SBI4U Unit 2 Test: Metabolic Processes
(50 Marks Total)

Name:_____

Signature:_____

Marks obtained:

Category	Total Marks	Possible Marks
Knowledge/Understanding (K/U)		**10**
Thinking/Investigation (T/I)		**15**
Application (A)		**15**
Communication (C)		**10**
Total		**50**
Percentage		

SECTION 1: Knowledge/Understanding - Multiple Choice (Questions 1-10)

[K/U, 10: 1 each]

Write your section 1 answers here:

Question	1	2	3	4	5	6	7	8	9	10
Answer										

K/U	T/I	A	C
/10			

****NOTE: FOR SECTIONS 1 WRITE YOUR ANSWERS IN THE TABLES ON THE FIRST PAGE OF THIS TEST****

SECTION 1: Knowledge/Understanding - Multiple Choice (Questions 1-10)

[K/U, 10: 1 each]

1. Light energy is converted to chemical energy through the process of
   a) cellular respiration.
   b) photosynthesis.
   c) fermentation.
   d) glycolysis.

2. As light intensity increases, the rate of photosynthesis
   a) increases indefinitely.
   b) decreases indefinitely.
   c) increases until the light saturation point is reached.
   d) decreases until the light saturation point is reached.

3. The total amount of ATP that a cell gains for each glucose molecule depends on the presence of
   a) water.
   b) oxygen.
   c) carbon dioxide.
   d) glucose.

4. The energy used in the Calvin cycle for the production of sugar molecules comes from
   a) ATP only.
   b) ATP and NADPH.
   c) the Krebs cycle.
   d) carbon dioxide.

5. When glycolysis occurs,
   a) a molecule of glucose is split.
   b) photosynthesis begins.
   c) a molecule of glucose is formed.
   d) pyruvates are combined.

6. Cells produce ATP most efficiently in the presence of
   a) water.
   b) oxygen.
   c) carbon dioxide.
   d) glucose.

7. Water is an end product in
   a) lactic acid fermentation.
   b) alcoholic fermentation.
   c) the Krebs cycle.
   d) the electron transport chain in aerobic respiration.

8. ATP is composed of a nitrogenous base, a sugar, and
   a) one phosphate group.
   b) three phosphate groups.
   c) two phosphate groups.
   d) four phosphate groups.

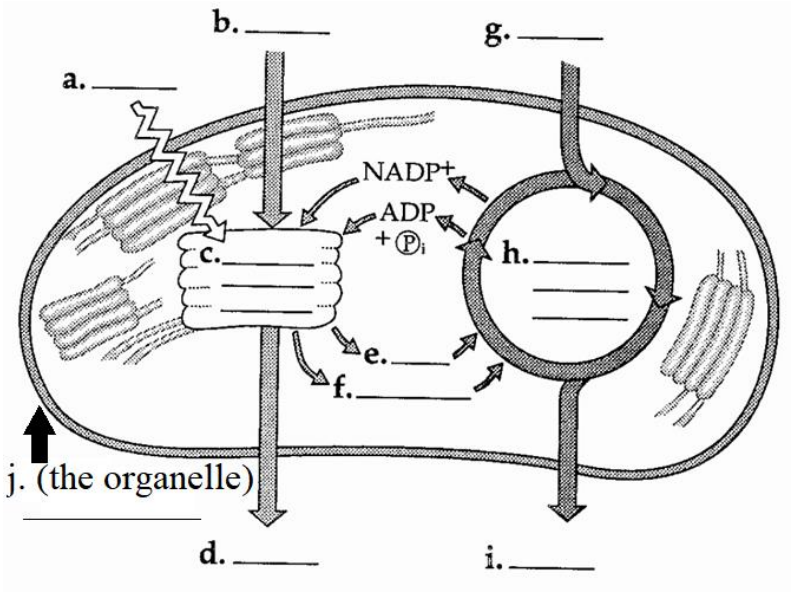
9. A cell that requires a lot of energy might contain large numbers of
   a) chromosomes.
   b) mitochondria.
   c) vacuoles.
   d) lysosomes.

10. Light energy : excite electrons is similar to:
   a) metabolism : autotroph
   b) carbon : electron
   c) ATP and NADPH : carbon dioxide fixation
   d) energy : food

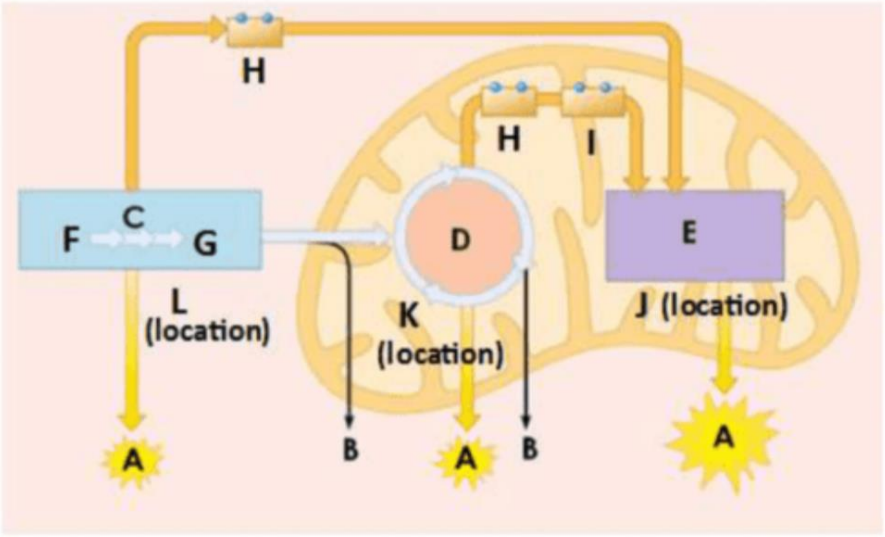
SECTION 2: Application - Labeling (Questions 11-12) *[A, 11: 1 each]*

11. Label the following diagram about photosynthesis by writing the letter associated with each term on the line below. *[A, 5; 0.5 each]*

_____ Light reactions
_____ Calvin Cycle
_____ NADH
_____ Light
_____ chloroplast
_____ CO_2
_____ O_2
_____ Sugar
_____ ATP
_____ H_2O



12. Label the following diagram about cellular respiration. *[A, 6; 0.5 each]*



_____ CO_2
_____ Glucose
_____ ATP
_____ Glycolysis
_____ Kreb Cycle
_____ Electron Transport Chain
_____ Pyruvate
_____ NADH
_____ FADH2
_____ Inner Membrane
_____ Matrix
_____ Cytoplasm

K/U	T/I	A	C
		/11	

SECTION 3: Thinking/Investigation, Application & Communication – Short Answer (Questions 13-19) *[T/I, 15; A, 4; C, 10]*

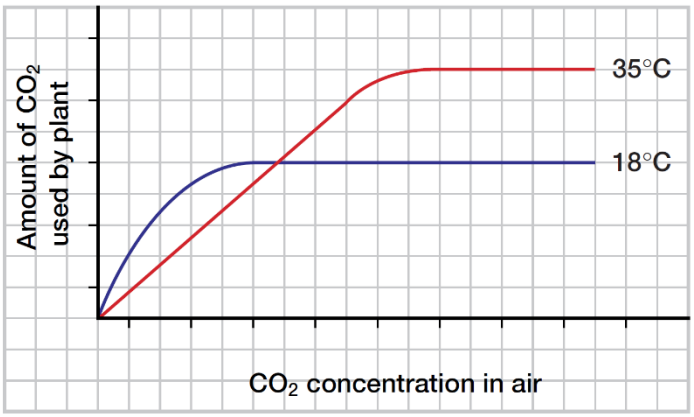
13. A strain of cells undergoes a mutation that increases the permeability of the inner mitochondrial membrane to hydrogen ions.
    a) What effect would you expect this mutation to have on the process of cellular respiration?
    b) Assuming the mutant cells can survive, how might the metabolic requirements of these cells differ from those of a non-mutant strain of the same variety? *[T/I, 4; 2 marks each]*

14. During carbon fixation in the Calvin cycle, CO_2 combines with RuBP. Oxygen can also combine with RuBP and can prevent CO_2 from reacting. If the ambient temperature is increased, will this increase or reduce glucose production? Make a graph help with your explanation. *[T/I, 5]*

K/U	T/I	A	C
	/9		

15. Mature human red blood cells do not have any mitochondria, yet they live for weeks. Predict which respiration processes red blood cells most likely use. What metabolic products would you expect to find in red blood cells that would support your prediction? *[T/I, 3]*

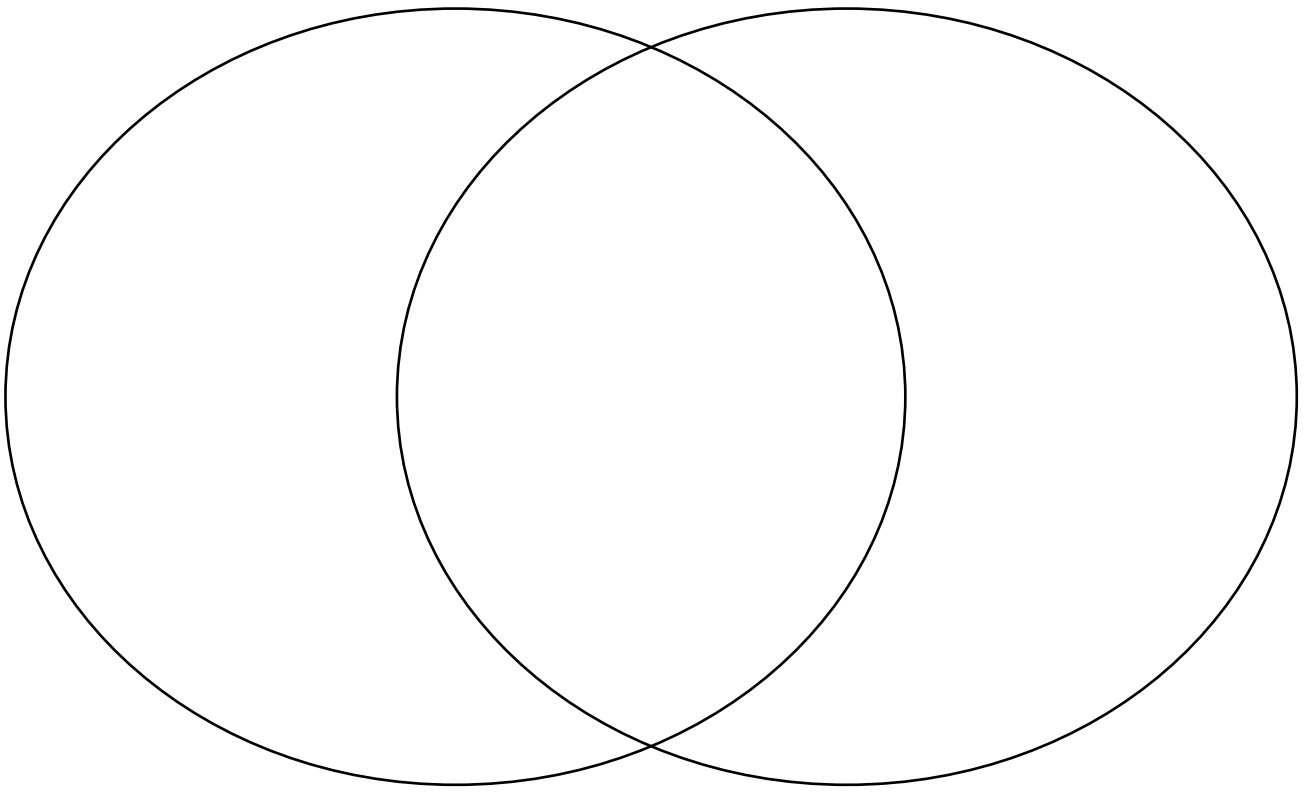
16. You are planning to build a greenhouse for the school. To ensure maximum growth of plants, the greenhouse needs extra carbon dioxide and heat at a reasonable cost. This graph shows the effect of temperature and carbon dioxide on plant growth (as measured by glucose production.) Write a summary of these data, indicating the best temperature and carbon dioxide concentration for the greenhouse. Be clear and precise. *[T/I, 3]*



K/U	T/I	A	C
	/6		

17. Pyruvate is available as a dietary supplement. Explain the possible results of adding pyruvate to your diet. *[A, 4]*

18. Write at least 3 difference and two similarities between aerobic and anaerobic respiration in the Venn Diagram below. *[C, 5]*



K/U	T/I	A	C
		/4	/5

19. Explain, with diagrams, how high levels of oxygen reduce the effectiveness of the Calvin cycle. Explain how alternative forms of carbon fixation avoid this problem. *[C, 5]*

K/U	T/I	A	C
			/5