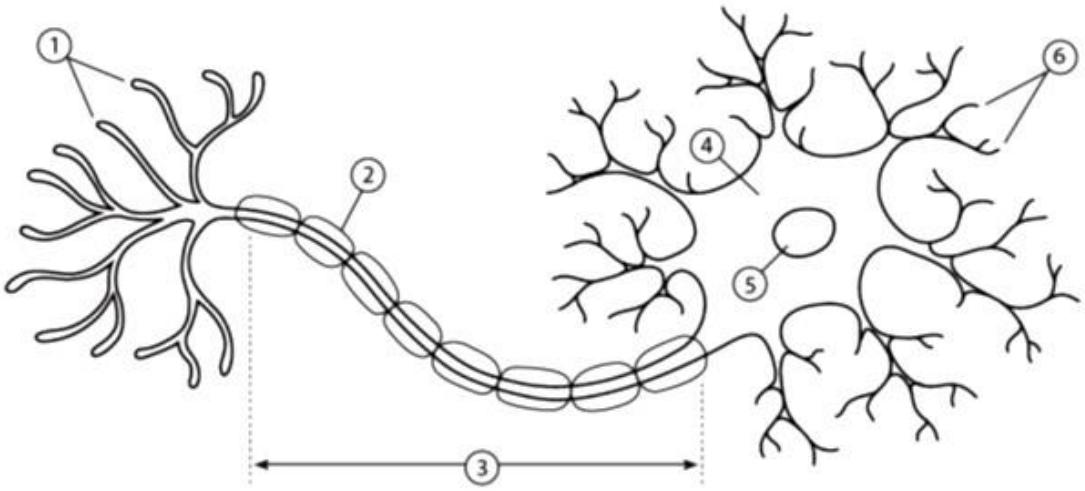
27 _____

Neuron Anatomy Activity

The parts of the neuron have been labeled. Your challenge is to write the correct name for each part and explain what it does. If you need some help, visit the web article listed below.



1. _____

2. _____

3. _____

4. _____

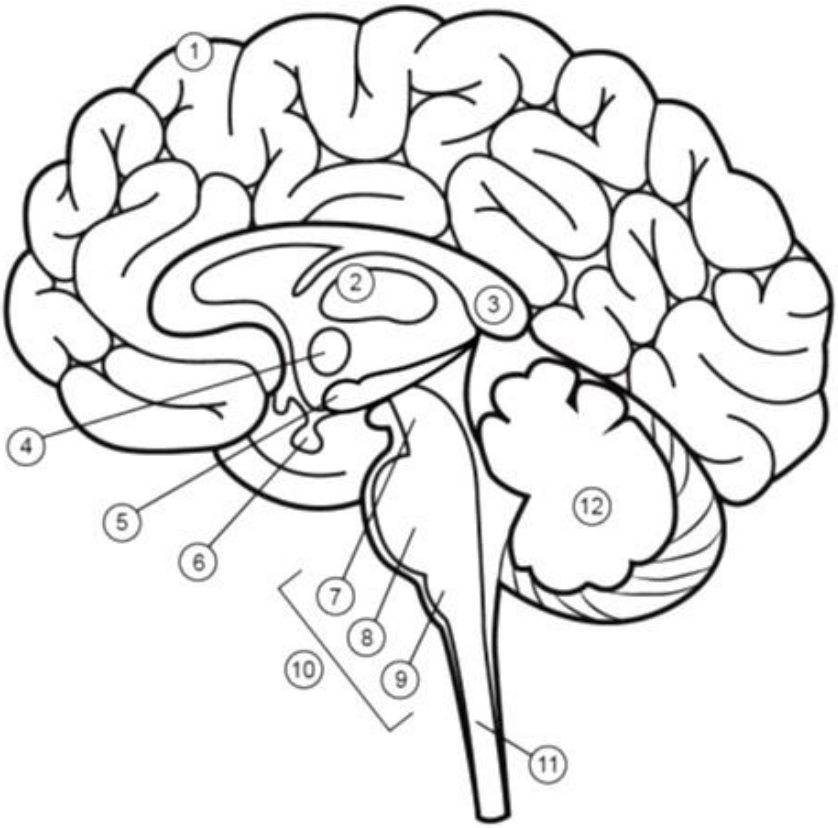
5. _____

6. _____

What's In Your Brain?

The parts of the brain have been labeled.
Your challenge is to write the correct name for each part.

For more fun brain food visit
askabiologist.asu.edu/explore/nervous-journey.



1. _____
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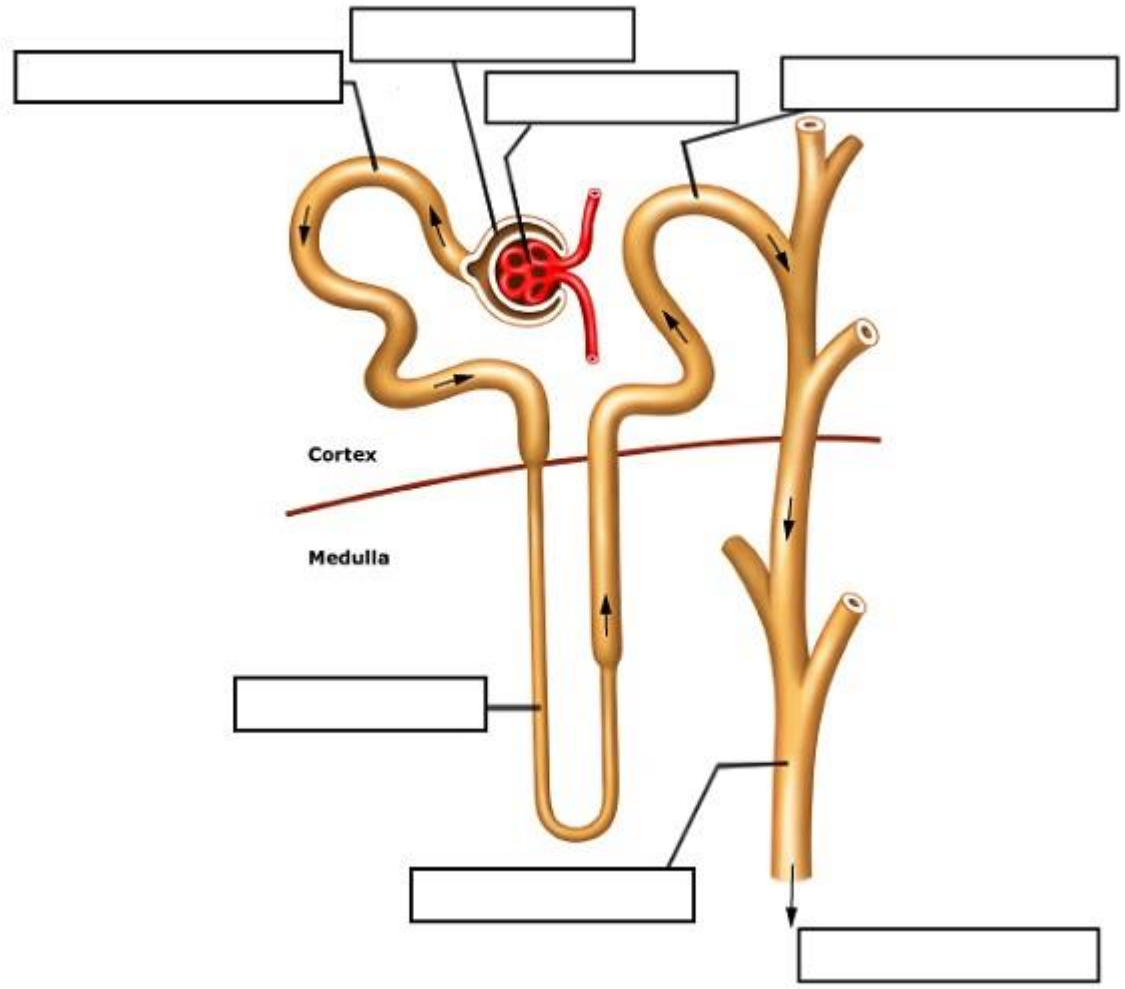
11. _____
12. _____


Cortex
Medulla