

**2010-2011**  
**SC/BIOL 1010 6.0 Section A**  
**Winter Midterm Test**  
**Feb. 14, 2011 - KEY**

This test consists of **32 multiple choice items** (30 questions and 2 section/version indicators). There are **9 pages**.

This test is **45 minutes** long.

The entire question booklet and your scantron must be submitted to receive a grade. **Indicate your full name and student number on the scantron and on this page. (Please double-check your student number bubbling.)** Be sure to sign the sign-in sheet. **Your name must be written in permanent ink in all places.**

Choose **the single best answer** out of the options for each question. Read each question (and all possible answers) carefully. Answer all questions on the scantron.

**Calculators, cell phones, mp3 players and other electronic devices are NOT permitted, and must be put away.**

**Invigilators reserve the right to move students during the test. This may not reflect any suspicion of you (e.g., someone behind you may be looking at your paper). However, please note that aiding and abetting cheating is considered an academic honesty offense in itself.**

**If you have not finished by 2:10 PM, you must remain at your seat until the exam is over and your test has been picked up.**

Good luck!

Last name	First name
Student number	

Students are reminded of the Code of Conduct agreement signed at the beginning of the course, in particular: *"I understand York University's Senate Policy on Academic Honesty and will abide by this policy (avoiding cheating, plagiarism and other forms of academic dishonesty)."*

Please check that you have bubbled your student number correctly on the scantron. Choose one answer for each question.

1. You are in Section **A** – please indicate this by filling in “A” on the scantron. (If you are NOT in Section A, see an invigilator immediately.)
  - A. **Pick me!!!** ✓
  - B. No X
  - C. No X
  - D. No X
  - E. No X
  
2. You have exam version **A**, which must be indicated on the scantron to get credit for test questions.
  - A. **Pick me!!!** ✓
  - B. No X
  - C. No X
  - D. No X
  - E. No X
  
3. Which of the following is considered a single-celled organism?
  - A. Egg/ovum
  - B. **Archaean.**
  - C. Virus
  - D. Animal
  - E. None of the above
  
4. Which of the following is expressed in the cell theory?
  - A. All cells have the ability to produce other cells.
  - B. **All cells come from other cells, and all living organisms consist of cells.**
  - C. All cellular organisms reproduce by sexual reproduction.
  - D. All living organisms use other cells for energy, directly or indirectly.
  - E. All cell walls come from other cell walls and all organisms have cell walls.
  - F. All of the above.
  
5. Cells from any type of living organism would be expected to contain which of the following components?
  - A. **chromosome.**
  - B. nucleus.
  - C. mitochondrion.
  - D. lysosome.
  - E. microtubule.

6. Which of the following statements is/are **true** in terms of metabolism?
- A. **The reversible reaction  $ADP + P_i \leftrightarrow ATP$  (simplified) is linked with other reactions in many metabolic pathways.**
  - B. Organisms can be classified as either catabolic or anabolic, but not both.
  - C. Metabolic reactions first appeared in evolutionary history with the appearance of eukaryotes.
  - D. Oxidation-reduction reactions occur in eukaryotes, but not in bacteria, nor in archaeans.
  - E. More than one of the above statements is true.
7. If a molecule of DNA has 10% cytosine, it has \_\_\_ guanine and \_\_\_ adenine respectively.
- A. **10%, 40%.**
  - B. 10%, 45%.
  - C. 40%, 40%.
  - D. 40%, 10%.
  - E. 30%, 30%.
  - F. This cannot be determined.

Use the figure below to answer the following 2 questions.

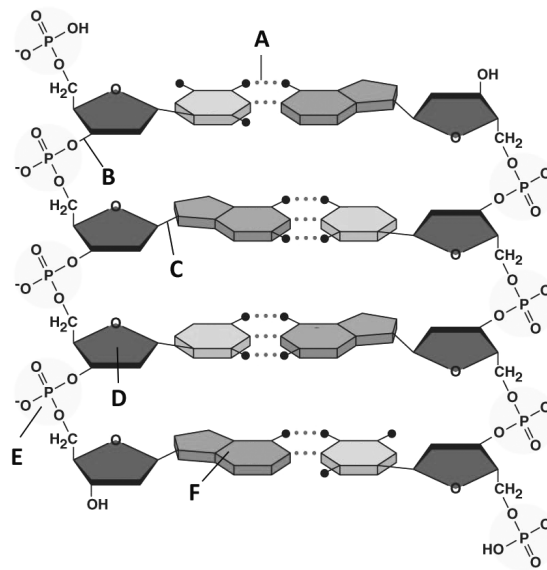


Figure 1

8. Which of the label letters indicate(s) hydrogen bonding in Figure 1?  
 On the scantron, choose **A**, B, C, D, E, F (label letters in figure) or G for "More than one of the labels in A through F".
9. Which of the Figure 1 label letters indicates a deoxyribose sugar?  
 On the scantron, indicate A, B, C, **D**, E or F as indicated in figure.

10. All of the following statements are correct regarding a role(s) of vesicles in a cell, **EXCEPT**
- A. Vesicles transport newly synthesized proteins to the Golgi body for processing.
  - B. Vesicle fusion with lysosomes allows digestion/recycling of vesicle contents.
  - C. Vesicles deliver macromolecules to the plasma membrane for secretion outside the cell.
  - D. **Vesicles transport mRNA molecules to the nucleus from the endoplasmic reticulum (ER).**
  - E. All of the statements in A through D are correct.
11. Which of the following statements about photosynthesis and cellular respiration is/are true?
- A. Photosynthesis is a catabolic process; cellular respiration is an anabolic process.
  - B. Photosynthesis occurs in plants and some prokaryotes; cellular respiration occurs in animals but not plants.
  - C. **Organelles are required to carry out photosynthesis and cellular respiration in eukaryotes.**
  - D. Both photosynthesis and cellular respiration require CO<sub>2</sub> as an input.
  - E. More than one of the above statements is true.
12. Oxidation-reduction (redox) reactions
- A. involve the transfer of one or more carbon atoms from one molecule to another.
  - B. allow organisms to convert energy from large macromolecules for cellular use. ✓
  - C. allow organisms to convert energy from photons of light for cellular use. ✓
  - D. All of the above (A through C) are true of redox reactions.
  - E. **Only 2 of the above (A through C) are true of redox reactions.**
13. The “information system” of the cell involves stable genetic information being stored in \_\_\_\_\_, which can be \_\_\_\_\_ to make a “disposable” (short-lived) copy of this information.
- A. RNA, transcribed.
  - B. DNA, replicated.
  - C. protein, translated.
  - D. RNA, translated.
  - E. **DNA, transcribed.**
14. All of the following are true of ribosomes, **EXCEPT**:
- A. Ribosomes are present in bacteria, archaeans, and eukaryotes.
  - B. Ribosomes are composed of RNA and associated proteins.
  - C. Ribosomes are directly involved in making polypeptides (proteins) from a set of genetic instructions.
  - D. **Ribosomes must be associated with (bound to) the endoplasmic reticulum to function.**

Use the following figure of a cell to answer the next two questions.

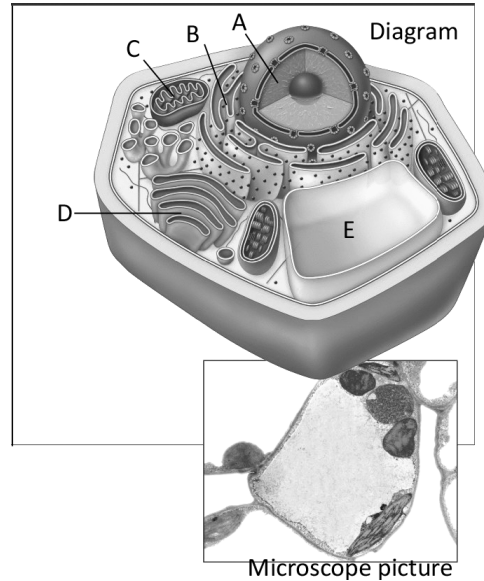


Figure 2

15. In Figure 2, which structure carries out energy transformation reactions?

On scantron, answer A, B, **C**, D or E as shown in the figure.

16. The diagram and microscope picture (in Figure 2) show a cell of \_\_\_\_\_ .

- A. **a plant.**
- B. a bacterium.
- C. an animal.
- D. an organism from any domain (Bacteria, Archaea, Eukarya).

**The cell has a cell wall, chloroplasts and a large vacuole.**

17. Which of the statements below describes evidence that supports the theory that mitochondria and chloroplasts descended from bacterial ancestors?

- A. These organelles are similar to the nucleus in terms of size and morphology.
- B. Mitochondria and chloroplasts can survive and reproduce outside of the cell, as well as inside eukaryotic cells.
- C. Electron transport occurs in plasma membranes of the eukaryotic cell, just as electron transport occurs on bacterial plasma membranes.
- D. **DNA is present in both organelles, as circular chromosomes.**

18. Which of the following is true of the cytoskeleton in eukaryotes?

- A. It is a specialized external structure, secreted to the exterior of the plasma membrane.
- B. It is made up of a combination of many different proteins, carbohydrates, and fatty acids.
- C. **It includes some components that are stable, and other components that assemble and disassemble frequently.**
- D. The elements of the cytoskeleton functionally interchangeable, so a deficiency in one component can be compensated for by substituting another.

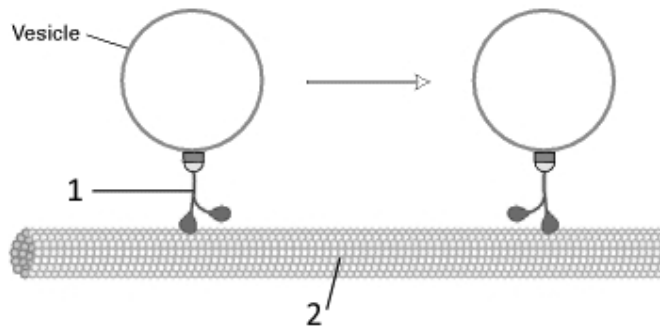


Figure 3.

19. Consider Figure 3. It diagrams vesicle movement using a(an) \_\_\_\_\_ (#1) along a(an) \_\_\_\_\_ (#2), and requires \_\_\_\_\_ (not shown).
- A. **motor protein, microtubule, ATP.**
  - B. ATP, microfilament, actin.
  - C. motor protein, intermediate filament, ATP.
  - D. ATP, microtubule, cilia.
  - E. motor protein, microfilament, tubulin.
  - F. mRNA, intermediate filament, photons of light.
20. Which of the following statements are true of **both** the bacterial flagellum and the eukaryotic flagellum?
- A. These structures are exterior to the plasma membrane of the cell.
  - B. Motion is caused by a motor that rotates at the base of the flagellum.
  - C. The major structural proteins that make up these structures are nearly identical (as are the genes encoding the proteins in both).
  - D. Functional dynein (motor protein) must be present in these structures for flagellar movement to occur.
  - E. **None of the above; bacterial and eukaryotic flagella are analogous structures.**
21. You are studying a cell under the microscope. It is a single-celled organism, with a single chloroplast. With this information, we know that this organism is
- A. only a bacterium.
  - B. only an archaean.
  - C. **only a eukaryote.**
  - D. a bacterium or an archaean (NOT a eukaryote).
  - E. a bacterium, an archaean, or a eukaryote.
- Chloroplasts are only present in eukaryotes. Eukaryotes include both single-celled organisms (e.g., many algae) and multicellular organisms.
22. Which of the following is **NOT** true regarding photosynthesis?
- A. It first appeared in ancient prokaryotes.
  - B. **The earliest form of photosynthetic reactions oxidized (used) H<sub>2</sub>O and yielded O<sub>2</sub>.**
  - C. Development of oxygenic photosynthesis led to atmospheric changes that allowed evolution of cells/organisms able to use aerobic respiration pathways.
  - D. Some forms of photosynthesis involve oxidizing compounds like ferrous iron or H<sub>2</sub>S.

23. Which of the following is **NOT** a valid reason why *E. coli* is considered a useful model organism?
- A. The complete sequence of the genome of a standard lab strain is known.
  - B. It reproduces very quickly (has a short life cycle).
  - C. Many of the fundamental aspects of its biochemistry are common to all organisms.
  - D. It is small, and easy to grow large numbers in a laboratory.
  - E. **All known strains of *E. coli* are 99% identical at the genetic level.**
24. Which of the following is true, regarding colonial organisms compared to multicellular organisms?
- A. **Colonial organisms are made up of undifferentiated cells; multicellular organisms have specialized cells.**
  - B. Colonial organisms are prokaryotic; multicellular organisms are eukaryotic.
  - C. Cells of colonial organisms are internally simple and lack membranous structures; cells of multicellular organisms compartmentalize activities into specialized organelles.
  - D. Cells of colonial organisms are cooperative; cells of multicellular organisms are independent of one another.
25. Which of the following is **NOT** true of both the Bacteria and the Archaea?
- A. Representatives from each can make use of a very wide range of carbon and energy sources compared to the Eukarya.
  - B. **The plasma membranes of both are identical in structure and composition.**
  - C. Their cells appear similar in size and inner complexity to one another.
  - D. They each have representatives that can live and grow at temperatures greater than 60°C.
  - E. They are found in nearly all types of environments on Earth.
26. Which of the following is/are true regarding histones and DNA gyrase?
- A. **They both help organize DNA in a compact form.**
  - B. They both serve as cores (“spools”), around which DNA is wound.
  - C. Histones are associated with RNA; DNA gyrase is associated with chromosomal DNA.
  - D. Bacteria and archaeans have histones; eukaryotes have DNA gyrase.
  - E. More than one of the above is true.
27. Which of the following membrane structures/components are mostly (or entirely) hydrophilic?
- A. **peripheral proteins.**
  - B. phospholipid fatty acid tails.
  - C. cholesterol deposits.
  - D. integral proteins.
  - E. None of the above.

28. Which characteristic would be expected in the plasma membranes of a plant that can survive winters in Northern Ontario (compared to a plant growing in a warmer region)?

- A. Fatty acid tails are more saturated.
- B. **Fatty acid tails are more unsaturated.**
- C. Higher levels of cholesterol.
- D. Additional glycerol molecules packed in between fatty acid tails.

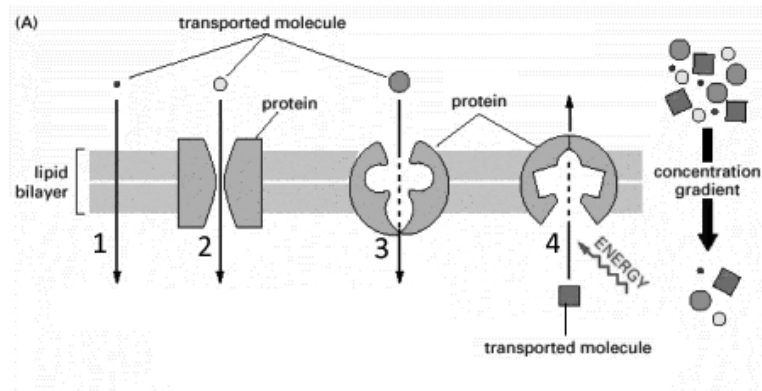


Figure 4.

29. In Figure 4, which of the labels indicate (an) example(s) of passive transport?

- A. 1 only.
- B. 3 only.
- C. 4 only.
- D. 1 and 2.
- E. 2 and 3.
- F. **1, 2 and 3.**

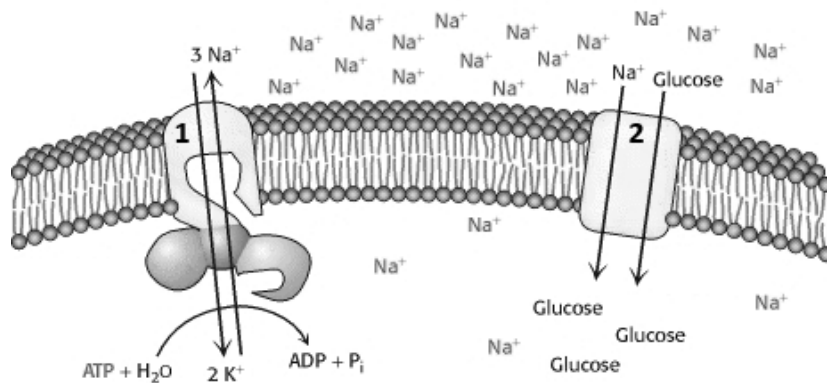


Figure 5.

30. In Figure 5, where is active transport occurring?

- A. Only via #1.
- B. Only via #2.
- C. **Both #1, and #2.**
- D. No active transport is occurring in this figure.

#1 is primary active transport. In #2, we have secondary active transport. Glucose is moved against its concentration gradient through a symporter that allows Na+ to diffuse into the cell.

Use the following information to answer the next two questions.

It is possible to (carefully) remove the cell wall of bacteria in an isotonic solution (Tube A), resulting in living bacterial protoplasts. Consider what would be expected if such protoplasts were transferred to Tube B (containing pure distilled water).

31. Initially, the protoplast cytoplasm is \_\_\_\_\_ to Tube B.

- A. **hypertonic.**
- B. isotonic
- C. hypotonic

32. After some time has passed with the protoplasts in Tube B, what will happen to these cells?

- A. **They will swell, and burst.**
- B. They will shrink and shrivel up.
- C. No visible change would be observed.

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↻ END OF TEST ↻