



Biology 1

Sample Test Materials

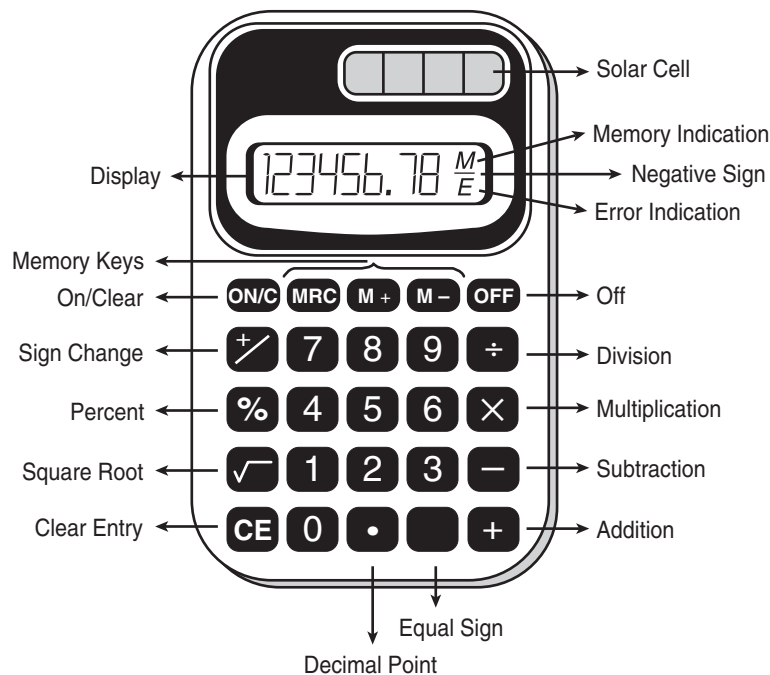
The purpose of these sample test materials is to orient teachers and students to the types of paper-based Biology 1 End-of-Course (EOC) questions. By using these materials, students will become familiar with the types of items and response formats they may see on a paper-based test. The sample items and answers are not intended to demonstrate the length of the actual test, nor should student responses be used as an indicator of student performance on the actual test. The sample test materials are not intended to guide classroom instruction.

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HELPFUL HINTS FOR USING A FOUR-FUNCTION CALCULATOR

This is a picture of a generic 4-function calculator and its parts.

GENERIC 4-FUNCTION CALCULATOR



If you decide you need the calculator to help you answer a question, use the following information:

1. When starting a new problem, always clear your calculator by pressing the on/clear key.
2. If you see an **E** in the display, clear the error before you begin.
3. If you see an **M** in the display, clear the memory and the calculator before you begin.
4. If the number in the display is not one of the answer choices, check your work.
5. Remember, your calculator will **NOT** automatically perform the order of operations.
6. Calculators might display an incorrect answer if you press the keys too quickly. When working with calculators, use careful and deliberate keystrokes, and always remember to check your answer to make sure that it is reasonable.
7. The negative sign may appear either to the left or to the right of the number.
8. Always check your answer to make sure that you have completed all of the necessary steps.

Periodic Table of the Elements

(based on $^{12}_6\text{C} = 12.0000$)

Group		Transition Metals										Representative Elements					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1A	2A	3B	4B	5B	6B	7B	8B			1B	2B	3A	4A	5A	6A	7A	8A
1 H Hydrogen 1.008												B Boron 10.81	C Carbon 12.011	N Nitrogen 14.007	O Oxygen 15.999	F Fluorine 18.998	He Helium 4.003
2 Li Lithium 6.941	4 Be Beryllium 9.012											Al Aluminum 26.982	Si Silicon 28.086	P Phosphorus 30.974	S Sulfur 32.06	Cl Chlorine 35.453	Ar Argon 39.948
3 Na Sodium 22.990	12 Mg Magnesium 24.305											Ga Gallium 69.723	Ge Germanium 72.61	As Arsenic 74.922	Se Selenium 78.96	Br Bromine 79.904	Kr Krypton 83.80
4 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.88	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.847	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.723	32 Ge Germanium 72.61	33 As Arsenic 74.922	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.80
5 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.94	43 Tc Technetium 98	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.82	50 Sn Tin 118.710	51 Sb Antimony 121.757	52 Te Tellurium 127.60	53 I Iodine 126.905	54 Xe Xenon 131.29
6 Cs Cesium 132.905	56 Ba Barium 137.327	57 La Lanthanum 138.905	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.85	75 Re Rhenium 186.207	76 Os Osmium 190.2	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.967	80 Hg Mercury 200.59	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium 208.982	85 At Astatine 210	86 Rn Radon 222
7 Fr Francium 223	88 Ra Radium 226.025	89 Ac Actinium 227.028	104 Rf Rutherfordium (261)	105 Db Dubnium (262)	106 Sg Seaborgium (263)	107 Bh Bohrium (264)	108 Hs Hassium (265)	109 Mt Meitnerium (268)									

14	Atomic number
Si	Symbol
Silicon	Name
28.086	Average Atomic Mass

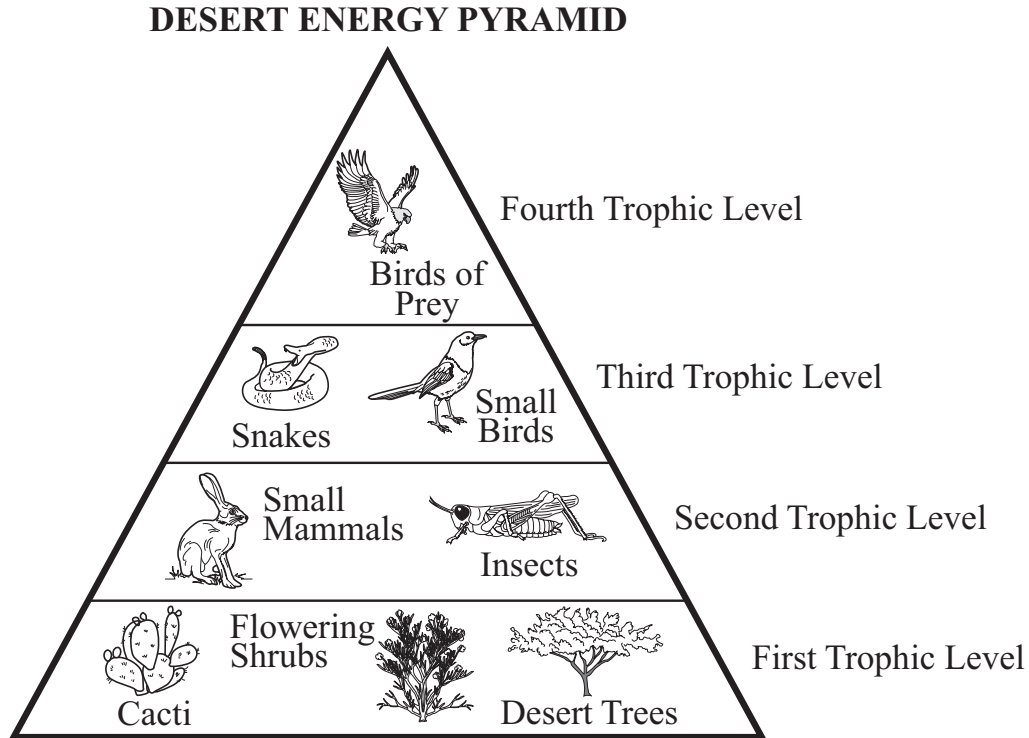


Inner Transition Metals

Lanthanide series													
58 Ce Cerium 140.12	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.24	61 Pm Promethium 144.913	62 Sm Samarium 150.36	63 Eu Europium 151.96	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.50	67 Ho Holmium 164.930	68 Er Erbium 167.26	69 Tm Thulium 168.934	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.967
90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium 237.048	94 Pu Plutonium 244.064	95 Am Americium 243.061	96 Cm Curium 247.070	97 Bk Berkelium 247.070	98 Cf Californium 251.080	99 Es Einsteinium 252.083	100 Fm Fermium 257.095	101 Md Mendelevium 258.099	102 No Nobelium 259.101	103 Lr Lawrencium 260.105

Actinide series

1. A team of ecologists observed feeding patterns of several populations in the desert. The energy pyramid shown below depicts the feeding patterns the ecologists observed.



Which of the following **best** explains the difference in the amount of available energy in the trophic levels of the desert ecosystem?

- (A) There is less energy available in the producers because their tissues are less dense than those at higher trophic levels.
- (B) There is more energy available in the second trophic level because less energy is needed for hunting compared to the higher trophic levels.
- (C) There is more available energy in the birds of prey because they have greater muscle mass for storing energy than organisms in lower trophic levels have.
- (D) There is less available energy in the fourth trophic level because of the loss of energy through metabolism in each of the lower trophic levels.

2. Water is essential for life. Its special properties make water the single most important molecule in plant life. Which of the following properties of water enable it to move from the roots to the leaves of plants?
- Ⓐ Water expands as it freezes.
 - Ⓑ Water is an excellent solvent.
 - Ⓒ Water exhibits cohesive behavior.
 - Ⓓ Water is able to moderate temperatures.

3. An osmosis investigation was conducted using chicken eggs to represent cells with semipermeable membranes. The mass of each egg was measured to determine how much water diffused into or out of the eggs. The eggs were first soaked in vinegar to dissolve the shell. Each egg was then placed in one of three different solutions for 24 hours. The table below shows the results of the investigation.

OSMOSIS IN CELLS

Solution	Average Mass of Eggs Before Soaking (grams)	Average Mass of Eggs After Soaking (grams)	Difference in Average Mass (grams)	Percent Change in Average Mass
Vinegar (95% water)	71.2	98.6	27.4	+38.5
Corn syrup (5% water)	98.6	64.5	34.1	-34.6
Distilled water (100% water)	64.5	105.3	40.8	+63.3

Based on this experiment, which of the following should be inferred about cells with semipermeable membranes?

- (A) Substances other than water may also cross the cell membrane.
- (B) Substances other than water may block pores in the cell membrane.
- (C) Water enters the cell when placed in environments of high water concentration.
- (D) Water leaves the cell when placed in environments with a low concentration of solutes.

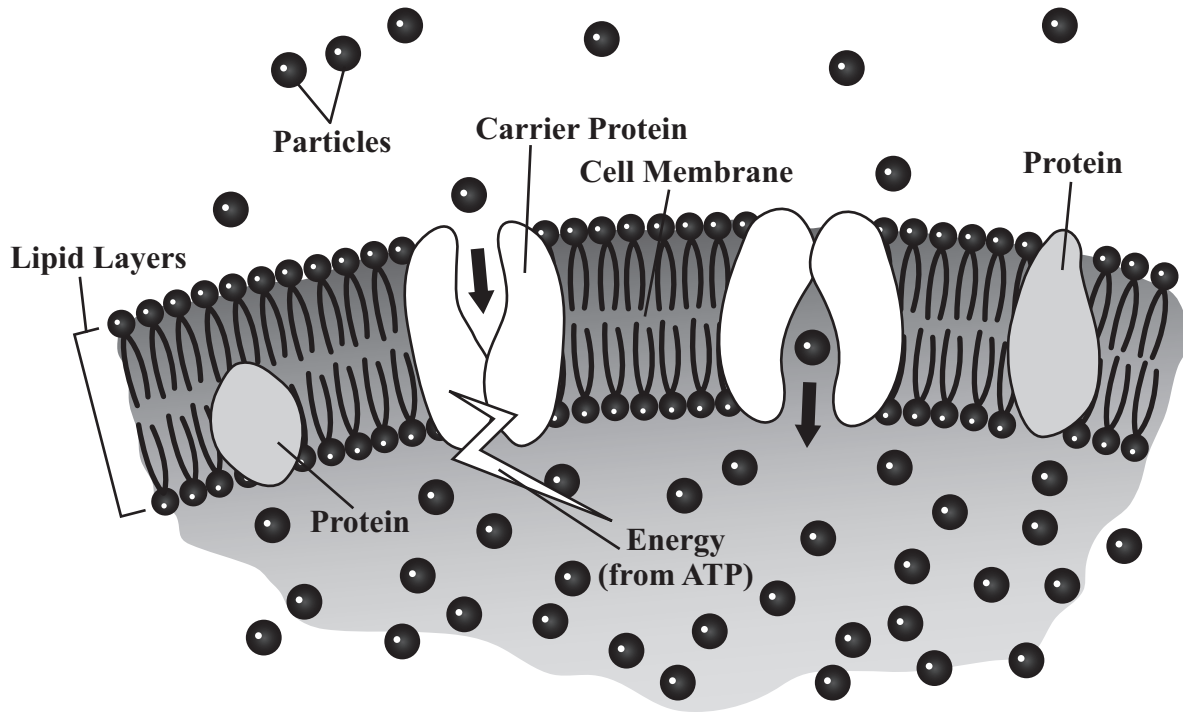
4. One of the accepted scientific theories describing the origin of life on Earth is known as chemical evolution. According to this theory, which of the following events would need to occur **first** for life to evolve?
- Ⓐ onset of photosynthesis
 - Ⓑ origin of genetic material
 - Ⓒ synthesis of organic molecules
 - Ⓓ formation of the plasma membrane

Biology 1 Sample Items

5. Hemophilia is a sex-linked, recessive trait. Which of the following describes the probability of hemophilia in the offspring of a man who does not have hemophilia and a woman who is a heterozygous carrier?
- Ⓐ There is a 0% chance that their daughters will have hemophilia.
 - Ⓑ There is a 25% chance that their sons will have hemophilia.
 - Ⓒ There is a 50% chance that their daughters will have hemophilia.
 - Ⓓ There is a 100% chance that their sons will have hemophilia.

Cell Membrane

A cell membrane is composed of a double layer of lipids in which many kinds of proteins are embedded. Many of these proteins act like gates, allowing only certain particles to enter or leave the cell.



When a particle has to go against its concentration gradient through one of these gates, energy is supplied by the cell to the correct protein to move the particle through the membrane. A sodium-potassium ion pump is an example of a type of carrier protein that uses a large portion of the cell's energy to move sodium ions through the cell membrane.

To answer this question, refer to the “Cell Membrane” passage and figure.

6. The sodium-potassium ion pump found in some cell membranes is made of which of the following basic structural components?
- Ⓐ amino acids
 - Ⓑ fatty acids
 - Ⓒ monosaccharides
 - Ⓓ nucleotides

To answer this question, refer to the “Cell Membrane” passage and figure.

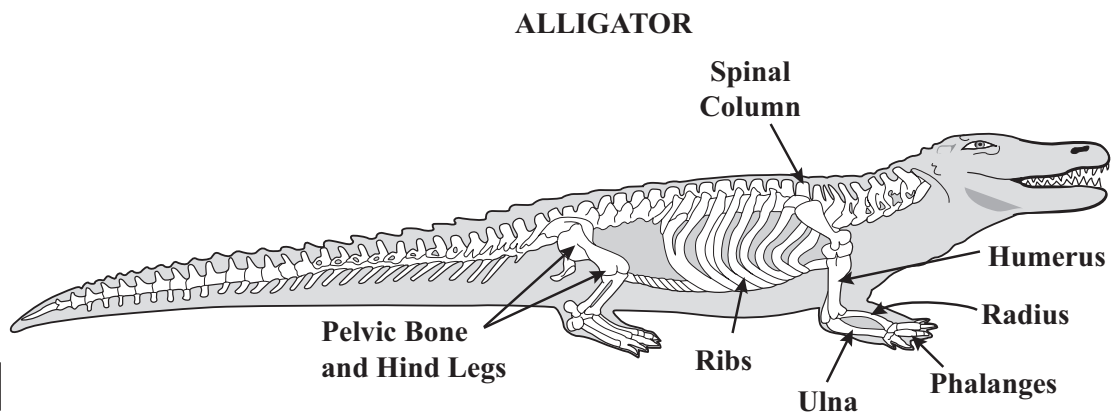
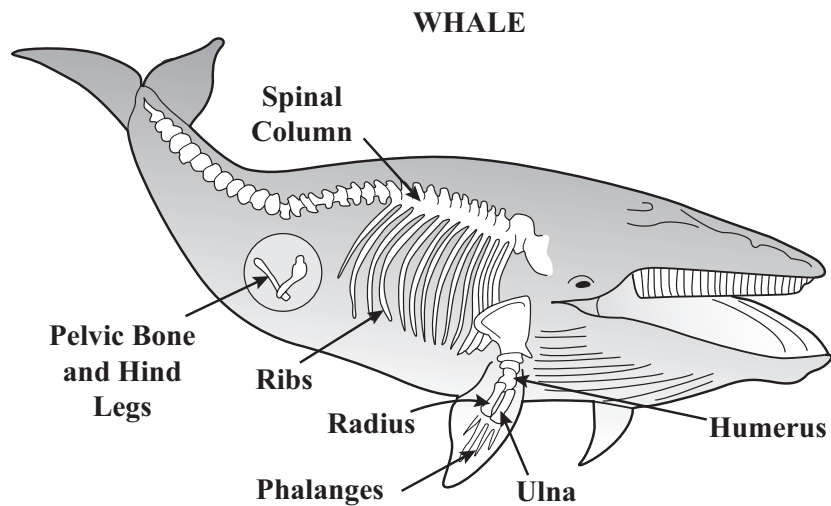
7. What is a primary function of the cell membrane?

- Ⓐ determining genetic traits
- Ⓑ defending against foreign particles
- Ⓒ breaking down proteins for energy
- Ⓓ generating energy from mineral nutrients

To answer this question, refer to the “Cell Membrane” passage and figure.

8. Why does the study of cell membranes lead to a better understanding of cell function?
- Ⓐ All cell functions occur in the cell membrane.
 - Ⓑ All energy transfers occur at the cell membrane.
 - Ⓒ All cell membranes contain the information for making proteins.
 - Ⓓ All materials needed for cell functions must pass through the cell membrane.

9. The scientific theory of evolution is supported by different types of evidence. The diagrams below show the skeletons of two different animal species.

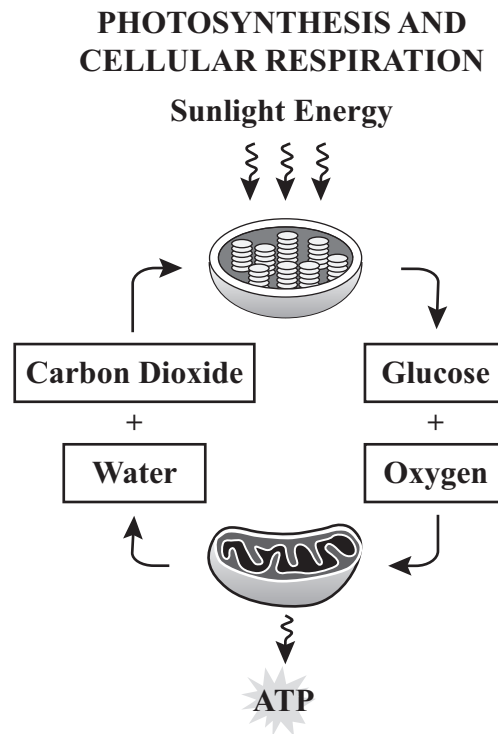


not to scale

How does comparing the skeletons of these animals provide support for the scientific theory of evolution?

- (A) It provides information about the organisms' habitats.
- (B) It shows possible common ancestry between organisms.
- (C) It provides information to determine the organisms' ages.
- (D) It shows possible chromosomal similarities between organisms.

10. The diagram below shows the relationship between photosynthesis and cellular respiration and the organelles in which they occur.



Which statement describes how photosynthesis and cellular respiration are interrelated?

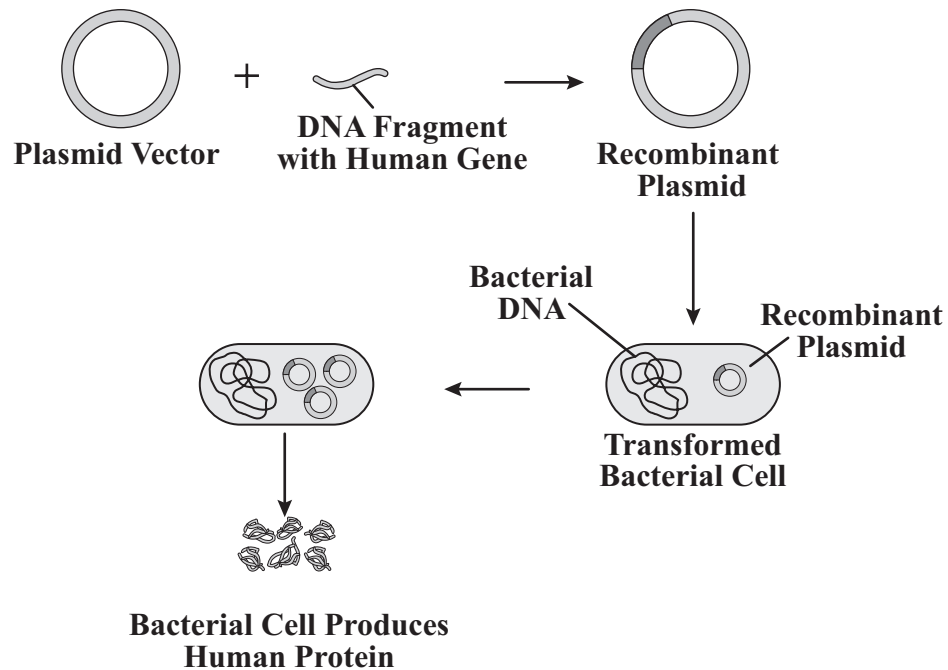
- Ⓐ Oxygen is produced during cellular respiration and stored during photosynthesis.
- Ⓑ Carbon dioxide and water released by cellular respiration are used in photosynthesis.
- Ⓒ Photosynthesis releases the energy that is stored during the process of cellular respiration.
- Ⓓ Glucose is used during cellular respiration to produce food that is broken down during photosynthesis.

11. As food travels through the digestive system, it is exposed to a variety of pH levels. The stomach has a pH of 2 due to the presence of hydrochloric acid (HCl), and the small intestine has a pH ranging from 7 to 9. HCl converts pepsinogen into pepsin, an enzyme that digests proteins in the stomach. Which of the following **most likely** happens to pepsin as it enters the small intestine?

- Ⓐ It becomes inactive.
- Ⓑ It begins to replicate.
- Ⓒ Its shape changes to engulf large proteins.
- Ⓓ Its activity increases to digest more proteins.

Biology 1 Sample Items

12. Genes for medically important proteins can be cloned and inserted into bacteria, as shown in the diagram below.



Why can bacteria recognize a human gene and then produce a human protein?

- (A) DNA replication in bacteria and humans is the same.
- (B) Bacterial cells contain the same organelles as human cells.
- (C) The basic components of DNA are the same in humans and bacteria.
- (D) Bacterial cells and human cells contain the same kind of chromosomes.



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