



Dr. Bbosa Science

Sponsored by
The Science Foundation College
Uganda East Africa
Senior one to senior six
+256 778 633 682, 753 802709
Based On, best for science

digitalteachers.co.ug



 *Nurture your dreams* 

NAME:.....

STREAM:.....

SENIOR FOUR

553/1

BIOLOGY

PAPER 1

EXAM 17

TIME: 2 HOURS

Instructions:

- Answer **all** questions in section A and B
- Answer **two** questions from section C
- Answers to section A should be written in the table provided.

SECTION A:

Table for section A answers

	A	B	C	D		A	B	C	D
1					16				
2					17				
3					18				
4					19				
5					20				
6					21				
7					22				
8					23				
9					24				
10					25				
11					26				
12					27				
13					28				
14					29				
15					30				

11. Egg-white was placed into test tubes containing the following substances

- Tube 1 Dilute HCL
 Tube 2 Bile salts
 Tube 3 pepsin and dilute HCL
 Tube 4 Renin and dilute HCL

Which of the following test tubes will NOT show pink when heated with Millons reagent?

- A: tube 1 B: tube 2 **C: tube 3** D: ;tube 4

Proteins had been digested to aminoacids

12. Holozoic nutrition involves 5 sequential stages. Which of the following sequences is correct?

- A: digestion – ingestion – assimilation – absorption
B: ingestion – digestion – absorption – assimilation
 C: ingestion – digestion - assimilation – absorption
 D: assimilation – ingestion – digestion – absorption

13. Essential vitamins are those

- A: that can not be produced by the body and taken in diet**
 B: that are produced in the body and not required in diet
 C: that are found in milk at birth
 D: obtained from fruits and prevent in man

14. The raw material of anaerobic respiration is

- A: oxygen B: carbon dioxide C: Alcohol **D: Glucose**

15. A muscle during anaerobic conditions

- A: accumulates inorganic phosphates **B: uses up reserved glycogen**
 C: sweet potato D: Adenosine triphosphate

16. The following are adaptations of plants to life in water except:

- A: small air spaces in stem and leaf**
 D: thin layer of cuticle
 C: poorly developed xylem
 D: many stomata on lower surface than upper surface.

17. The non green parts of variegated leaves get sugar for respiration by

- A: Diffusion from the green parts** B: transpiration pull
 C: translocation through the phloem D: Osmosis

18. Oxygen is normally transported in the

- A: plasma B: platelets C: leucocytes **D: Erythrocytes**

19. Which of the following is likely to happen to a man moving in the cold?

- A: perspiration B: vasodilatation
 C: palpitations **D: vasoconstriction**

20. A person with blood group O is said to be a universal donor because he

- A: lacks antigens in his red blood cells**
 B: lack antibodies in his serum
 C: has both the antigens and antibodies in his blood
 D: has only antigen A in his red blood cells

21. Which of the following is not an advantage of vegetative propagation?

- A: maintenance of parental characteristics in the offspring
B: Early maturity of the offspring
 C: production of more vigorous offspring
 D: increases the chances of colonising new areas

22. Menstruation may be defined as

- A: the release of an egg from the ovary
B: the loss of uterine lining when an egg is not fertilised
 C: the fusion of the nuclei of the egg and sperm
 D: the production of a placenta to nourish the embryo.

23. A fruit containing many seeds and when ripe splits down both sutures is called...

- A:** legume B: follicle C: capsule D: Schizocarp

24. Albinism is inherited through double recessive genes. If (A) stands for normal skin colour and (a) for recessive skin colour absence. Which of these parental crosses would produce 25% Albino offspring.

- A: AA x Aa B: AA x aa **C:** Aa x Aa D: aa x aa

25. Hinge joints may be found in each of the following place except the

- A: knee **B:** neural spine C: Elbow D: Finger

26. Which of the following structures/substances is responsible for hardness in wood?

- A: pith B: phloem C: xylem **D:** lignin

27. The rate of glomerular filtration is highest in

- A: man B: Amphibians
C: fresh water fishes D: marine fishes

28. Which one of the following would lead to excretion of large quantities of sugar in urine of man?

- A:** Removal of the pancreas B: drinking large quantities of water
 C: A hot day D: A meal rich in carbohydrates

29. A nocturnal bird was found to have a retina composed entirely of rods. This means that it

- A: has good colour vision **B:** has accurate vision in dim light
 C: can only focus on distant object D: can judge distance very well

30. Dwarfism may be caused by the lack of

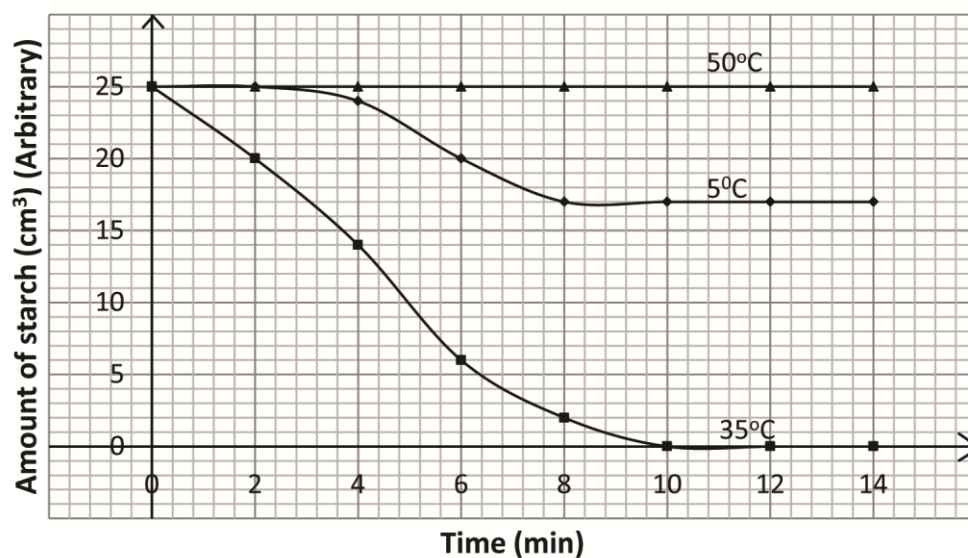
- A: Adrenalin **B:** Thyroxin C: Insulin D: Graffian follicle

31. S4 students performed an experiment to find out the effect of saliva incubated at different temperature on starch. 5 cm^3 of saliva was added to 25 cm^3 of starch solution. Drops were withdrawn from the test tubes at 2 minutes intervals and amount of starch was tested.

Time (min)	Amount of starch (cm^3) (Arbitrary)		
	5°C	35°C	50°C
0	25	25	25
2	25	20	25
4	24	14	25
6	20	6	25
8	17	2	25
10	17	0	25
12	17	0	25
14	17	0	25

- (a) Using a graph paper, plot a graph of amount of starch (Y – axis) against time (x – axis)

A graph of amount of starch against time



- (b) (i) Briefly describe the shape of the graphs at 5°C

The amount of starch reduces very slowly in the first 4 minutes, then reduces relatively first in the next four minutes and finally remains constant at 17 units per cm^3 for the rest of the experiment

35°C

The amount of starch per cm^3 reduces rapidly to zero units in 10 minutes and remains zero for the rest of the experiment

50°C

The amount of starch per cm^3 remained unchanged during the period of the experiment

- (ii) Explain each of the graphs above

5°C

The amount of starch reduced slowly because the enzyme amylase is inactive at low temperature

35°C

The amount of starch reduced rapidly because the enzyme amylase is very active and broke down starch to sugars

50°C

The amount of starch remained unchanged because the enzyme amylase is denatured by high temperature and unable to break down starch

(c) (i) What was the effect of saliva on the starch

It breaks down starch to maltose

(ii) Which of the above temperatures is suitable for the action of salivary amylase?
35°C

(iii) Give a reason for your answer in (ii) above

It is the temperature at which the enzyme worked fastest

(d) Another student tested the contents of the tube using Benedict's solution. Explain what will be observed at time 0 and time 14

Time 0

Color of Benedict's solution remained blue

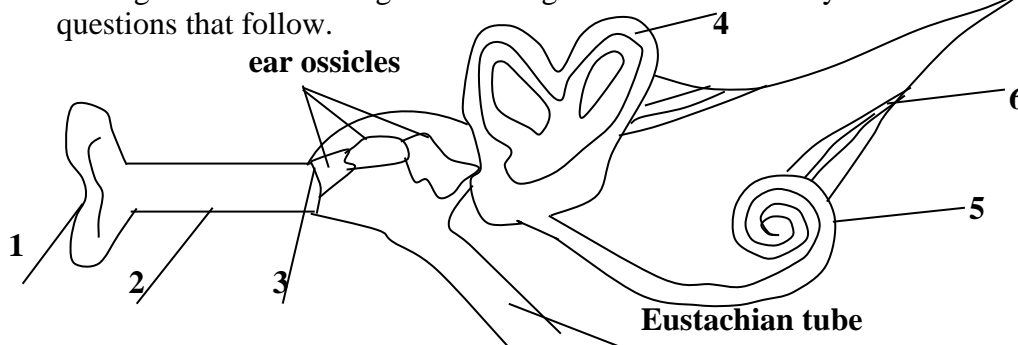
Time 14

5°C Color changed from blue to green

35°C Color changed from blue to green, to yellow to orange precipitates

50°C Color of Benedict's solution remained blue

32. The figure below is a diagram showing the human ear. Study it and answer the questions that follow.



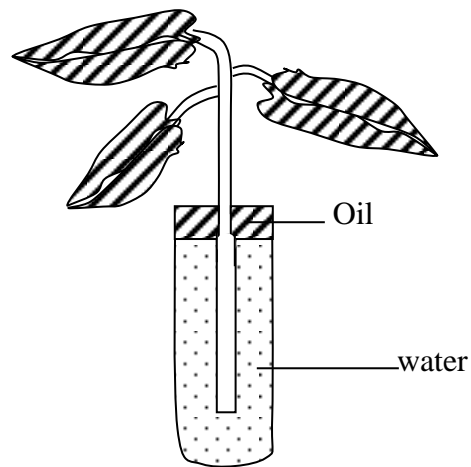
(a) (i) Label structures

1. Pinna
2. Ear canal
3. Ear drum
4. Semi-circular canal
5. cochlea

6. Auditory nerves

- (ii) What is the function of the substance produced by the structure 2?
Wax protects the ear from invasion of organisms and keeps away dirt and debris from the ear drum
- (iii) When mucus fills the Eustachian tube, hearing is impaired. Explain why.
It may causes increase in pressure in the middle air which distorts vibration of the eardrum and ossicles
- (b) In what ways do the following parts help the organism to her?
- (i) Ear Ossicles
Amplify vibration of the eardrum and conduct them to oval window
- (ii) Structure 3
Vibrates when hit by sound waves
- (iii) Structure 6
Conducts impulses to the brain for interpretation

33. S4 students arranged an experiment to investigate the factors affecting the rate of transpiration as shown below.



When the apparatus was weighed it was found to be 50g. It was then weighed at one-hour interval in the different environmental conditions and results are shown in the table below.

Table of results

Condition	Weight of apparatus (g)		
	1 hr	2 hrs	3 hrs
Windy	33	25	18
Darkness	47	44	42
Light	30	22	16

- (a) (i) What was the purpose of oil in this experiment?
To prevent evaporation of water
- (ii) In all the environmental conditions explain why the weight of the apparatus decreased with time.

Because water was lost by transpiration

- (b) (i) A large decrease in the weight of the apparatus was registered during light conditions than during darkness. Explain why.

Light causes the stomata to open increasing the rate of transpiration

- (ii) How does wind affect the results of the experiment?

Wind blows away humid air from the surface of the leaves increasing the rate of transpiration

SECTION C

34. (a) What do you understand by the term osmosis?

Osmosis is the passage of solvent molecules from a region of their high concentration to a region of their low concentration through a partially permeable membrane.

(b) An onion epidermis was placed in a strong/ concentrated sugar solution for 40 minutes. Another epidermis was placed in pure water for 40 minutes. Explain what happened in epidermis cells.

The cells of the epidermis placed in strong sugar solution lost water by osmosis, and became flaccid

The cells of the epidermis placed in pure water gained water by osmosis, swell and became turgid

35. (a) What do you understand by the following terms

(i) Heterozygote

Heterozygous refers to **having different alleles for a particular trait**

(ii) Co-dominance

Codominance, in genetics, **phenomenon in which two alleles (different versions of the same gene) are expressed to an equal degree within an organism.**

(iii) Sex linked genes

Sex linked genes are those that sit on sex chromosomes and that are inherited differently in males and females

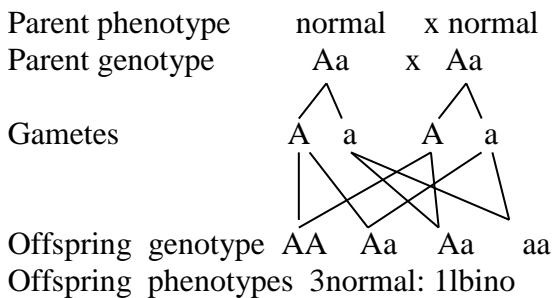
(iv) Multiple alleles

(b) Albinism is a condition where the skin fails to produce the skin pigment melanin.

An Albino man married a normal woman and all their children were normal. One of the children married a woman whose mother was an albino and the father was normal. What is the phenotypic and genotypic ratio of their children?

A – normal skin allele

a – recessive allele for albino

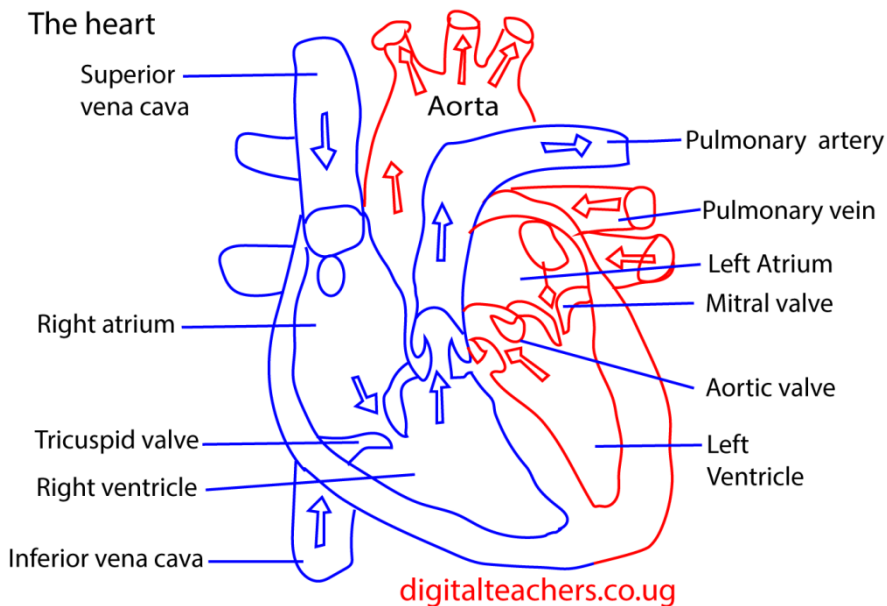


36. (a) Give the structural differences between an artery and a vein

Structural differences between arteries and veins

	Arteries	veins
1.	Thick wall	Thin walls
2.	Narrow lumen	Broad lumen
3.	Have no valves except pulmonary artery and aorta	Have valves

(c) Describe blood flow through the mammalian heart



Circulation in the heart

Blood returning via the venae cava enters the right atrium. The resulting pressure in this chamber forces open the flaps of the **tricuspid valve**. The result is that blood flows through the atrioventricular opening into the right ventricle.

When the atrium and ventricle are full of blood the atrium suddenly contracts, propelling the remaining blood into the ventricle. The contraction spreads from the right atrium over the rest of the heart. Atrial systole is relatively weak but the ventricles, whose thick walls are particularly well endowed with muscles, contract more powerfully. As a result, blood is forced from the right ventricle into the pulmonary artery.

The blood is prevented from flowing back into the atrium by the flaps of the atrio-ventricular opening. The atrio-ventricular valve is prevented from turning inside out by tough strands of connective tissue, the tendinous cord or “heart strings” which run from the underside of each flap to the wall of the ventricle

Once in the pulmonary artery, blood is prevented from flowing back into the ventricle by pocket like **semilunar** valves guarding the opening of pulmonary artery.

From the lungs oxygenated blood returns to the left atrium via the pulmonary veins. It is then conveyed to the left ventricle and so into the **systemic arch** which leads to the **aorta**. The flow of blood takes place in the atrioventricular valve consists of two flaps rather than three, for which reason. It is called the **bicuspid valve**. It is also known as the **mitral valve** because its two flaps are rather like a bishop’s miter.

Although systole starts at the right atrium, it quickly spreads to the left so that the whole heart appears to contract synchronously. The de-oxygenated blood is pumped from the right ventricle into the pulmonary artery at the same time as oxygenated blood is pumped from the left ventricle in the aortic arch.

Systole is followed by diastole during which the heart refills with blood again. The entire sequence of events is known as the **cardiac cycle**.

37. (a) Give the structural adaptations of the xylem and the phloem for their functions

Adaptations of the xylem

1. Cross walls are perforated or completely removed to form continuous tubes from roots to stems and leaves
2. Xylem vessels have no living contents to allow water to flow freely
3. Contain bordered pits to allow water cross to living cells
4. Lignified to prevent water loss
5. Lignified to prevent them from collapsing under negative pressure of transpiration pull.
6. Small tube to enable high capillarity
7. Xylem walls have high adhesive forces.

Adaptations phloem for its functions

1. Lack a nucleus and most cell organelles to leave room for transportation of food
2. The sieve plates are perforated to allow rapid flow through from one cell to another.
3. Has filament for quick transport by streaming
4. Intimate association with companion cells to obtain energy and materials

(b) Explain why plants do not have excretory organs.

- Most of plant wastes are gaseous (oxygen from photosynthesis and carbon dioxide from respiration) and are lost by diffusion through stomata.
- There is very little accumulation of toxic wastes e.g. nitrogenous wastes because plants are inactive
- Excess water passes to the exterior via similar routes and is eliminated by processes of guttation (droplet exudation) and transpiration (evaporation of water from plant surfaces).
- Plants use waste plants (oxygen for respiration and carbon dioxide for photosynthesis)
- The plant wastes are stored in cellular vacuoles, and lost in leaves that fall off. Some other waste products are stored in the xylem, like resins and gums.

END