**AGA KHAN UNIVERSITY EXAMINATION BOARD**

**SECONDARY SCHOOL CERTIFICATE**

**CLASS IX**

**ANNUAL EXAMINATIONS 2021**

**Biology**

**Total Time: 1 hour 40 minutes**

**Total Marks: 50 (40-Theory & 10-Alternate to Practical)**

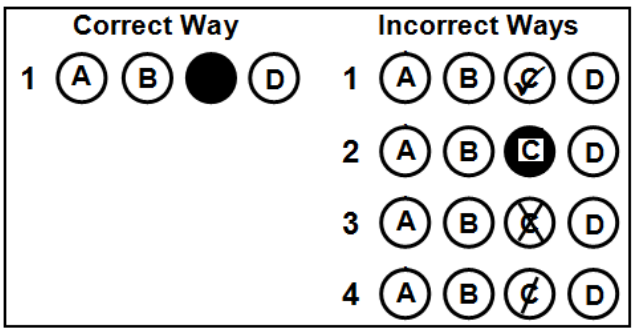
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**INSTRUCTIONS**

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 50 only.
4. Question Distribution:

| Theory | Alternate to Practical (ATP) |
|---|---|
| 40 MCQs | 10 MCQs |

5. In each question, there are four choices A, B, C, D. Choose ONE. On the answer grid, black out the circle for your choice with a pencil as shown below.




**Candidate's Signature**

6. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
7. DO NOT write anything in the answer grid. The computer only records what is in the circles.
8. The marks obtained on the 40 MCQs will be equated to the total marks of 65 for the theory examination results.
9. You may use a simple calculator if you wish.

## THEORY (Questions 1-40)

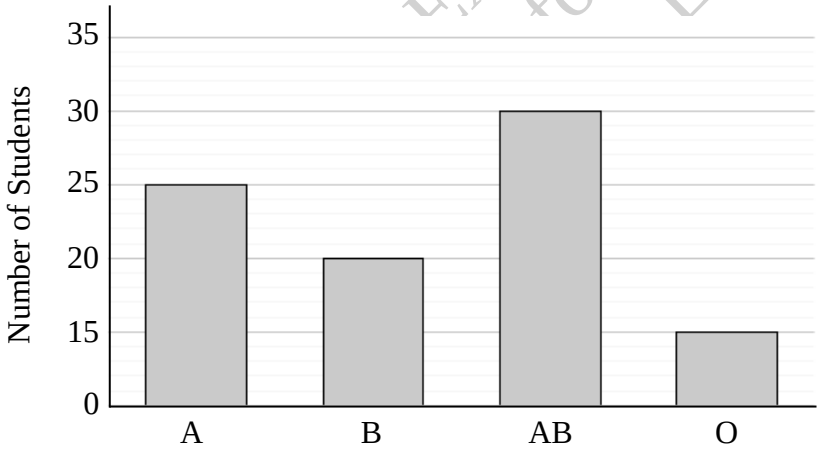
1. Sara wants to study the toxic effect of two different types of insecticides (**M** and **N**) on insects in stored grains. The given table shows the experimental set-up.

| | **Container X Insecticide M** | **Container Y Insecticide N** |
|---|---|---|
| Amount of grain | 200 grams | 200 grams |
| Amount of insecticide applied | 0.25 mL | 0.25 mL |
| Number of insect treated | 10 | 10 |

To complete the experimental set-up, Sara should design the control group by treating insects with

A. insecticide N.
B. insecticide M.
C. distilled water.
D. mixture of insecticides M and N.

2. The given graph shows the number of students having different blood groups in a class.

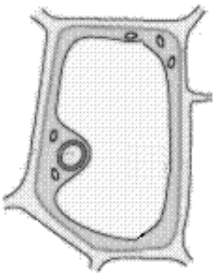



If three students with blood group A and four students with blood group B leave the class while two students with blood group O join the class, then which blood group students are present least in number?

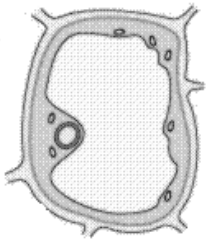
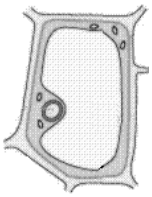
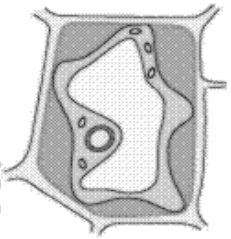
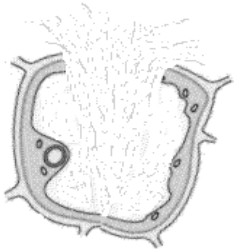
A. O
B. A
C. B
D. AB

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3. The diagram below shows a plant cell when placed in an isotonic solution.



If the same cell is placed in a hypertonic solution for two hours, then the state of the plant cell is diagrammatically represented as is

| | | | |
|---|---|---|---|
|  |  |  |  |
| A | B | C | D |

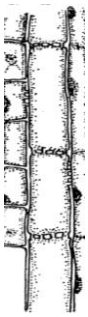
4. The cell organelle which forms a network of interconnecting canals and continues with the nuclear envelope is identified as the

A. ribosome.
B. mitochondrion.
C. Golgi apparatus.
D. endoplasmic reticulum.

5. In the cell, Golgi apparatus lies near the endoplasmic reticulum because Golgi apparatus

A. provides mechanical strength to the endoplasmic reticulum.
B. receives and utilises ATP molecules from the endoplasmic reticulum.
C. modifies and packages proteins produced by the endoplasmic reticulum.
D. controls the movement of substances in and out of the endoplasmic reticulum.

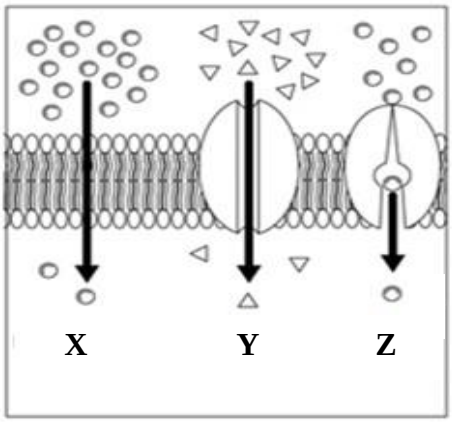
6. The diagram that represents phloem vessels in plants is

| | | | |
|---|---|---|---|
|  |  |  |  |
| A | B | C | D |

7. The organelle which is ABSENT in the root hair cell is

A. nucleus.
B. vacuole.
C. cell wall.
D. chloroplast.

8. The given diagram represents different transport mechanisms across the plasma membrane.




In the given diagram, facilitated diffusion is represented as

A. X only.
B. Z only.
C. Y and Z.
D. X and Y.

9. The option that is CORRECT about the number and function of vacuole in an animal cell is

| | Number | Function |
|---|---|---|
| A | single | transports nutrients throughout the cell |
| B | multiple | maintains the cell shape |
| C | multiple | stores nutrients |
| D | single | synthesises enzymes |

10. In the mitochondria of a cell, the presence of inner membrane with large surface area is significant for the

A. storage of lipids.
B. removal of waste materials.
C. protection of cell organelles.
D. occurrence of chemical reactions.

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11. In the chloroplast of a plant cell, if thylakoid membrane is damaged, then this will directly affect the

    A. Krebs cycle.
    B. Calvin cycle.
    C. process of glycolysis.
    D. light dependent reactions.

12. During a strenuous exercise, ATP (adenosine triphosphate) helps in the

    A. contraction of skeletal muscles.
    B. transportation of oxygen to muscles.
    C. storage of glucose in the muscle fibres.
    D. conversion of amino acids into proteins.

13. Dark reactions of photosynthesis involve the

    A. utilisation of ATP.
    B. photolysis of water.
    C. liberation of oxygen.
    D. production of NADPH.

14. During photosynthesis, oxygen gas is released by the splitting of

    A. pyruvic acid.
    B. water molecules.
    C. glucose molecules.
    D. carbon dioxide gas.

15. In the absence of Calvin cycle of photosynthesis, the plant will be unable to

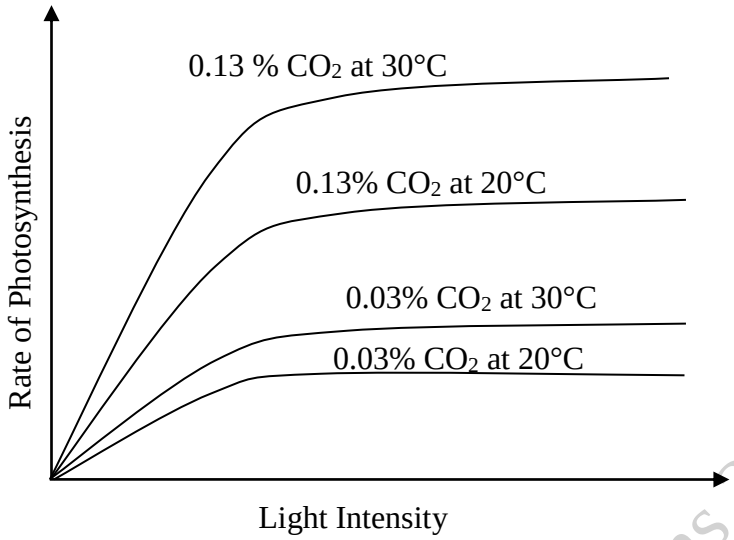
    A. synthesise glucose.
    B. reduce NADP to NADPH.
    C. breakdown water molecules.
    D. synthesise ATP and NADPH.

16. In anaerobic respiration, the total net yield of ATP molecules after the oxidation of a glucose molecule is

    A. 2
    B. 4
    C. 36
    D. 38

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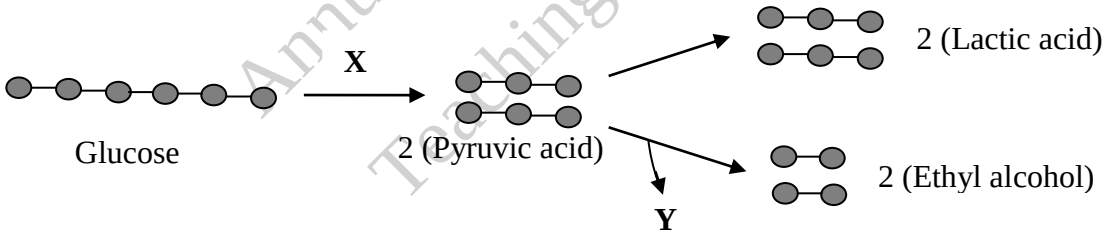
17. The given graph shows the effects of different levels of factors on the rate of photosynthesis.




Based on the given graph, it can be inferred that the rate of photosynthesis

A. increases with the decrease in temperature.
B. is inversely proportional to the light intensity.
C. increases significantly with the increase in $CO_2$ concentration and temperature.
D. increases continuously with the increase in the light intensity and $CO_2$ concentration.

18. The given diagram shows some events of anaerobic respiration.




Which process and by-product formation occurs at **X** and **Y**, respectively?

| | **X** | **Y** |
|---|---|---|
| A | Glycolysis | Carbon dioxide |
| B | Glycolysis | Water |
| C | Alcoholic fermentation | Carbon dioxide |
| D | Alcoholic fermentation | Water |

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19. In the human respiratory system, gaseous exchange takes place between the

A. alveoli and capillaries.
B. trachea and capillaries.
C. alveoli and bronchioles
D. trachea and bronchioles.

20. The respiratory disorder in which bronchioles become inflamed and narrow is

A. asthma.
B. pneumonia.
C. emphysema.
D. tuberculosis.

21. In the human respiratory system, the function of epiglottis is to

A. moist and warm the incoming air.
B. keep the air ways open all the time.
C. filter dust particles and kill the bacteria.
D. prevent the food particles from entering the trachea.

22. Which of the following is CORRECT about the change in the pressure and volume of thoracic cavity during exhalation?

| | **Pressure in Thoracic Cavity** | **Volume of Thoracic Cavity** |
|---|---|---|
| A | Increases | Increases |
| B | Increases | Decreases |
| C | Decreases | Increases |
| D | Decreases | Decreases |

23. Phosphorus is classified as a macronutrient for plants because it is

A. required in large amount.
B. abundantly present in the soil.
C. present in large molecular size.
D. produced by plants in large amount.

24. Phytonadione is a medicine that is prescribed to patients with blood clotting problems.

The vitamin which plays a similar function to phytonadione is

A. vitamin A.
B. vitamin C.
C. vitamin D.
D. vitamin K.

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25. Sarosh eats a slice of white bread with butter and grilled beef in her breakfast.

The nutrient which is present in LEAST amount in her breakfast is

A. lipids.
B. fibres.
C. proteins.
D. carbohydrates.

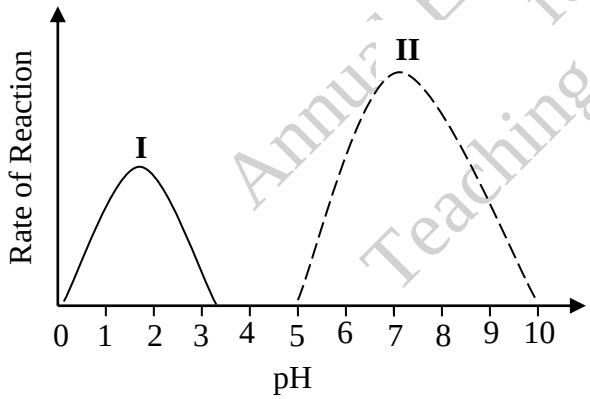
26. The part of the human digestive system where the digestion of proteins begin is

A. Ileum.
B. mouth.
C. stomach.
D. duodenum.

27. The CORRECT pathway for the food bolus to enter stomach is

A. oesophagus → pyloric sphincter.
B. oesophagus → cardiac sphincter.
C. pyloric sphincter → oesophagus.
D. cardiac sphincter → oesophagus.

28. The given graph shows the optimum activity of two enzymes at different pH in the human digestive system.




The option that CORRECTLY identifies the parts of digestive system where enzymes (**I** and **II**) work is

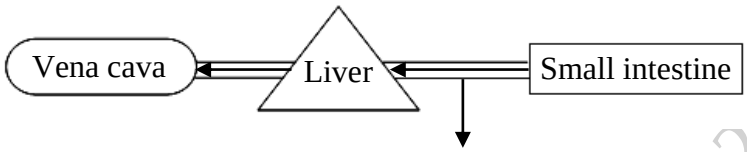
| | **Enzyme I** | **Enzyme II** |
|---|---|---|
| A | stomach | mouth |
| B | mouth | duodenum |
| C | duodenum | stomach |
| D | duodenum | mouth |

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29. The part(s) of the human digestive system where both chemical and mechanical digestion of food take place is/ are

A. large intestine only.
B. small intestine only.
C. stomach and mouth.
D. small intestine and stomach.

30. The given diagram represents the pathway of blood flow from the small intestine to the vena cava.




Blood vessel **Y**

The option that is CORRECT about vessel **Y** is

| | **Identification of Y** | **Composition of Fluid Inside Y** |
|---|---|---|
| A | hepatic vein | glucose |
| B | hepatic vein | glycogen |
| C | hepatic portal vein | glucose |
| D | hepatic portal vein | glycogen |

31. The given diagram illustrates a process that occurs in the digestive system of human beings. This process is called

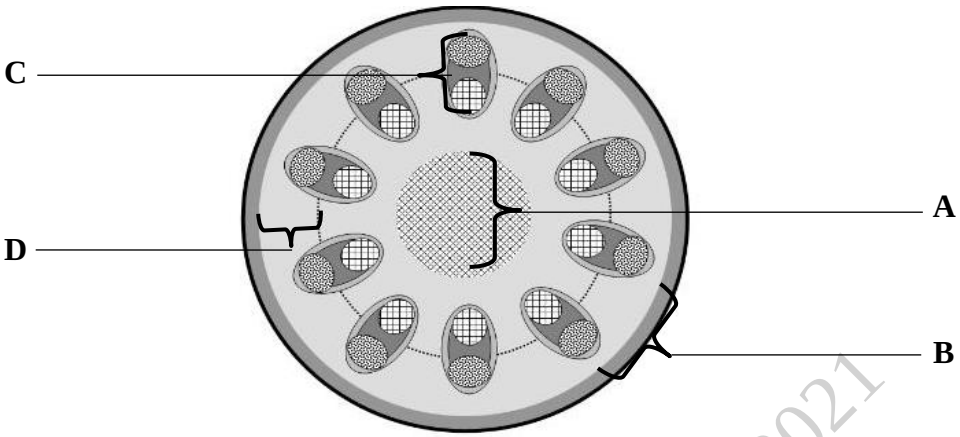


Fat drop Fat droplets

A. assimilation.
B. deamination.
C. emulsification.
D. chemical digestion.

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32. The given diagram represents cross section through a young non-woody dicot stem. In this diagram, the vascular bundle is labelled as




33. In an experiment a thin layer of petroleum jelly (Vaseline) is used to cover the underside of leaves.

How does this application affect the plant's physiology?

A. It strengthens cuticles.
B. It inhibits ATP formation.
C. It reduces transpiration rate.
D. It increases sunlight absorption.

34. Following are the parts of a growing plant.

I. Roots
II. Mature leaves
III. Tubers

In the middle of growing season, the part(s) which act(s) as source is/ are

A. I only.
B. II only.
C. I and II.
D. II and III.

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35. Diagram **I** represents a plant in wilted state, while diagram **II** represents the same plant in the normal state.



Diagram **I**

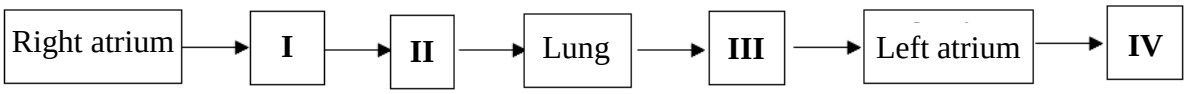


Diagram **II**

Which of the following conditions are required for the plant shown in diagram **I** to regain the state shown in diagram **II**?

| | **Rate of Absorption** | **Rate of Transpiration** |
|---|---|---|
| A | Decreased | Increased |
| B | Increased | Decreased |
| C | Decreased | Decreased |
| D | Increased | Increased |

36. The given flow chart shows the pathway of blood through heart and lungs.




The part of heart which has the thickest walls and the highest internal pressure is labelled as

A. I.
B. II.
C. III.
D. IV.

37. Consider the given characteristics of a blood vessel.

| **Blood Pressure** | **Concentration of Oxygen** | **Target Organ** |
|---|---|---|
| Low | High | Heart |

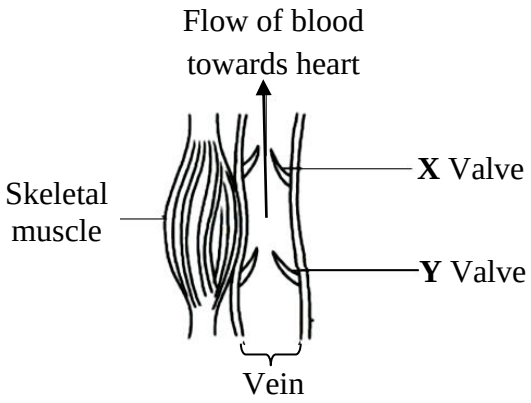
The blood vessel identified is

A. renal artery.
B. femoral vein.
C. hepatic artery.
D. pulmonary vein.

38. In the human circulatory system, the blood vessel which has the highest blood pressure is the

A. aorta.
B. venules.
C. arterioles.
D. vena cava.

39. The given diagram represents the regulation of blood flow in a vein.

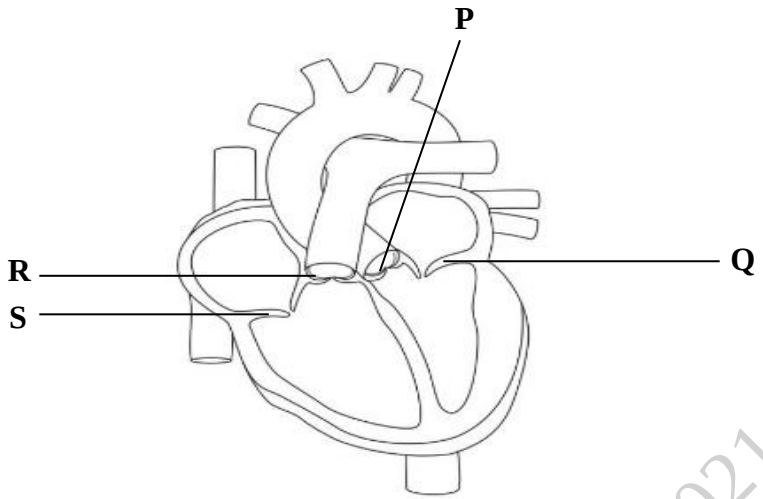



What would be the condition of valves **X** and **Y** when the adjacent skeletal muscles are contracted and the flow of blood is towards the heart?

| | **X** | **Y** |
|---|---|---|
| A | Open | Open |
| B | Close | Open |
| C | Close | Close |
| D | Open | Close |

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40. The given diagram represents the human heart.

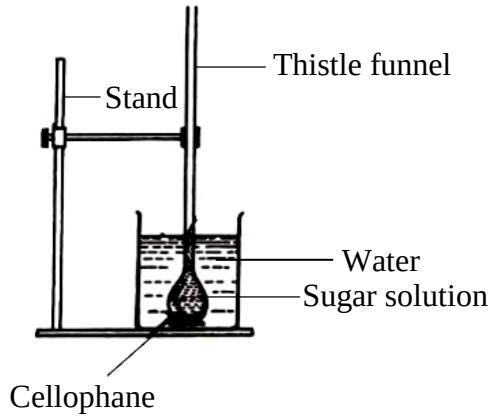



Which of these labelled valves are CORRECTLY aligned with their function?

| | Allows Flow of Blood from | |
|---|---|---|
| | **Right Ventricle to Pulmonary Trunk** | **Left Ventricle to Aorta** |
| A | S | Q |
| B | P | R |
| C | R | P |
| D | Q | S |

**<u>ALTERNATE TO PRACTICAL</u> (ATP: Questions 41-50)**

41. The diagram represents an experimental set-up for the demonstration of osmosis.




In contrast to the solution in the beaker, the solution in the thistle funnel is

A. dilute.
B. isotonic.
C. hypotonic.
D. hypertonic.

42. Four potato cubes (**W**, **X**, **Y** and **Z**) were immersed in separate beakers, each containing iodine solution. After fifteen minutes, they were taken out. All cubes were then cut into half to see the depth of diffusion.

The given table shows the result of this experiment.

| Potato Cubes | Length of One Side of Potato Cube (cm) | Surface Area to Volume Ratio | Depth of Diffusion (cm) |
|---|---|---|---|
| W | 0.6 | 10 | 0.5 |
| X | 1 | 6 | 0.4 |
| Y | 2 | 3 | 0.3 |
| Z | 4 | 1.5 | 0.12 |

The cube that has absorbed the iodine solution at the MOST efficient rate is

A. W.
B. X.
C. Y.
D. Z.

43. The given diagram represents a microscopic view of one of the types of muscle tissues.

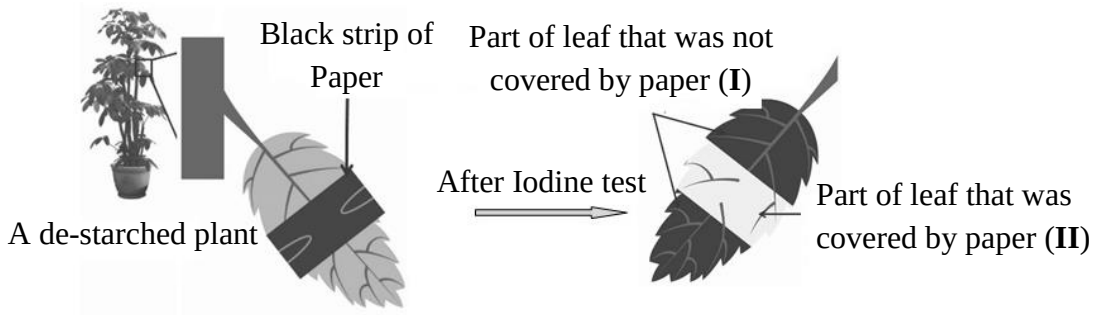



This type of muscle tissue is present in

A. eyes.
B. triceps.
C. ear pinnae.
D. blood vessels.

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44. The given image shows an experimental set-up in which a de-starched plant is kept in the sunlight for a day and an iodine test was conducted on the experimental leaf.



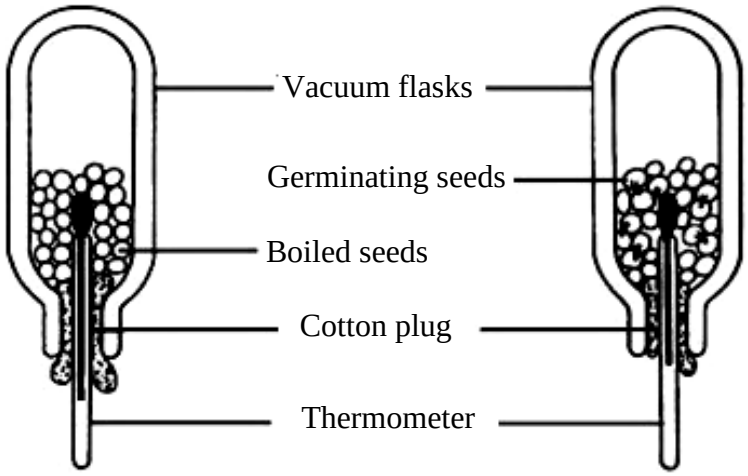

Experimental Set-Up

The option that CORRECTLY identifies the part of experimental leaf which shows the presence of starch and the reason of this result is

| | **Identification** | **Reason** |
|---|---|---|
| A | I | It obtained required sunlight to synthesise starch. |
| B | I | Stored starch is converted into maltose. |
| C | II | It obtained required carbon dioxide to form sucrose. |
| D | II | Stored starch is used by the plant. |

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45. The given experimental set-up shows that heat is produced during respiration in germinating peas.




The given result is obtained after keeping this set-up for 3-4 days which is inaccurate.

| | **Vacuum Flask Containing Boiled Seeds** | **Vacuum Flask Containing Germinating Seeds** |
|---|---|---|
| **Temperature** | 25°C | 24°C |

Which of the following would be the possible reason for increased temperature in the vacuum flask containing boiled seeds?

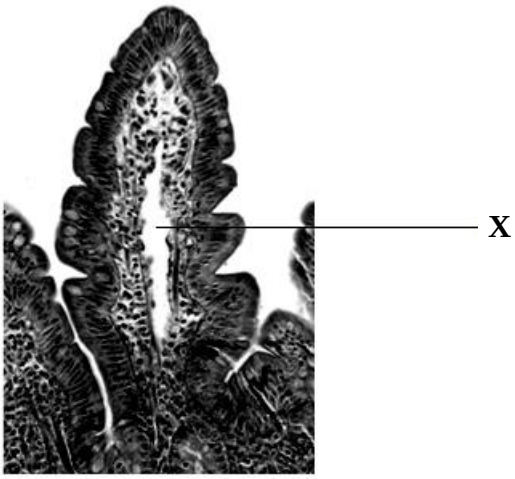
A. Some bacteria might be present in the flask.
B. Carbon dioxide content in the flask might be increased.
C. Cotton wool might prevent the escape of heat from the flask.
D. A vacuum flask might have increased the internal temperature.

46. A variegated leaf is used to investigate the factor necessary for photosynthesis because a variegated leaf

A. synthesises glucose at a high rate.
B. contains large amount of chlorophyll.
C. absorbs maximum amount of sunlight.
D. contains some green and white patches.

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47. Given is the microscopic image of the transverse section of a part of the human small intestine.




The labelled part **X** is identified as

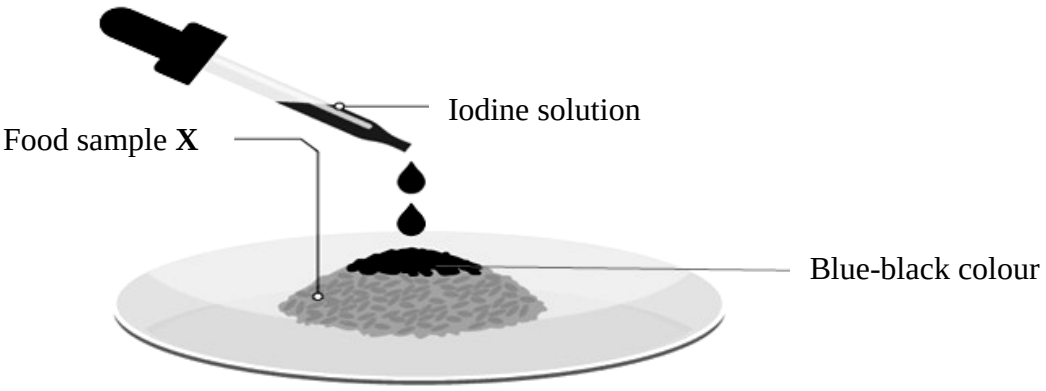
A. lacteals.
B. Goblet cells.
C. blood vessels.
D. smooth muscles.

48. A pregnant woman's urine sample was tested positive for Benedict's test.

This positive result indicates that the urine sample contains

A. lipid.
B. glucose.
C. proteins.
D. sodium ions.

49. The given diagram shows iodine test performed on a food sample.

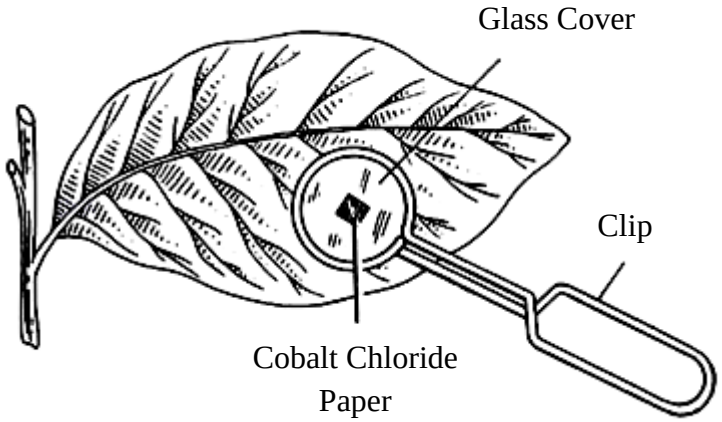



The food sample **X** would be

A. cheese.
B. nuts powder.
C. breadcrumbs.
D. scrambled egg.

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50. The given image shows an experimental set-up to investigate transpiration in plants. After few hours, the colour of cobalt chloride paper changes from blue to pink.




This change of colour is due to the

A. presence of chlorophyll in the leaf.
B. water vapours produced by the leaf.
C. pressure exerted by the clip on the paper.
D. blockage of light by cobalt chloride paper.

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