SAMPEL PERCUMA

Trial STPM 2020 Biologi Semester 1 Kulai (UPP Sem 1)

Set penuh: Kertas Percubaan STPM

Sem 1 · Biologi

Sampel ini: 7 muka surat. Set penuh ada:

- 3 fail PDF
- Semester 1: kertas percubaan (trial) negeri, subjek yang dipilih + skema
- Blueprint 30 hari Semester 1 (setiap subjek)
- Semester 3: percubaan 2024, 10 subjek, banyak negeri, soalan + skema dalam satu fail

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Sampel bermula di muka surat sebelah

Section A [15 marks]

Answer **all** *questions in this section*

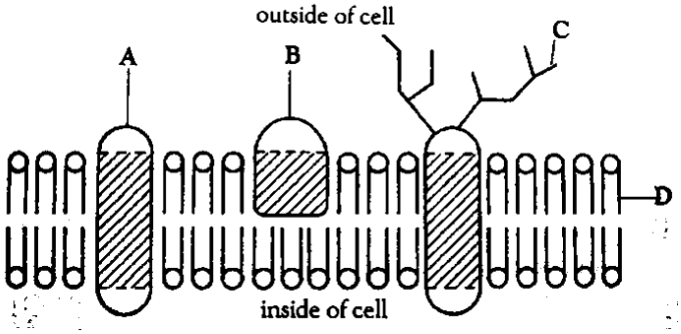
1. The density of water is highest at 4°C. What is the effect of this property of water?
   A. Water can function as lubricant.
   B. Water can act as a thermal buffer.
   C. Water can function as an insulating layer.
   D. Water provides a cooling effect on animals.

2. Which of the following statements are true about triglycerides?
   I. It is a non-polar molecule.
   II. It forms a bilayer in cell membrane.
   III. It is formed by condensation of one fatty acid and three glycerol.
   IV. It has higher hydrogen to oxygen ratio compared with carbohydrate.
   A. I and II B. I and IV C. II and III D. III and IV

3. At which levels of protein structure do ionic bonds occur?
   A. Quaternary
   B. Quaternary and tertiary
   C. Quaternary, tertiary and secondary
   D. Quaternary, tertiary, secondary and primary

4. Which of the following is **not** true about prokaryotes and eukaryotes?

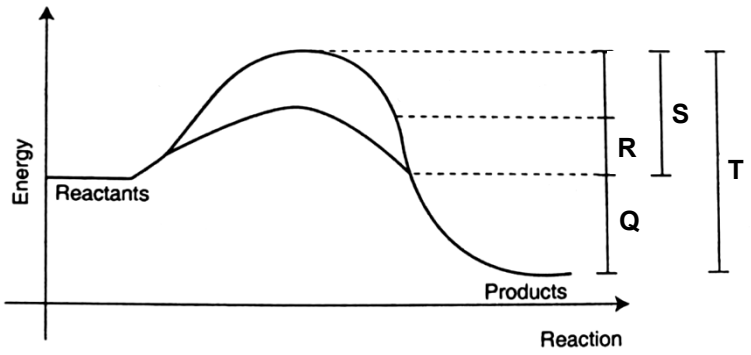
	Prokaryotes	*Eukaryotes*
A.	70S ribosome	80S ribosome
B.	Has circular DNA	Has linear DNA
C.	Can perform meiosis	Can perform mitosis and meiosis
D.	Cell wall made up of murein	Cell wall made up of cellulose or chitin



5. The diagram above represents the basic structure of a cell membrane. Which component allows vitamin E to move into the cell?

6. A special poison can break up the cytoskeleton of the cell. Which of the following cell processes will be affected directly by the poison?
   A. Photosynthesis C. Protein synthesis
   B. Respiration D. Cell division

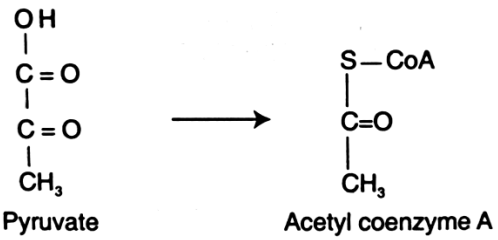
7. The graph shows the energy level for enzyme catalysed and uncatalysed reactions.
Which of the following shows the overall change in free energy of the enzyme catalysed reaction?
A. Q
B. R
C. S
D. T



8. Which of the following comparison between competitive inhibitor and non-competitive inhibitor of enzyme is correct?

	Competitive inhibitor	*Non-competitive inhibitor*
A.	Attaches to active site of enzyme	Attaches to allostearic site of enzyme
B.	Increases V_{max} of reaction	Reduces V_{max} of reaction
C.	Reduces K_m of enzyme	K_m of enzyme remains unchanged
D.	Effect cannot be overcome by substrate concentration	Effect can be overcome by substrate concentration

9. If the ratio of $\frac{(A+G)}{(T+C)}$ in one DNA strand is 0.40, what is the ratio of $\frac{(A+G)}{(T+C)}$ in its complementary strand?
A. 0.40 B. 0.60 C. 1.50 D. 2.50



10. Which of the following statements are true about the reaction shown above?

I. The reaction happens in cell cytoplasm.
II. $2H^+$ are released and received by NAD^+.
III. Carbon dioxide is released in the reaction.
IV. Enzyme pyruvate kinase catalyses the reaction.

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

11. A runner in marathon was facing insufficient of oxygen supply in his body when he was approaching the finishing point. How many ATP is produced by his leg muscle cells from each glucose molecule in that condition?
A. 0 ATP B. 2 ATP C. 36 ATP D. 38 ATP

12. An experiment was carried out to investigate the anaerobic respiration process in plant cells as shown in the table:

Test tube	*Content*
I	Glucose + cytoplasm without organelles
II	Glucose + mitochondria
III	Pyruvate + cytoplasm without organelles
IV	Pyruvate + mitochondria

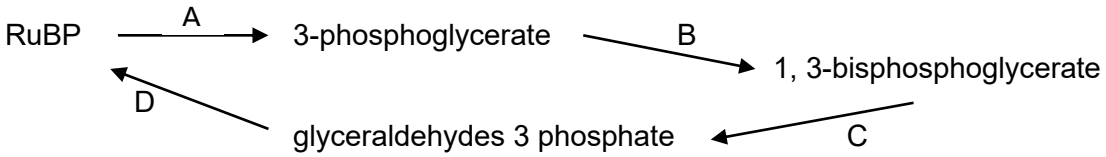
After some incubation period, in which test tube is carbon dioxide most likely to be found?
A. I and III B. I and IV C. II and III D. II and IV

13. A type of weedkiller can block the electron flow in electron transport chain of photophosphorylation. How does it work to kill the wild grass?
A. Blocks the photolysis of water.
B. Stops the photoactivation of chlorophyll.
C. Stops the production of ATP and NADPH.
D. Denatures the enzyme used in photosynthesis.

14. Which of the following conditions can produce the highest photosynthesis yield?

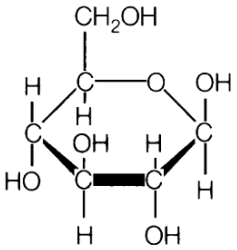
	Concentration of CO_2	*Light colour*
A.	High	Red and blue
B.	High	Blue and green
C.	Low	Red and blue
D.	Low	Blue and green

15. At which stage of Calvin cycle that NADPH is oxidised?



Section B [15 marks]
Answer **all** *questions in this section.*

16. The diagram shows a type of biological molecule.



(a) Name the molecule shown. [1]

_____

(b) Two of the molecules shown may combine to form a disaccharide.
(i) Name the chemical reaction involved. [1]

_____

(ii) Name the bond that holds the two molecules together. [1]

_____

(b) (i) Identify cell Y. [1]

_____

(ii) How does cell Y obtain carbon dioxide to carry out the light independent reaction? [1]

_____

_____

(c) Open burning is one of the human activities that threatens the environment. By referring to C_3, C_4 and CAM plants, suggest which type of plant would gain more benefit from the effect of open burning? Justify your answer. [2]

_____

_____

_____

Section C [30 marks]

*Answer ONLY **two** questions in this section.*

18. (a) Describe the structures and functions of three types of ground tissues in plants. [9]
    (b) Discuss the advantages and disadvantages of transmission electron microscope as compared to light microscope. [6]

19. (a) Describe the features of the plasma membrane that allow it to maintain its fluid -mosaic pattern. [9]
    (b) Explain the substrate specificity of an enzyme based on the lock & key model. [6]

20. (a) Explain how many ATP can be produced from one molecule of acetyl-CoA that enters Krebs cycle and oxidative phosphorylation during aerobic respiration in a muscle cell. [9]
    (b) Describe the effects of carbon monoxide on respiration. [6]

ANSWER SCHEME UPP SEM 1 2020 SSI Kulai

Section A [15 marks]

1. C	6. D	11. B
2. B	7. A	12. A
3. B	8. A	13. C
4. C	9. D	14. A
5. D	10. C	15. C

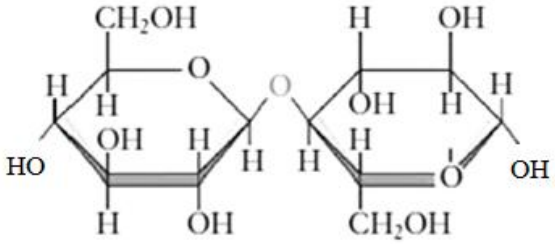
Section B [15 marks]

16. (a) β-glucose

(b) (i) condensation

(ii) (β)1,4 glycosidic bond

(iii)



(c) - cellulose [1] + any 2

- long linear/straight/unbranched chain
- (layers of parallel cellulose molecules) form microfibrils / fibres
- (high tensile strength) as support/building materials / <u>plant</u> cell wall

17. (a) (i) PEP carboxylase

(ii) - high affinity to CO_2 / binds to CO_2 more efficiently

- prevent photorespiration

(b) (i) Bundle sheath cell

(ii) CO_2 produced from oxidation of malate to pyruvate

(c) *[answer must be justified by suitable reason]*

- C3 plants, high CO_2 prevent photorespiration [2/0] or
- C4/CAM plants, high temperature (due to greenhouse effect) closes stomata and increases photorespiration [2/0]

Section C

18. (a) 1. Parenchyma [1]

S1: - Usually spherical/isodiametric/thin primary cell wall/large central vacuole/ loosely arranged / flexible / retain ability to differentiate into other types of plant cells [any 1]

F1: - synthesising/storing organic compound / fleshy tissue of fruits / major component of ground tissue //
- perform photosynthesis/metabolic reactions //
- provide turgidity (for support) [any 1]

2. Collenchyma [1]

S2: - generally elongated cells / have thicker primary walls than parenchyma cells / unevenly thickened primary walls (usually at corner) / compactly arranged [1]

F2: - support young parts of plant shoot / provide flexibility //
- carry out photosynthsis [any 1]

3. Sclerenchyma [1]

S3: - secondary cell walls / cell walls thicken by lignin / elongated (with tapered end) / dead at maturity / tightly packed / empty lumen [1]

F3: - provide mechanical strength/support/rigidity to plants //
- sclereids protect the seed/impart hardness to nutshell/gritty texture to pear [any 1] *[3x3 = 9m]*

(b) Advantage:

1. very high resolution / up to 2nm
2. permits very high magnifications of 250,000 times
3. able to view detail structures at the molecular level [max 3m]

Disadvantage:

1. kill specimen during preparation
2. alter specimen structure during preservation
3. special techniques (of thin sectioning) are needed to prepare specimens // preparation of material is time-consuming
4. need to stain the specimen to obtain sufficient contrast

8. The active site is unchanged or can be reused / recycled after the reaction. [max 6m] **[Total: 9+6=15M]**

20. (a)

Krebs cycle:

1. Oxidative decarboxylation of citrate to α-ketoglutarate produces 1 NADH
2. Oxidative decarboxylation of α-ketoglutarate to succinyl-CoA produces 1 NADH
3. 1 GTP/ATP produced by substrate level phosphorylation when sccinyl-CoA converts to succinate.
4. Oxidation of succinate to fumarate produces 1 $FADH_2$.
5. Oxidation of malate to oxaloacetate produces 1 NADH.

Oxidative phosphorylation:

6. Each NADH generates 3 ATP
7. Each FADH2 generates 2 ATP

8. 3 NADH x 3 = 9 ATP
9. 1 FADH2 x 2 = 2 ATP
10. + 1 ATP from Krebs cycle = 12 ATP [any 8 + P10 = 9m]]

(b)

1. Carbon monoxide is a non-competitive inhibitor
2. binds to cytochrome oxidase
3. blocks the transfer of electron through electron transport chain (to oxygen)
4. oxygen is not reduced to water
5. protein gradient not generated
6. prevents ATP synthesis / chemiosmosis / stop oxidative phosphorylation
7. resulting in the failure of cellular respiration / death of cell
8. CO binds to (haem group of) haemoglobin to form carboxyhaemoglobin
9. reducing the oxygen transport in blood. [any 6]

[Total: 9+6 = 15m]

TAMAT SAMPEL

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