

AP BIOLOGY CHAPTER 3 WORKSHEET**MULTIPLE CHOICE. 20 PTS.**

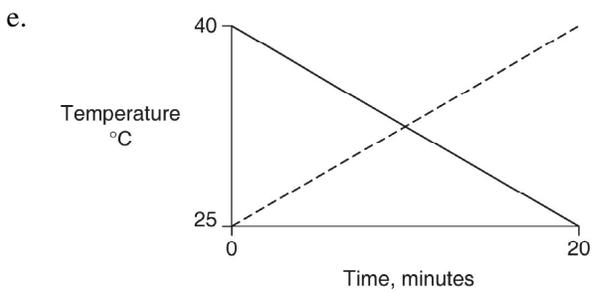
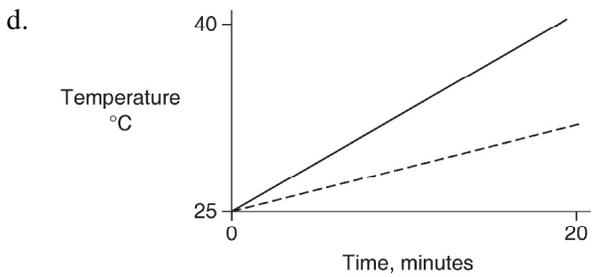
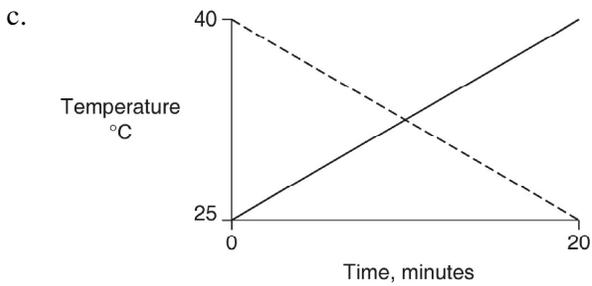
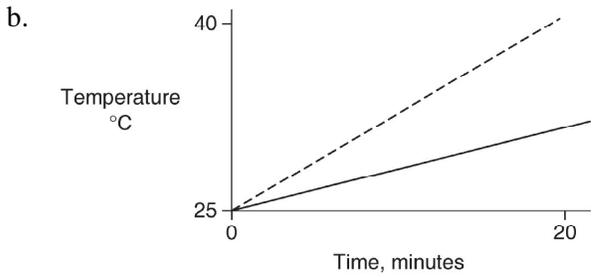
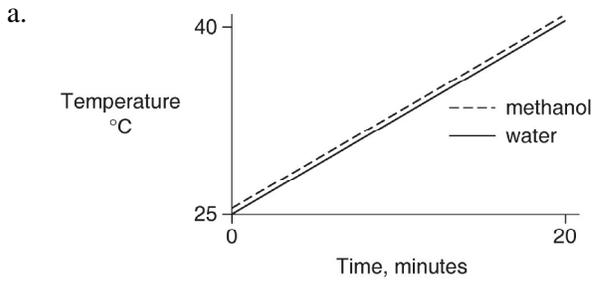
Place the letter of the choice that best completes the statement or answers the question in the blank.

- _____ 1. In a single molecule of water, two hydrogen atoms are bonded to a single oxygen atom by
- hydrogen bonds.
 - nonpolar covalent bonds.
 - polar covalent bonds.
 - ionic bonds.
 - van der Waals interactions.
- _____ 2. The polar covalent bonds of water molecules
- promote the formation of hydrogen bonds.
 - help water to dissolve nonpolar solutes.
 - lower the heat of vaporization and lead to evaporative cooling.
 - create a crystalline structure in liquid water.
 - do all of the above.
- _____ 3. The slight negative charge at one end of one water molecule is attracted to the slight positive charge of another water molecule. What is this attraction called?
- a covalent bond
 - a hydrogen bond
 - an ionic bond
 - a hydrophilic bond
 - a hydrophobic bond
- _____ 4. Which type of bond must be broken for water to vaporize?
- ionic bonds
 - nonpolar covalent bonds
 - polar covalent bonds
 - hydrogen bonds
 - covalent bonds
- _____ 5. Each water molecule is capable of forming
- one hydrogen bond.
 - three hydrogen bonds.
 - four hydrogen bonds.
 - two covalent bonds and two hydrogen bonds.
 - two ionic bonds and two hydrogen bonds.

- _____ 6. Why does ice float in liquid water?
- The liquid water molecules have more kinetic energy and thus support the ice.
 - The ionic bonds between the molecules in ice prevent the ice from sinking.
 - Ice always has air bubbles that keep it afloat.
 - Hydrogen bonds stabilize and keep the molecules of ice farther apart than the water molecules of liquid water.
 - The crystalline lattice of ice causes it to be denser than liquid water.
- _____ 7. Buffers are substances that help resist shifts in pH by
- releasing H^+ in acidic solutions.
 - donating H^+ to a solution when they have been depleted.
 - releasing OH^- in basic solutions.
 - accepting H^+ when they are in excess.
 - both b and d are correct.
- _____ 8. Hydrophobic substances such as vegetable oil are
- nonpolar substances that repel water molecules.
 - nonpolar substances that have an attraction for water molecules.
 - polar substances that repel water molecules.
 - polar substances that have an affinity for water.
 - charged molecules that hydrogen-bond with water molecules.
- _____ 9. Which of the following solutions has the greatest concentration of hydroxyl ions $[OH^-]$?
- lemon juice at pH 2
 - vinegar at pH 3
 - tomato juice at pH 4
 - urine at pH 6
 - seawater at pH 8
- _____ 10. If the pH of a solution is decreased from 9 to 8, it means that the
- concentration of H^+ has decreased to one-tenth (1/10) what it was at pH 9.
 - concentration of H^+ has increased 10-fold (10X) compared to what it was at pH 9.
 - concentration of OH^- has increased 10-fold (10X) compared to what it was at pH 9.
 - concentration of OH^- has decreased to one-tenth (1/10) what it was at pH 9.
 - Both B and D are correct.
- _____ 11. Many mammals control their body temperature by sweating. Which property of water is most directly responsible for the ability of sweat to lower body temperature?
- water's change in density when it condenses
 - water's ability to dissolve molecules in the air
 - the release of heat by the formation of hydrogen bonds
 - the absorption of heat by the breaking of hydrogen bonds
 - water's high surface tension

- _____ 12. Climates tend to be moderate near large bodies of water because
- a large amount of solar heat is absorbed during the gradual rise in temperature of the water.
 - water releases heat to the environment as it cools.
 - the high specific heat of water helps to moderate air temperatures.
 - a great deal of heat is absorbed and released as hydrogen bonds break or form.
 - of all of the above.
- _____ 13. Temperature is a measure of
- specific heat.
 - average kinetic energy of molecules.
 - total kinetic energy of molecules.
 - Celsius degrees.
 - joules.
- _____ 14. Why is water such an excellent solvent?
- As a polar molecule, it can surround and dissolve ionic and polar molecules.
 - It forms ionic bonds with ions, hydrogen bonds with polar molecules, and hydrophobic interactions with nonpolar molecules.
 - It forms hydrogen bonds with itself.
 - It has a high specific heat and a high heat of vaporization.
 - It is wet and has a great deal of surface tension.
- _____ 15. What accounts for the movement of water up the vessels of a tall tree?
- cohesion
 - hydrogen bonding
 - adhesion
 - hydrophilic cell walls
 - all of the above
- _____ 16. A burn from steam at 100°C is more severe than a burn from boiling water because
- the steam is hotter than boiling water.
 - steam releases a great deal of heat as it condenses on the skin.
 - steam has a higher heat of vaporization than does water.
 - a person is more likely to come into contact with steam than with boiling water.
 - steam stays on the skin longer than does boiling water.
- _____ 17. Evaporative cooling is a result of
- a low heat of vaporization.
 - the release of heat during the breaking of hydrogen bonds when water molecules escape.
 - the absorption of heat as hydrogen bonds break.
 - the reduction in the average kinetic energy of a liquid after energetic water molecules enter the gaseous state.
 - both c and d.

18. Identical heat lamps are arranged to shine on identical containers of water and methanol (wood alcohol), so that each liquid absorbs the same amount of energy minute by minute. The covalent bonds of methanol molecules are non-polar, so there are no hydrogen bonds among methanol molecules. Which of the following graphs correctly describes what will happen to the temperature of the water and the methanol?



- _____ 19. A hydration shell is likely to form around
- a. an ion.
 - b. a fat.
 - c. a sugar.
 - d. both a and c.
 - e. both b and c.
- _____ 20. In the past century, the average temperature of the oceans has increased by 0.74°C . Is this evidence of global warming?
- a. No, the rise in temperature is too small to be significant.
 - b. No, global warming affects air temperature, not water temperature.
 - c. No, the change of average temperature does not reflect the quantity of heat in the oceans.
 - d. Yes, because of the high specific heat of water and the huge volume of water in the oceans, a small rise in temperature would reflect a large amount of heat absorbed by the oceans.
 - e. Yes, the decreased rate of calcification is directly related to this temperature increase.