

PEPERIKSAAN PERCUBAAN STPM BERSAMA
DAERAH MANJUNG 2008

964/1
BIOLOGY
PAPER 1

1 hour 45 minutes

Instructions to candidates:

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

There are **fifty** questions in this paper. For each question, four suggested answers are given. Choose one correct answer and indicate it on the multiple-choice answer sheet provided.

Read the instructions on the multiple-choice answer sheet very carefully.

Answer **all** questions. Marks will not be deducted for wrong answers.

Arahan kepada calon:

JANGAN BUKA BUKU SOALAN INI SEHINGGA ANDA DIBENARKAN BERBUAT DEMIKIAN.

Ada **lima puluh** soalan dalam kertas ini. Bagi setiap soalan, empat cadangan jawapan diberikan. Pilih satu jawapan yang betul dan tandakan jawapan itu pada helaian jawapan aneka pilihan yang dibekalkan.

Baca arahan pada helaian jawapan aneka pilihan itu dengan teliti.

Jawab **semua** soalan. Markah tidak akan ditolak bagi jawapan yang salah.

This question paper consists of 9 printed pages.
(Kertas soalan ini terdiri daripada 9 halaman bercetak)

[Turn over]

- Which of the following involves facilitated diffusion?
 - Transportation of glucose into the cell
 - Movement of oxygen and carbon dioxide across the alveolus membrane
 - Diffusion of ATP from the mitochondrion
 - Movement of sodium ions across the axon membrane during action potential

A. I, II and III B. I, II and IV C. I, III and IV D. II, III and IV
- How many fatty acid molecules are present in a lecithin molecule?

A. 1 B. 2 C. 3 D. 0
- If 20% of the bases in a DNA molecule are cytosine, what percentage of the bases are thymine?

A. 10% B. 20% C. 30% D. cannot be determined.
- The following substances are found in nucleic acids;

1. purine	2. pyrimidine	3. phosphate
4. ribose	5. deoxyribose	

Which of these molecules are found in a nucleotide containing uracil?

A. 1, 2 and 4 B. 1, 3 and 5 C. 2, 3 and 4 D. 2, 3 and 5
- Which of the following does not involve active transport?

A. muscle contraction B. absorption of water by plant roots

C. synthesis of proteins from amino acids D. transmission of nerve impulse
- The maximum resolution of a light microscope is

A. 1nm B. 2nm C. 20nm D. 200nm
- Which of the following reactions is catalysed by lyase?

A. Hydrolysis of a substance by the addition of water

B. Rearrangement of atoms within a molecule

C. Breaking of chemical bonds without the addition of water.

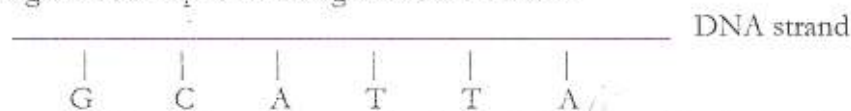
D. Formation of new chemical bonds which require input of energy
- Which of the following statement is false about K_M in an enzymatic reaction?

A. K_M varies from one enzymatic reaction to another

B. It gives an indication of the affinity of the enzyme for its substrate

C. When K_M is high the enzyme and substrate have a low affinity for one another

D. It is the concentration of enzyme needed for the reaction to reach $\frac{1}{2}V_{max}$
- The diagram shows part of a single strand of DNA.



How many hydrogen bonds are required to link the base pairs when both complementary strands are present?

- A. 6 B. 14 C. 28 D. 32

10. The table gives the tRNA anticodons for three amino acids.

Amino acid	Base sequence anticodon tRNA
Methionine	UAC
Valine	CAA
Arginine	GCU

What is the base sequence on part of a DNA strand which would code for the tripeptide methionine – valine – arginine?

- A. ATGGTTCGA B. AUGGUUCGA C. TACCAAGCT D. UACCAAGCU
11. When the bacteria having a radioactive DNA molecule is transferred to a non-radioactive medium and left to replicate two generations, what is the radioactive status of the four new DNA molecules that are formed?
- A. Two molecules are radioactive B. All molecules are radioactive
C. One molecule is radioactive one both strands D. None of the molecules are radioactive

12. If the ratio $\frac{(A + G)}{(T + C)}$ in one of the DNA strain is 0.6, what is the ratio $\frac{(A + G)}{(T + C)}$ in its complementary strand?
- A. 0.24 B. 0.6 C. 0.4 D. 1.67

13. How do the chloroplasts in palisade cells of a leaf differ from the bundle sheath cells in the C_4 plants?

Palisade cells	Bundle sheath cells
A. Large grana, no starch grains.	Small grana, contains starch grains.
B. Large grana, contain starch grains	Small grana, no starch grains
C. Small grana, no starch grains	Large grana, contain starch grains
D. Small grana, contain starch grains	Large grana, no starch grains

14. When radioactive carbon dioxide is added to an illuminated suspension of Chlorella, which organic compound will be labelled first with ^{14}C ?
- A. Ribulose biphosphate B. Oxaloacetate
C. Glycerate 3-phosphate D. Glycceraldehyde 3-phosphate
15. Which of the following statements is not true about xylem?
- A. Xylem cells contain pit
B. Matured xylem cells are dead cells
C. Companion cells provide nutrients to the xylem
D. Xylem consists of vessel elements and tracheids

16. The table below shows the components of a cell membrane and their functions.

Components of a cell membrane	Functions
I Oligosaccharide	(p) Acts as a receptor to a certain molecule such as hormone.
II Lecithin	(q) As an indicator so that the cells can recognize each other.
III Protein	(r) Gives the semipermeable and selective characteristics to the membrane.
IV Cholesterol	(s) Maintains the fluid characteristic of the membrane.

Which of the following is correct for the components of a cell membrane and their function?

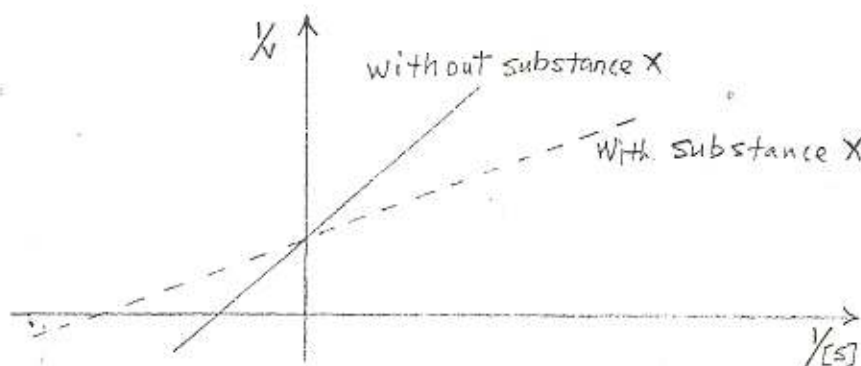
	I	II	III	IV
A	(p)	(q)	(r)	(s)
B	(q)	(r)	(p)	(s)
C	(r)	(p)	(s)	(q)
D	(s)	(r)	(q)	(p)

17. Which of the following statements explain the characteristics of the competitive inhibitor?

- I Inhibition is temporary
- II The inhibitor is located at the allosteric site.
- III The inhibitor molecule does not have the same configuration as the substrate molecule.

- A. 1 only B. 1 and II C. I and III D. II and III

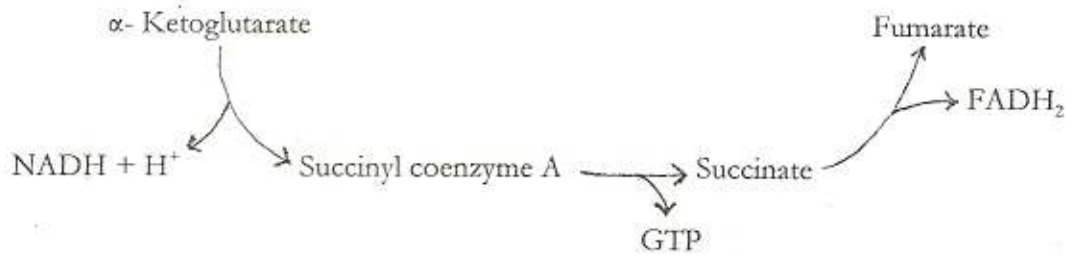
18. The graph below shows Lineweaver-Burk plot of a reaction which is catalysed by an enzyme with and without the presence of substance X.



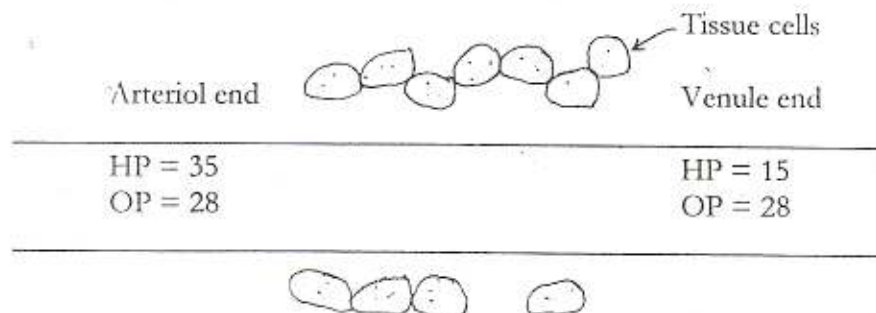
Substance X is

- A. a metabolic poison
- B. an enzyme cofactor
- C. a competitive inhibitor
- D. a non-competitive inhibitor.

19. Which of the following compounds provides carbon dioxide to cactus during the day?
 A. Malate B. Pyruvate C. Aspartate ~~X~~ D. Oxaloacetate
20. The diagram below shows part of the Krebs cycle.



- If two molecules of α -ketoglutarate are changed to form fumarate in the pathway above, the total ATP formed during aerobic respiration at this stage is
- A. 6 B. 12 C. 15 D. 30
21. Which of the following statements are true about respiration?
- I The Krebs cycle involves decarboxylation and dehydrogenation.
 - II Glycolysis causes the removal of carbon from the substrate.
 - III In the electron transport system, oxygen is reduced to water.
 - IV During the conversion of pyruvate to acetyl coenzyme A, CO_2 is released and NADH is formed.
- A. I and II B. I, III and IV C. II, III and IV D. I, II, III and IV
22. Which of the following statements are true about the Casparian strip?
- I It covers the tangential walls of the endodermis cell.
 - II It covers the radial walls of the endodermis cell.
 - III It covers the transverse walls of the endodermis cell.
 - IV It ensures that water crosses the root through the apoplast only.
- A. I and II B. II and III C. II, III and IV D. I, II and IV
23. The diagram below shows the hydrostatic pressure (HP) and osmotic pressure (OP) in mm Hg at the arteriole end and venule end.



If the osmotic pressure of the tissue fluid is 3 mm Hg and the hydrostatic pressure of tissue fluid is zero, what is the net pressure which caused the fluid to move in or out of the arteriole and venule end?

	Arteriol end	Venule end
A.	7 mm Hg, out	13 mm Hg, in
B.	7 mm Hg, in	13 mm Hg, out
C.	10 mmHg, out	10 mmHg, in
D.	10 mmHg, out	13 mm Hg in

24. If a cell with an initial water potential of $\psi = -0.8$ mPa is placed into a solution with a water potential of $\psi = -0.6$ mPa, the cell will
- A. absorb the water B. plasmolyse C. lose its water D. become flaccid
25. Which of the following action potential diagrams is correct about axon polarity when the propagation of nerve impulse occurs?
- A. + + + + + outside the axon
 - - - - - inside the axon
- B. + + - - - + + outside the axon
 - - + + + - - inside the axon
- C. + + - - - + + outside the axon
 + + - - - + + inside the axon
- D. - - + + + - - outside the axon
 + + - - - + + inside the axon
26. The following are events that occur during muscle contraction.
- I Calcium ions bind to troponin
II Binding forms between actin and myosin
III Calcium ions are released from the sarcoplasmic reticulum
IV Tropomyosin moves exposing the binding site
- Which of the following sequences is correct after impulse reaches the muscle?
- A. I, IV, II and III B. II, IV, I and III C. III, I, IV and II D. IV, I, II and III
27. The peptide hormone action mechanism involves the first and second messengers. Which of the following explains the role of the second messenger in the peptide hormone action mechanism?
- A. Activates the protein kinase enzyme
B. Helps the activation of the adeny cyclase enzyme
C. Enters the cell to trigger activation of cAMP
D. Helps the formation of hormone-receptor complexes
28. Which of the following statements are true about T cells?
- I T cells produce antibodies
II T cells reach their maturity in the thymus gland
III Cytotoxic T cells kill the cells which are infected by antigen
IV Suppressor T cells suppress the action of cytotoxic T cells
- A. I, II, III and IV B. II, III and IV C. II and III D. III and IV

29. Which of the following statements is not true about hormonal control during birth in humans?
- The release of the prostaglandin hormone from the placenta is increased.
 - The level of progesterone hormone in blood is higher than that of oestrogen hormone.
 - The anterior lobe of the pituitary gland secretes the prolactin hormone.
 - The posterior lobe of pituitary gland secretes the oxytocin hormone.

30. Phytochrome

- is a red pigment which acts as photoreceptor
- regulates circadian rhythm
- activates regulatory proteins
- regulates flowering and seed germination in some plants.

- A. 1, 2 and 3 B. 1, 2 and 4 C. 2, 3 and 4 D. 1, 2, 3 and 4

31. The following are the events that occur during germination of monocotyledonous seed.

- synthesis of enzyme
- Secretion of gibberellic acid
- activation of aleurone layer
- Soluble sugar produced from insoluble carbohydrate
- the metabolic process in the embryo is started

The correct sequence for the events above is

- III, I, IV, II, V
- II, III, I, IV, V
- V, II, III, I, IV
- IV, III, II, I, V

32. If a diploid state is represented by D and a haploid state is represented by H, which of the following is the correct match for the number of chromosome to the parts of plant structures?

	Polar nucleus	Tube nucleus	Anther	Cell of pericarp	Cell of testa
A.	D	D	H	D	D
B.	D	H	H	D	H
C.	H	D	H	H	H
D.	H	H	H	D	D

33. What is the phenotypic ratio for the crossing of F_1 individuals which are produced from the crossing of $AABB \times aabb$?

- A. 3:1 B. 9:7 C. 1:1:1:1 D. 9:3:3:1

34. The table below shows types of mutations and their examples.

Types of mutation	Example
I Base substitution	(a) Sickle cell anaemia
II Aneuploidy	(b) Cri-du-chat
III Chromosome deletion	(c) Down's syndrome
IV Base deletion	(d) Thalassaemia

Which of the following is correct about the types of mutations and their examples?

- | | | | | |
|----|-----|-----|-----|-----|
| | I | II | III | IV |
| A. | (a) | (c) | (b) | (d) |
| B. | (d) | (a) | (c) | (b) |
| C. | (b) | (c) | (a) | (d) |
| D. | (c) | (d) | (a) | (b) |

35. Mrs Tan has type B blood group and Mrs Wong has type A. Both of them gave birth on the same day at the same hospital. Mrs Tan named her child Ah Kow while Mrs Wong named her child Ah Lee. After being discharged from the hospital, Mrs Wong suspected that her child had been changed with that of Mrs Tan's. A blood test found that Ah Kow has type O blood group while Ah Lee has type B blood group. Which of the following statements is/are true about the above case if their husbands have type A blood group?

- I Mrs Wong's assumption is not correct.
- II Ah Lee is Mrs Tan's child.
- III Their children have been changed at the hospital.
- IV Ah Lee can have type B blood group.

- A. II only B. I and II C. I and III D. II, III and IV

36. A study on 1000 mice about their resistance towards a type of poison was carried out. The resistance characteristic is controlled by the dominant allele T. 51% of the mice population is found to be resistant towards the poison. Calculate number of mice expected to have genotype Tt.

- A. 412 B. 420 C. 490 D. 588

37. In a certain plant, red flowers (R) are dominant to white flowers (r) and tall (T) is dominant to short (t). A heterozygous (RrTt) plant is backcrossed with a double recessive (rrtt) plant. If the gene loci for colour and size are situated very close together on the same chromosome, the expected percentage of offspring could be approximately

	tall red	tall white	short red	short white
A.	25%	25%	25%	25%
B.	49%	49%	1%	1%
C.	1%	49%	49%	1%
D.	1%	1%	49%	49%

38. A woman who is a carrier of haemophilia had phenotypically normal parents and is married to a man without the recessive haemophilia gene. Which one of the following statements is true?

- A. Being recessive, the gene will not appear phenotypically in any of her children.
- B. Her mother also possessed the gene.
- C. All of her sons will be haemophiliacs.
- D. All of her daughters will carry the recessive gene.

39. If the promoter of the lactose operon system in *Escherichia coli* has mutated and is non-functional, which of the following statements is true?

- A. β -galactosidase enzyme is synthesized in the presence of lactose.
- B. β -galactosidase enzyme is synthesized with or without the presence of lactose.
- C. β -galactosidase enzyme is not synthesized in the presence of lactose.
- D. β -galactosidase enzyme is not synthesized with or without the presence of lactose.

40. Which of the following statements are the benefits of using plasmid as a vector in recombinant DNA technology?
- can transport more gene than virus
 - has one or more restriction sites recognized by restriction enzyme.
 - has a circular shape
 - can be cleaved by restriction enzyme
- A. II and IV B. I, II and IV C. II, III and IV D. I, II, III and IV
41. The following are the steps taken during the cloning process.
- transformation
 - Insertion of target DNA
 - Isolation of target DNA
 - amplification
 - screening
- The correct sequence for the steps above is
- A. I, II, III, IV, V B. III, II, I, IV, V C. III, II, I, V, IV D. V, III, II, I, IV
42. Organism X and Y are from the same order. Which of the following statements are true?
- they are from the same class
 - They are from the same family
 - they may be from the same genus
 - They may be from a different family
- A. I, II and III B. I, III and IV C. II, III and IV D. I, II, III and IV
43. Which of the following statements are true about organisms in the kingdom Prokaryotae?
- consists of bacteria and cyanobacteria
 - Some are photoautotrophs
 - the genetic material is a single strand DNA
 - Organelles are not present
- A. I and II B. I, II and III C. I, II and IV D. I, II, III and IV
44. Which of the following characteristics are the advancements achieved by Angiosperms compared to Filicinophytes?
- pollen tube to transfer male gametes
 - Heterosporus
 - presence of xylem vessels to provide structural support
 - sporophytes generation as the dominant generation
- A. I, II and III B. I, II and IV C. II, III and IV D. I, II, III and IV
45. Two populations of a species will only evolve into two distinct species if they are subjected to
- A. extrinsic isolation B. genetic isolation C. ecological isolation D. habitat isolation
46. Which of these statements best explains why a food chain is short?
- only 1% of sunlight is converted into gross primary productivity in producers.
 - energy lost when energy is transferred from one trophic level to another higher trophic level is high.
 - as the food chain gets longer, fewer organisms are found in the higher trophic levels.
 - as the food chain gets longer; organisms in the higher trophic levels have a bigger size.
47. The following are the values of energy in an ecosystem.
- Gross primary productivity of producers: $2000 \text{ kJm}^{-2}\text{y}^{-1}$
- Net primary productivity of producers: $1600 \text{ kJm}^{-2}\text{y}^{-1}$
- If the efficiency of energy transfer from producers to herbivores is 10% and ~~the~~ ^{to} the higher levels is 20%, what is the amount of energy obtained by the secondary consumers?
- A. $6.4 \text{ kJm}^{-2}\text{y}^{-1}$ B. $8 \text{ kJm}^{-2}\text{y}^{-1}$ C. $14.4 \text{ kJm}^{-2}\text{y}^{-1}$ D. $32 \text{ kJm}^{-2}\text{y}^{-1}$
48. Which of these statements are not true for organisms that use the K strategy for survival?
- produce a small number of progenies
 - adapted for competition
 - have a short life cycle
 - provide parental care to their offspring

49. Which of the following are the assumptions made in the capture-mark-release-recapture method?
- no death or birth occurs in the population during the study.
 - the marked organism mixes randomly and freely with the unmarked organisms, in the population.
 - chance of each organism in the population being caught is the same.
 - population being studied is not isolated from other populations of the same species.
- A. I, II and III B. I, II and IV C. II, III and IV D. I, II, III and IV
50. A quadrat frame of the size 50 cm x 50 cm was used to determine the density of a species X in areas P and Q. The results obtained are as follows:

Quadrat number	1	2	3	4	5	6	7	8	9	10
P	20	0	14	16	6	10	10	18	0	6
Q	12	0	4	6	4	2	0	10	2	0

What is the density, in units per square metre, of species X in the two areas?

- | | |
|--------|-----|
| P | Q |
| A. 5 | 2 |
| B. 10 | 4 |
| C. 40 | 16 |
| D. 400 | 160 |

END OF QUESTION PAPER.

DISEDIAKAN OLEH,



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