S5 Biology holiday activities

S5 MCB and S5 PCB

Do all these exercises in your exercise book.

I. Choose whether the following statements are True (T) or False (F)

1. Insects have a specialised system of 'tubes' called the tracheal system for exchange of gases.

2. There is active ventilation in most treacheates (i.e., animals possessing trachea). Gas Exchange in Animals 237

3. Fish gills consist of thousands of highly specialised gill lamellae enclosed in a gill cavity.

4. Amphibians use the moist skin, gills or the lungs for gas exchange.

5. Modern amphibians do not rely heavily on cutaneous respiration.

6. Most adult amphibians have lungs for breathing air.

7. Internal (tissue) respiration is the exchange of gases between blood in systemic capillaries and tissue cells.

8. Alveoli are the structure for gas exchange in humans.

9. The apparatus for measuring inspired and expired volumes during breathing is a spirometer.

10. The sum of inspiratory reserve volume, tidal volume, and expiratory reserve volume is called residual volume.

II. Long Answer Type Questions

1. Describe the tracheal system of insects and relate to its function.

2. Describe the structure of the gills in relation to its function.

3. In your own words, explain the significance of counter current flow in bony fish.

4. Describe the mode of gaseous exchange in amphibians.

5. Describe the structure of the human gas exchange system.

6. Describe the distribution of tissues within the trachea, bronchi, bronchioles and alveoli and relate each tissue to its function.

7. Explain the mechanism of ventilation in humans. 8. Explain the process of gas exchange in alveoli with emphasis on diffusion.

9. Describe the role of the brain in controlling gas exchange in humans.

10. Define the following terms related to the lung capacities: (i) Tidal volume (ii) Reserve volume (iii) Vital capacity (iv) Residual volume (v) Dead air space

11. Describe how a spirometer can be used to measure vital capacity, tidal volume, breathing rates, and oxygen uptake.

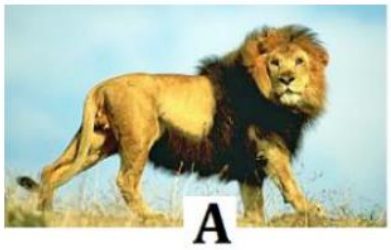
12. Calculate vital capacity and alveolar ventilation from the data provided.

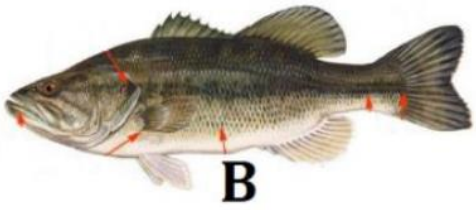
Tidal volume = 550 ml, Dead space = 185 ml, Respiratory rate = 17/min, inspiratory reserve volume = 2500 ml, tidal volume = 550, and expiratory reserve volume = 1450.

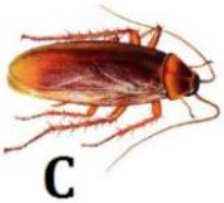
13. What contribution does exchange of gases make on global warming? Discuss your answer with relevant data. Also throw light on the dialect "Global warming: a myth or truth."

Other activities

1. Look carefully the specimen below


A


B


C


D


E

a) To which kingdom do the following organisms belong? **/2mks**

b) Make a dichotomous key for these animal specimens. **/5mks**

2. The photo below shows a light microscope.

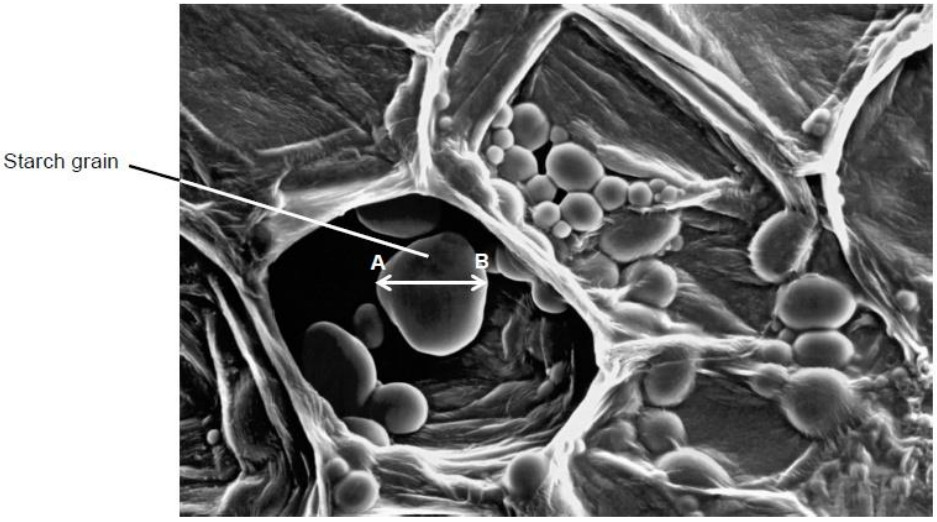
a) Identify the parts represented by the letters A, B, C and D**.(4maks)**

b) What is the difference between magnification and resolution? **(2marks)**

c) State advantages of an electron microscope over a light microscope. **(2maks)**

d) Advantages of a light microscope over an electron microscope. **(2marks)**

3. The figure below shows a section through a plant tissue at a magnification of ×500.



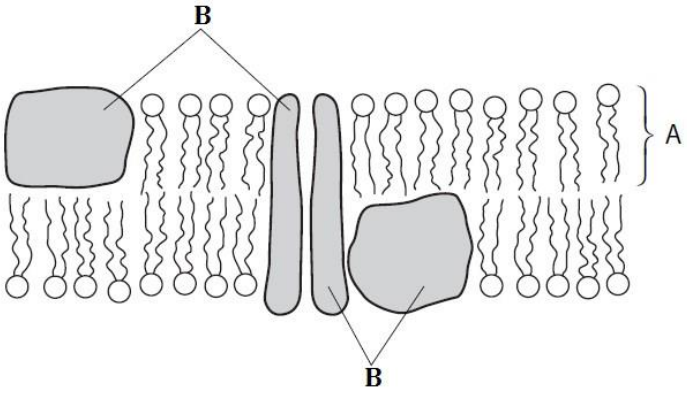
a) Calculate the actual diameter of the starch grain between points A and B. **(2maks)**

b) What type of microscope was used to obtain the image shown in Figure ? Give one piece of evidence to support your answer.

i) Type of microscope: ----------**(1mark)**

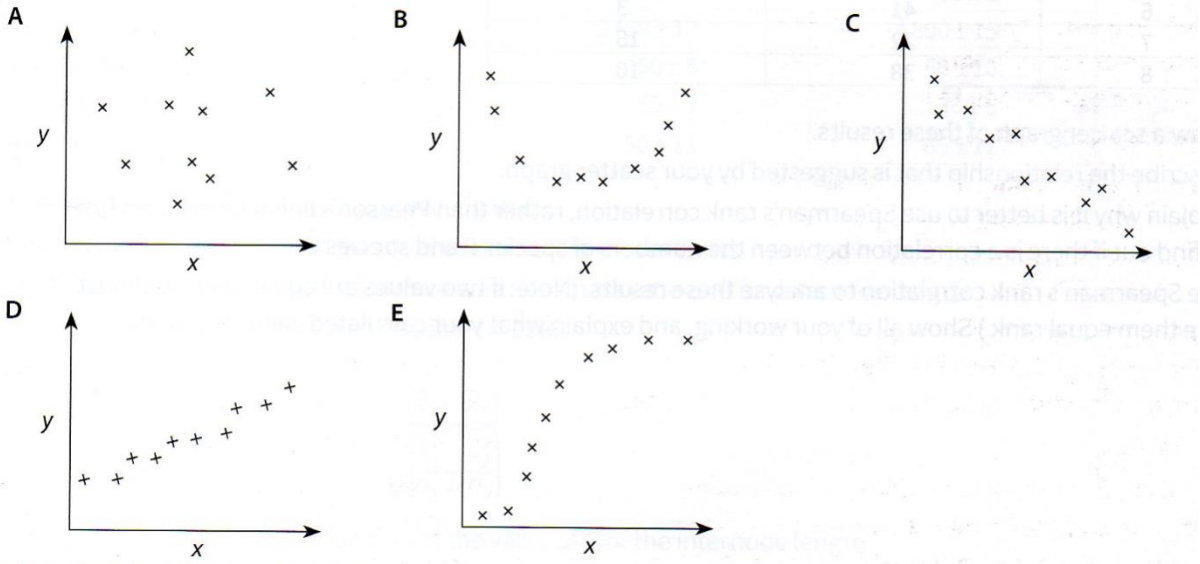
ii) Evidence : ----------**(2marks)**

4. The fluid mosaic model describes the structure and properties of cell membranes. The diagram below shows the structure of a cell membrane based on this model.



a. Name the molecule labelled A and describe its structure. **(2 marks)**
b. Name the molecule labelled B and state its function. **(2 marks)**

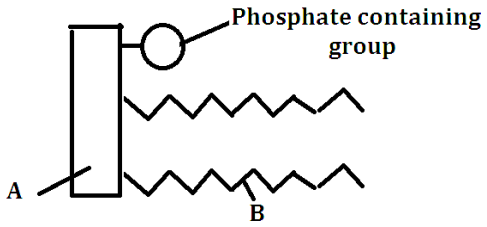
5. The scatter graphs show values for x plotted against values for y.



State the letter of any graph or graphs that: **(5 marks)**

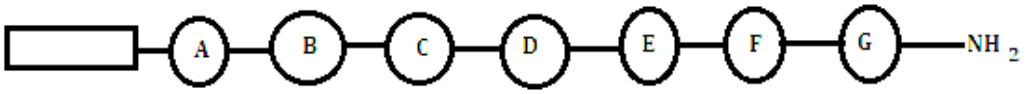
a) Indicate there could be a positive correlation.
b) Indicate that there is probably no correlation.
c) Indicate there is a linear correlation.
d) Indicate that Spearman's rank correlation could be used.
e) Indicate that Pearson's linear correlation could be used.

6. The figure below represents a phospholipid molecule:



a) Give the structure labelled A and B. **(2 marks)**
b) State how the structures A and B differ in the way they react to water. **(2 marks)**
c) Which chemical elements are found in fats? **(1 mark)**
d) What is meant by a saturated fatty acid? **(1 mark)**

7. The figure below represents a polypeptide made up of seven amino acids, A-G.



a) What is the chemical formula of the group represented by the box? **(1mark)**
b) How many molecules of water would be produced in forming this polypeptide? **(1mark)**
c) Give the difference between globular and fibrous proteins. **(2marks)**
d) Protein molecules are held together by a combination of the following: Peptide bonds, hydrogen bonds, ionic bonds, disulfide bridges, hydrophobic interactions.
Which one or more of these bonds:
i. Maintain the primary structure of a protein. **(1mark)**
ii. Maintain the secondary structure of a protein. **(1mark)**
iii. Maintain the tertiary structure of a protein. **(1marks)**

8. Two proteins have the same number and type of amino acids but different tertiary structures. Explain why? **(2maks)**

9. The table below shows the composition of five foods A, B, C, D and E. Study it and answer the following questions

Composition per kg							
Food	**KJ/100mg**	**Proteins**	**Fats**	**Carbohydrates**	**Vit C**	**Vit D**	**Iron**
A	3800	0.4g	8.6g	0	0	40g	0
B	130	1.2g	0	8g	220g	0	0
C	1150	8.8g	1.5g	60g	0	0	0
D	400	2.0g	0.1g	25g	10g	0	6mg
E	1650	0	0	100g	0	0	0

From the table, which food among A, B, C, D and E would: **(8 marks)**

a) Help prevent anemia and why?
b) Help prevent scurvy and why?
c) Help prevent rickets and why?
d) Provide most energy and why?

10. a) During the laboratory test of non – reducing sugars, explain why the following procedures are performed.

I) Addition of dilute hydrochloric acid **[2 marks]**

II) Addition of Benedict's solution **[2 marks]**

c) Examine structural features that make carbohydrates have a wide variety of polysaccharides? **(2maks)**

11. The diagram shows a metabolic pathway in which substrate A is converted, with the aid of enzymes, to the end – product **D**.

A —Enzyme 1→ **B** —Enzyme 2→ **C** —Enzyme 3→ **D**

a) Giving an explanation for your answer, suggest what would happen to rate of production of the end protein **D** if;

i. The production of substrate were reduced **[1 mark]**

ii. The concentration of enzyme 1 were increased but the concentration of the other enzymes remained constant. **[1 mark]**

iii. The temperature rose from 15^{o}C to 25^{o}C. **[1 mark]**

b) Suggest how molecule **D** could act as an end product inhibitor. **[1 mark]**

12. a. Why are enzymes effective in small quantities? **(2maks)**

b.Explain why changing an amino acid that makes up the active site could prevent the enzyme from functioning. **(2maks)**

C. Why might changing certain amino acids that are not part of the active site also prevent the enzyme from functioning? **(2maks)**

Good luck!