



**SMJK PEREMPUAN PERAK, IPOH, PERAK.**  
**PEPERIKSAAN PERCUBAAN SPM 2021**  
**BIOLOGY KERTAS 2 (4551/2)**  
(MASA : 2 ½ JAM)

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**This paper consists of 11 printed pages.**

**Section A :**

[60 marks]

Answer all questions in this section.

1. Diagram 1 shows the structure of a typical cell of an organism as seen under an electronmicroscope.

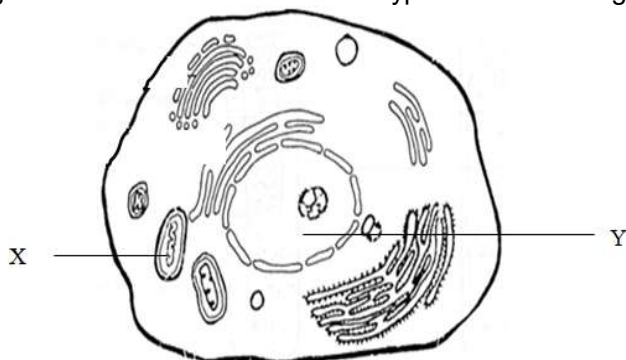


Diagram 1

a) Name the structures labelled X and Y. (2m)

X : \_\_\_\_\_

Y : \_\_\_\_\_

b) State the process that occurs in structure X. (1m)

\_\_\_\_\_

c) State **one** function of structure Y. (1m)

\_\_\_\_\_

d) What type of cell is shown in Diagram 1? Give a reason for your answer. (2m)

\_\_\_\_\_

2. Diagram 2.1 and 2.2 show level of antibody in the blood of individual P and individual Q respectively during immunisation treatment.

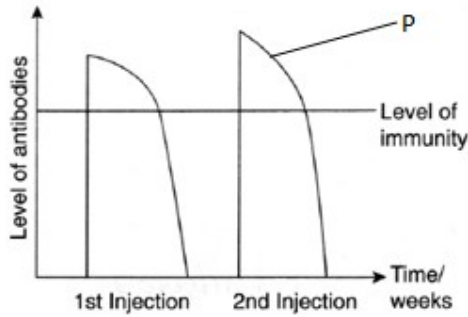


Diagram 2.1

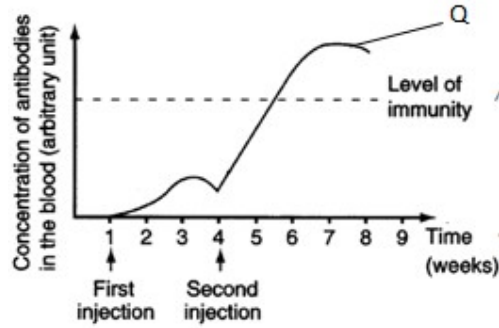


Diagram 2.2

a) i) State the type of body defence mechanism involved in the immunity. (1m)

\_\_\_\_\_

ii) State the type of immunisation given to individual P and individual Q. (2m)

P : \_\_\_\_\_

Q : \_\_\_\_\_

b) Explain why individual P and individual Q had to be given a second injection of the same substance. (2m)

P : \_\_\_\_\_

Q : \_\_\_\_\_

c) State the different between the type of immunisation received by P and Q. (1m)

\_\_\_\_\_

3. Diagrams show food samples which contain fatty acids.



P



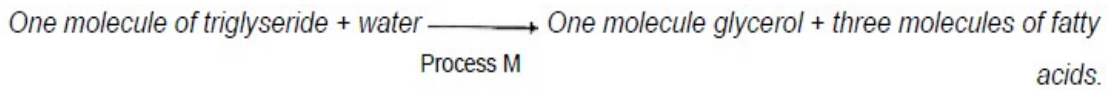
Q

a) Based on the Diagrams above, name the type of fatty acids in those cooking oil sample: (2m)

cooking oil sample P : \_\_\_\_\_

cooking oil sample Q : \_\_\_\_\_

b) Diagram below shows part of word equation for breaking down cooking oil sample P and Q.



Based on Diagram above, explain process M. (3m)

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c) Compare and contrast between cooking oil sample P and Q. (2m)

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4. Diagram 4.1 shows the stages of the cell cycle.

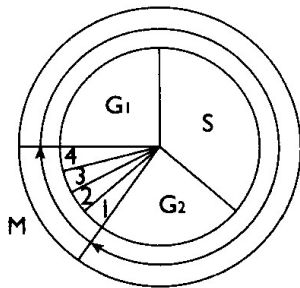


Diagram 4.1

a)i) Based on diagram 4.1, in which phase DNA synthesis happen? (1m)

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ii) Shade the part of the diagram to show the stage where the chromosomes become shorter and thicker. (1m)

b) State two roles of process M in an organism. (2m)

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c) Diagram 4.2 shows the phase of cell division in mitosis.

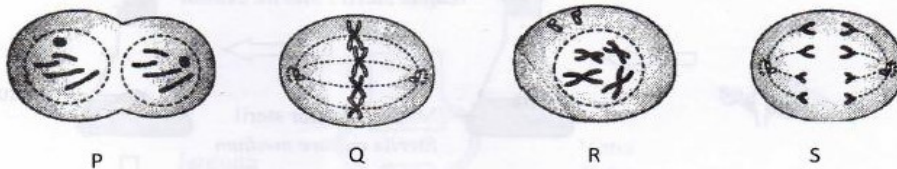


Diagram 4.2

(d) Arrange the phase of mitosis in Diagram 4.2 according to the correct sequence. (1m)

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e) State the chromosomal behavior of the named phase. (2m)

Phase Q:

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Phase S:

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5. Diagram 5 shows the forelimb and joint of humans.

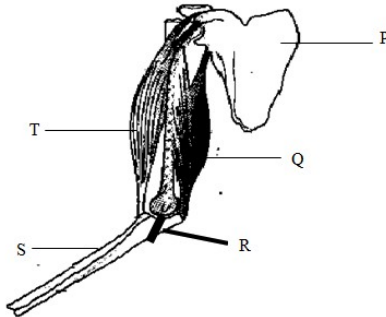


Diagram 5

a) Name the parts labelled P and R. (2m)

P : \_\_\_\_\_

R : \_\_\_\_\_

b) State the characteristic of R tissues which is adapted to its function. (1m)

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c) i) Name the tissue that connects T and S. (1m)

---

ii) What happened if this tissue is torn? (1m)

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d) Circle and name a joint in the above diagram. (1m)

e) Explain how the P, Q, R, S, T and joint enable the arm to bend. (2m)

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6. Diagram 6.1 and 6.2 show different types of fingerprints and a group of students with various body heights respectively.

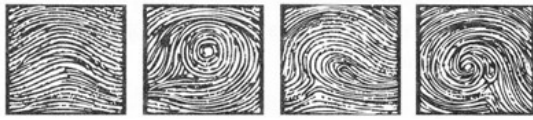


Diagram 6.1

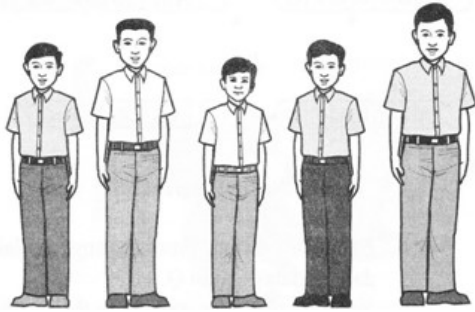


Diagram 6.2

a) State the types of variation shown by the two diagrams above. (2m)

Diagram 6.1 : \_\_\_\_\_

Diagram 6.2 : \_\_\_\_\_

b) Explain the importance of variation. (2m)

\_\_\_\_\_  
 \_\_\_\_\_

c) Mutation is one of the factors that cause variation. Diagram 6.3 shows two types of chromosomal mutation.

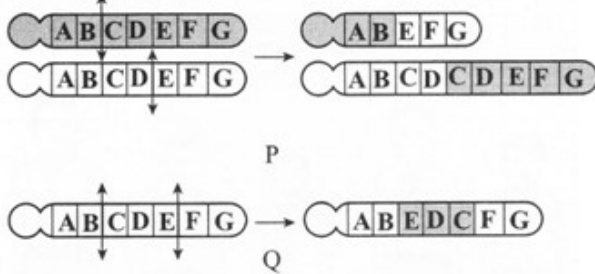


Diagram 6.3

Name the processes involved in the mutation of P and Q. (2m)

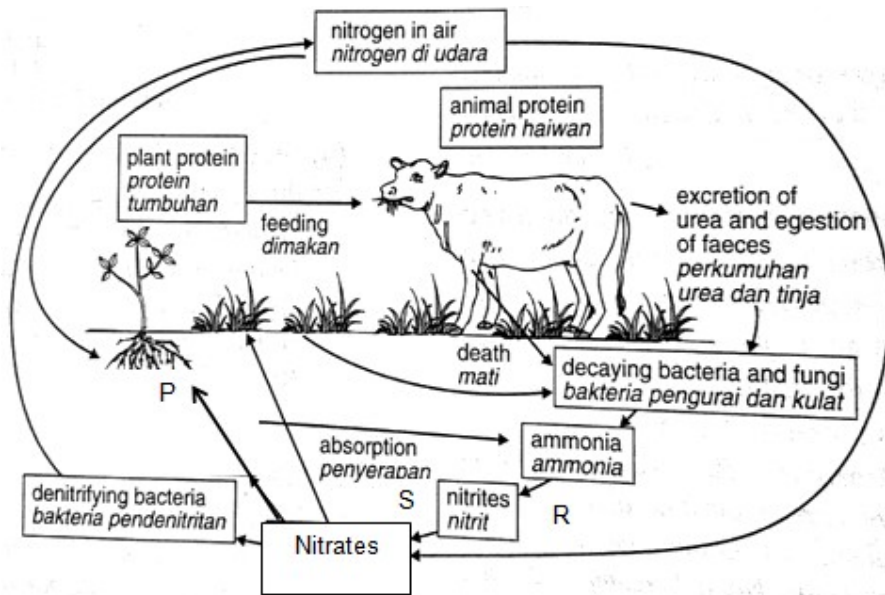
P: \_\_\_\_\_

Q: \_\_\_\_\_

d) A woman who is a heavy smoker is pregnant. Explain why she should stop smoking. (2m)

\_\_\_\_\_  
 \_\_\_\_\_

7. Diagram below shows a nitrogen cycle.



a) i) Name the organism P and S. (2m)

P : \_\_\_\_\_

S : \_\_\_\_\_

ii) State in which Kingdom P, R and S are classified. (1m)

\_\_\_\_\_

b) i) State the function of organism P and S. (2m)

P : \_\_\_\_\_

S : \_\_\_\_\_

ii) Explain the relationship between P and leguminous plant. (2m)

\_\_\_\_\_  
 \_\_\_\_\_

e) Explain what will happen to activity of P, R and S if this area received acid rain. (2m)

\_\_\_\_\_  
 \_\_\_\_\_

8. A group of students conducted an experiment to study the effect of light intensity on the rate of photosynthesis.

Diagram 8.1 shows the apparatus set up for collecting the gas produced during photosynthesis.

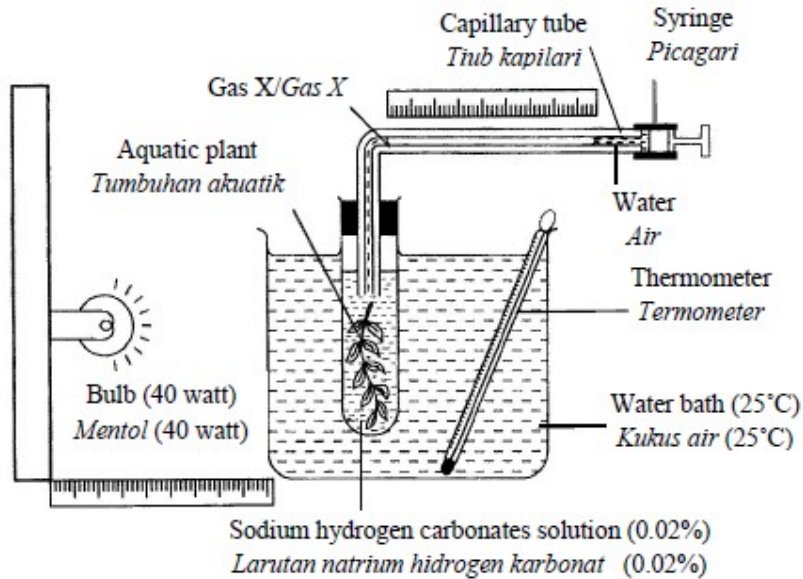


Diagram 8.1

a) Based on diagram 8.1,

i) Name gas X. (1m)

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ii) State the function of sodium hydrogen carbonate used in this experiment. (1m)

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iii) Suggest one way to increase the volume of gas X collected. (1m)

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b) The graph in Diagram 8.2 shows the relationships between the rate of photosynthesis and light intensity.

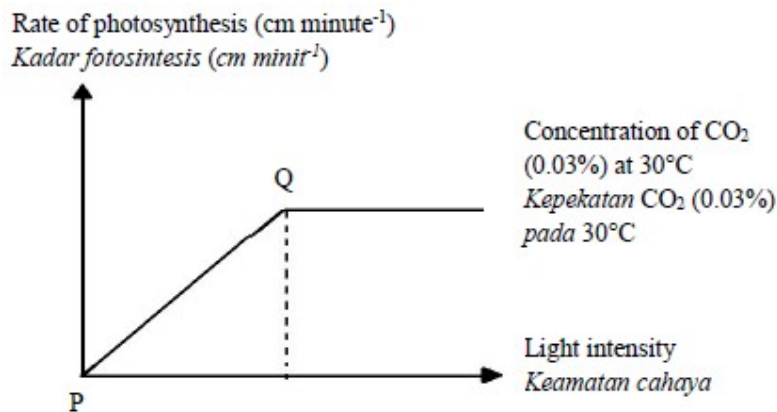


Diagram 8.2

i) Explain the relationship between the rate of photosynthesis and light intensity. (2m)

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ii) Predict what happens to the rate of photosynthesis if the surrounding temperature increases to 55°C. (2m)

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c) Diagram 8.3 shows a treatment used on a leaf of a plant.

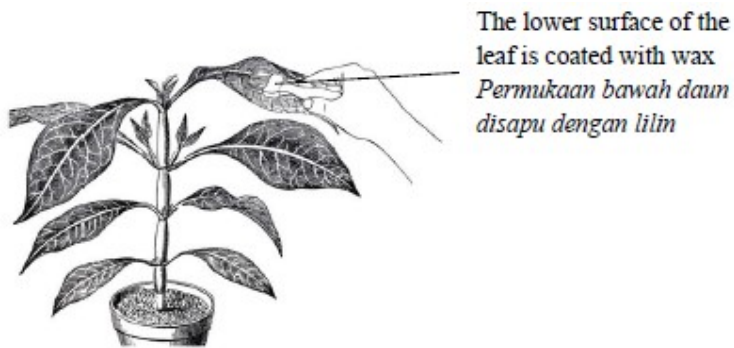


Diagram 8.3

Explain how the treatment affects the rate of photosynthesis. (2m)

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**Section B**  
[20 marks]

Answer any **one** question from this section.

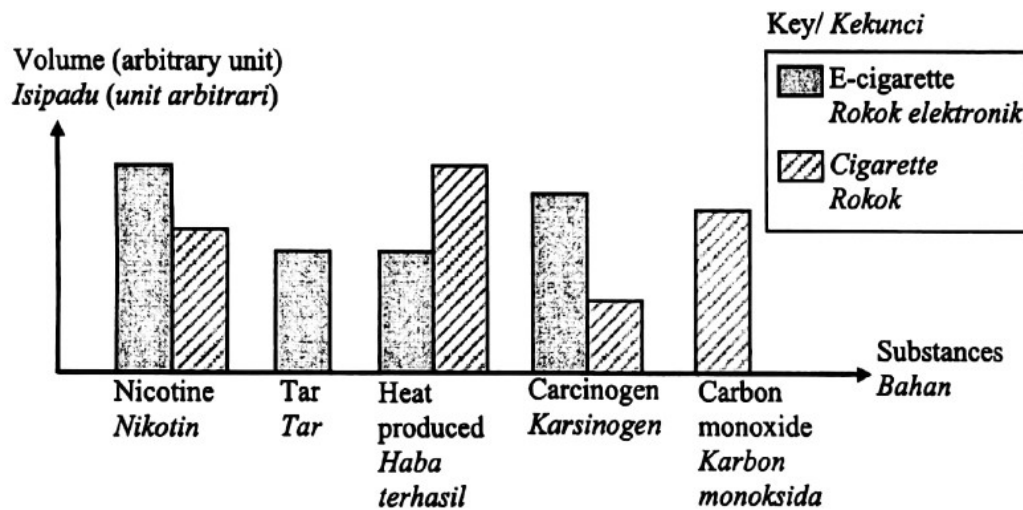
9. a) Diagram 9.1 shows organism X.



Diagram 9.1

- i) Based on diagram 9.1, describe briefly the respiratory structure of organism X and its adaptation. (6m)
- ii) Explain the respiratory mechanism of organism X. (4m)

b) Graph below shows differences of volume of substances that present in cigarette and e-cigarette.



Compare the substances that present in cigarette and e-cigarette and its effect on human health. (10m).

10. Diagram 10.1 shows the digestive system and the organs associated with digestion.

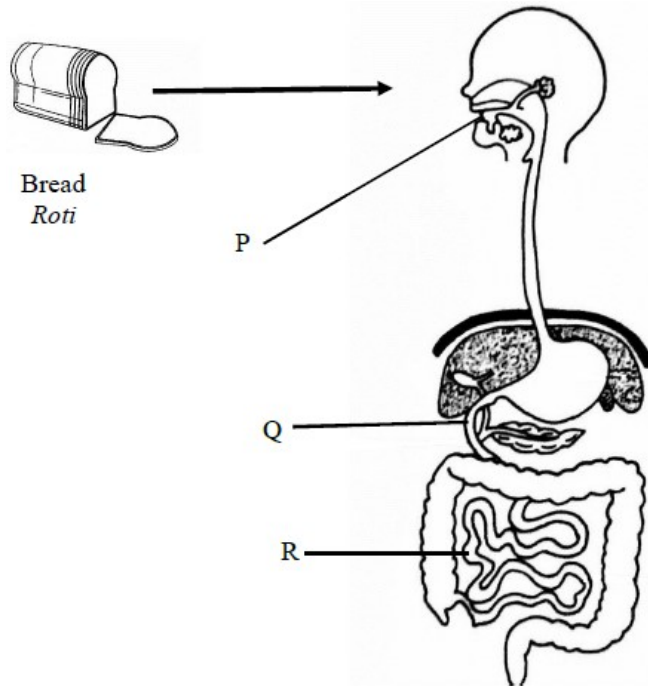


Diagram 10.1

a) Explain how bread is digested in structures labelled P, Q and R. (10m)

b) Table below shows the types and quantity of food consumed by an adult woman in a particular day.

Types of food / <i>Jenis makanan</i>	Quantity (g) <i>Kuantiti (g)</i>	Energy (kJ per 100g) <i>Tenaga (kJ per 100g)</i>
Rice / <i>Rice</i>	500	1800
Fried chicken / <i>Ayam goreng</i>	200	800
Fried potato / <i>Kentang goreng</i>	200	1100
Soft drink / <i>minuman ringan</i>	150	400
Snack / <i>makanan ringan</i>	180	400

- i) Calculate the total energy intake for the woman for one day. (2m)
- ii) If the daily requirement of an adult woman is 9200 kJ, justify the woman's diet based on your calculation. Explain the possible consequences of consuming the diet. Give your recommendation to improve her daily diet. (8m)

**Section C**  
[20 marks]

Answer **all** questions from this section.

11. Diagram 11.1 shows a production of compost to implement the concept of recycle.



Diagram 11.1

a) Explain what compost is and state the benefits of using compost instead of chemical fertilisers. (10m)

b) Diagram 11.2 show bananas in two different situations, situation X and Y.

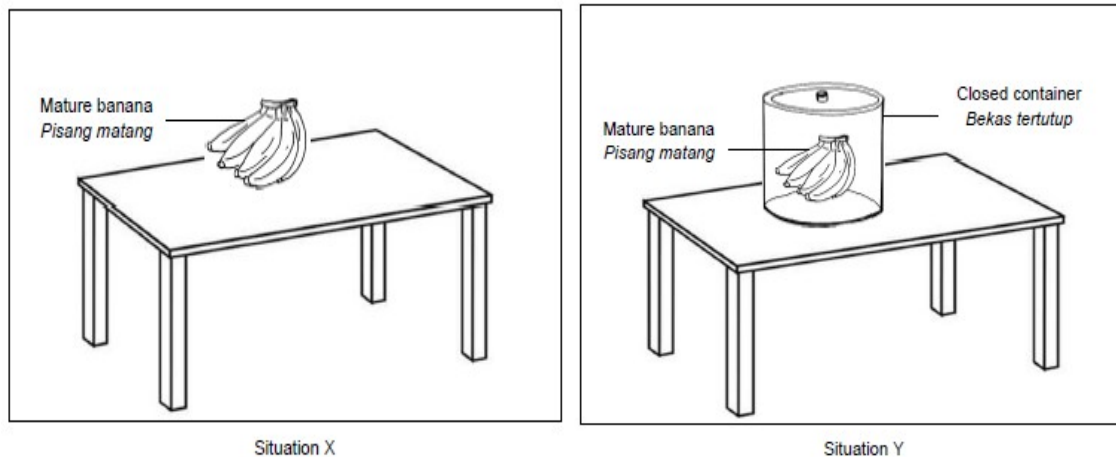


Diagram 11.2

i) Based on Diagram 11.2, which situation banana will ripen first? Explain why. (4m)

ii) Bananas have been genetically modified through genetic engineering and are known as genetically modified food (GMF).

Give the advantages and disadvantages of GMF bananas. (6m)