These review questions are for the Cells lecture topics. The questions were adapted from several sources, including 1700+ Review Questions for Anatomy and Physiology II (3rd edition) by R. Michael Anson, Ph.D.

Multiple choice review questions:

1) The cell membrane is composed primarily of a double layer of ____ molecules.
   A) phospholipid
   B) carbohydrate
   C) nucleic acid
   D) amino acid

2) Which of the following organic molecules is not commonly found in the cell membrane?
   A) lipids
   B) protein
   C) cholesterol
   D) nucleic acids

3) Most receptor proteins are found in which part of the cell?
   A) cytosol
   B) nucleus
   C) membrane
   D) endoplasmic reticulum

4) Which of these is *not* a final product of aerobic cell respiration?
   A) carbon dioxide
   B) water
   C) oxygen
   D) energy (ATP)

5) In addition to ATP energy, what are the final products of aerobic respiration?
   A) O_2 and CO_2
   B) CO_2 and H_2O
   C) O_2 and H_2O
   D) CO_2 only

6) Which of the following is *not* a source of energy for aerobic respiration?
   A) nucleotides
   B) glucose
   C) amino acids
   D) fats

7) As a result of *anaerobic respiration* in humans, glucose is converted to
A) pyruvic acid.
B) lactic acid.
C) citric acid.
D) acetyl CoA.

8) Anaerobic metabolism of glucose produces _____ as a product.
A) carbon dioxide
B) lactic acid
C) glycogen
D) fatty acid

9) For every glucose molecule that is broken down by anaerobic respiration, ____ molecules of lactic acid are made, and _____ molecules of ATP are generated.
A) 2 and 4
B) 32 and 6
C) 6 and 12
D) 2 and 2

10) How many molecules of ATP are produced per molecule of glucose during aerobic respiration?
A) 32
B) 4
C) 26
D) 20

Answers to multiple choice problems:

1) A
2) D
3) C
4) C
5) B
6) A
7) B
8) B
9) D
10) A

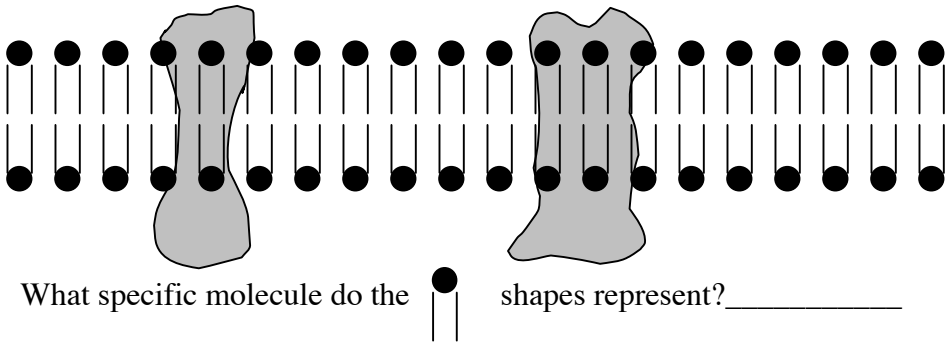
Fill-in-the-blank review questions:

1) The smallest living unit of the body is the _____.

2) The cell membrane blocks the passage of most _____.

3) The cell membrane is hydrophobic because it is composed primarily of the hydrophobic molecules _____ and _____ molecules. In addition to these hydrophobic molecules, cell membranes have _____, which are proteins that detect solutes outside the cell, and also _____ proteins that bring solute molecules through the membrane.

4) The drawing below shows the cell membrane. Answer the questions below the drawing. Some answers require more than one word.



What specific molecule do the shapes represent?_____

The gray shapes represent proteins. What two types of proteins that interact with solutes outside the cell are found in membrane? Be as specific as possible.

5) A double layer of phospholipids (as is shown in problem 5 above) is known as a phospholipid _____.

6) The watery material that fills the cell is called the _____. The structures that float in this watery material and that keep the cell alive are called the _____.

7) The region in a human cell that houses the genetic material (the DNA) is the _____. The DNA is found in tightly coiled structures called _____ that can be seen as thread-like shapes under a microscope.

8) When a protein in the cell uses an ATP for energy, the ATP becomes split apart into what two molecules?

9) The number of ATP molecules produced by the aerobic respiration of one glucose molecule is _____.

10) Where do the CO_2 and H_2O molecules that are made by aerobic respiration in the cell go?

11) Although glucose is the usual "fuel" for cellular respiration, other molecules that the cell can use for fuel are _____ and _____

12) The purpose of cellular respiration is to recharge the cell's _____ supply.

13) The type of respiration that produces lactic acid from glucose when there isn't sufficient oxygen for aerobic respiration is known as _____.

14) The breakdown of one glucose molecule in the absence of oxygen leads to a gain of how many ATP molecules? _____

15) An example of a cell type that regularly uses anaerobic respiration are _____ cells.

16) For each glucose that a cell uses for aerobic respiration, how many ATP molecules are produced from it if the cell is using aerobic respiration? _____. How many ATP molecules are produced from it if the cell is using anaerobic respiration? _____

17) What molecule causes the burning sensation in your muscles if you exercise vigorously?

18) After each activity listed below, write Aerobic or Anaerobic to describe what kind of cellular respiration the muscle cells are using during that activity. In situations when both are occurring, write both answers but add "Mostly" after the one that is being used more.

Reading: _____
Standing: _____
Sitting: _____
Walking at a slow easy pace: _____
Jumping up high in the air once or twice: _____
Jogging at a comfortable pace: _____
Sprinting as fast as you can for as long as you can: _____

Answers to multiple choice problems:

1) Cell
2) Solute molecules
3) Phospholipid
Cholesterol
Receptor
Membrane transport proteins
4) Phospholipid
Receptors
Membrane transport proteins
5) Bilayer
6) Cytoplasm
Organelles
7) Nucleus
Chromosome
8) ADP and a phosphate
9) 32
10) Into the blood
11) Fats
Amino acids
12) ATP
13) Anaerobic respiration
14) 2
15) Muscle
16) 32
2
17) Lactic acid
18) Aerobic
Aerobic
Aerobic
Aerobic (mostly)
Anaerobic
Aerobic mostly
` Anaerobic (mostly)

Short answer review questions:

1) Write the full chemical reaction for cellular aerobic respiration. Put the molecular formulas in the blanks. Under each blank, write the name of the molecule.

_____ + _____ –> _____ + _____

2) Write the full chemical reaction for cellular anaerobic respiration. Put the molecular formulas in the blanks. Under each blank, write the name of the molecule.

_____ –> _____

3) What is the main advantage of anaerobic respiration to a cell (compared to aerobic respiration)? What is the main disadvantage?

4) A friend of yours in this class tells you the following: "Your cells are able to get energy using anaerobic respiration, which requires no oxygen. Therefore, you don't need to breath to stay alive." Explain to your friend why she is wrong.

Answers to short answer review questions:

1) $C_6H_{12}O_6$ + $6O_2$ -> $6H_2O$ + $6CO_2$
Glucose Oxygen Water Carbon dioxide

2) $C_6H_{12}O_6$ -> $2C_3H_6O_3$
Glucose Lactic acid

3) The main advantage of cellular anaerobic respiration is that the cell can continue to make ATP even when there is insufficient oxygen for aerobic respiration. The main disadvantage is that the cell gains only 2 ATP per glucose (compared to 32 ATP per glucose using aerobic respiration), and therefore the cell depletes its glucose supply too quickly.

4) It is true that many cells can use anaerobic respiration to make ATP for a short time, but this process is so inefficient that the cells deplete their glucose supply very rapidly. Furthermore, not all cells in the body are capable of using anaerobic respiration. Therefore, you still need to breathe to stay alive, even though some of your cells can perform anaerobic respiration for a short time.