1) | Molecule | Energy Released |
--- | --- | --- |
Glucose | 4 kcal/gram |
Sucrose | 4 kcal/gram |
Lipid | 9 kcal/gram |
Protein | 4 kcal/gram |

If you ate bacon and fried eggs for breakfast, the largest component of the energy would come from the
A) carbohydrates.  
B) fats.  
C) proteins.  
D) sugars.

2) Which of these organic molecules functions to help speed up biological chemical reactions?
A) lipids  
B) proteins  
C) nucleic acids  
D) carbohydrates

3) _______ fats or lipids form animal body fat that is used for stored energy and insulation.
A) Hydrogenated  
B) Reconstituted  
C) Saturated  
D) Unsaturated

4) Breads and other whole grain foods are composed of very large polysaccharide molecules which contain hydrogen, oxygen, and which other element?
A) carbon  
B) iron  
C) nitrogen  
D) water

5) A segment of DNA shows bases in this order AGT CAC GCA, complete the corresponding DNA strand: TCA GTG?
6) DNA and RNA differ in all BUT one of the following ways.

A) DNA is double-stranded, while RNA is single stranded.
B) RNA uses the sugar ribose in its backbone, while DNA uses deoxyribose.
C) DNA contains the base uracil, while RNA contains the base thymine instead.
D) DNA is found in chromosomes in the nucleus, while RNA can move around the cell.
7) Living matter is at least sixty percent water. It makes sense, then, that cell membranes are made of phospholipids because
A) phosphates dissolve in water.  
B) the bilayer acts to repel water.  
C) the lipids form an insoluble barrier.  
D) the lipids mix easily in a water environment.

8) You and a group of friends are spending your vacation hiking through the mountains. It is cold in the mountains. You will be expending a lot of energy while hiking and you will need plenty of energy to help keep you warm.
You should pack foods high in ________ to provide the most energy or kilocalories per gram of food.
A) carbohydrates  
B) fats  
C) proteins  
D) sugars

9) Given the sequence of DNA nucleotide bases TAGTAGTAG, give the complementary strand of mRNA produced during transcription.
A) AAGGUAGUA  
B) AAUCGGAAC  
C) AUCAUCAUC  
D) GAGGAGGAG

10) A(n) ___________ is a pattern of dark bands on photographic film that is made when DNA fragments are separated by gel electrophoresis and tagged. The photograph produced is often used to determine whether or not suspects were involved in a crime.
A) DNA fingerprint  
B) RNA pattern  
C) human replicant  
D) allele impression

11) Which compound is a reusable, complex protein that speeds up chemical reactions?
A) starch  
B) a sugar  
C) a lipid  
D) an enzyme

12) In cells, ________ are proteins that are needed to lower the amount of energy required to start chemical reactions.
A) acids  
B) enzymes  
C) products  
D) substrates

13) Amylase increases the rate at which starch is broken down into glucose. What kind of molecule is amylase?
A) lipid  
B) enzyme  
C) carbohydrate  
D) nucleic acid

14) Reusable, complex proteins that promote chemical reactions within cells are called
A) enzymes.  
C) regulators.
15) How do enzymes speed up chemical reactions? Enzymes
A) lower the activation energy of chemical reactions.
B) raise the temperature of the cell, speeding chemical reactions.
C) store ATP, allowing more energy to be used in chemical reactions.
D) act as miniature 'transfer trucks', gathering materials for chemical reactions, and placing them together.

16) In the lock-and-key model of enzyme action, the ________ fits into the ________ of the enzyme.
A) product; substrate.
B) active site; product.
C) substrate; active site.
D) active site; substrate.
17) The human stomach secretes an enzyme known as **pepsin**. This enzyme breaks down proteins into smaller chemical molecules called peptides. If pepsin was mixed in a laboratory with sugar molecules like glucose, what is the MOST LIKELY result?

A) Pepsin will break down glucose molecules into simpler substances.
B) Pepsin will react with glucose only if the necessary RNA molecules are present.
C) Pepsin will probably NOT react with the sugar glucose since it is an enzyme that breaks down proteins.
D) Pepsin will probably NOT react with glucose since the activity of enzymes is limited to the human body.

18) All of the following are true facts about enzymes EXCEPT

A) all living cells have enzymes.
B) life would not be possible without enzymes.
C) enzymes can speed chemical reactions by 100s to millions of times.
D) there are a few types of enzymes, but they each perform many types of reactions.

19) A person starts to eat a hamburger. As she takes a bite and chews, an enzyme called **salivary lipase** helps to begin the process of fat digestion. Which of these is the BEST description of the role of enzymes in digestion?

A) Enzymes are acids that physically break down food molecules.
B) Enzymes moisten food to help teeth in the mechanical process of grinding and chewing.
C) Enzymes are proteins that speed up the process of chemically breaking down food molecules.
D) Enzymes are cells that secrete saliva and other necessary substances needed for digestion.

20) In the enzymatic reaction, the __________ is on the left of the arrow, while the products are to the right of the arrow.

Hydrogen Peroxide $\rightarrow$ Water + Oxygen

A) enzyme  B) filtrate  C) pre-product  D) reactant

21) Enzymes

A) are composed of long chains of fatty acids.
B) can be destroyed by variations in temperature or pH.
C) are used up, in the process of performing a chemical reaction.
D) raise the amount of energy required to start a chemical reaction.

22) Amylase becomes denatured at a temperature of 80°C. During an experiment to study the effect of varying temperature on enzyme activity, amylase’s reactivity with starch was measured at body temperature (37°C), and then again at an increased temperature of 42°C. How would this increase in temperature affect the experiment?

A) The reaction will stop.
B) The enzyme would become inactive.
C) The rate of reaction will increase.
D) The rate of reaction will decrease.

23) In an experiment involving an enzyme, the pH is raised from 2 to 11. What will be the MOST LIKELY effect of this on the reaction?

A) The enzyme will denature, stopping the reaction.
B) The activation energy of the reaction would be reduced.
C) The rate of reaction will reduce due to a decrease in the kinetic energy of the molecules
D) The rate of reaction will increase due to the increased number of collisions of the enzyme and substrate.
24) The model shows the relation between the reaction velocity of an enzyme and temperature.

Which of these is a description of the relation?

A) Reaction velocity decreases with an increase in temperature.
B) Reaction velocity always increases with increase in temperature.
C) Reaction velocity remains constant with an increase in temperature.
D) Reaction velocity increases up to a certain temperature before decreasing.

25) The chemical processes that occur within a cell are affected by many factors. Optimum cell function occurs within a narrow range of conditions.

Which combination of factors would curtail cell function?

I. pH
II. density
III. salinity
IV. temperature

A) I and II
B) I and IV
C) I, II and III
D) I, III and IV

26) Why do most enzymes stop functioning after being soaked in a strong acid or base?

A) They have been diluted.
B) Their water content has been reduced.
C) They have been converted to tripeptides.
D) Their bonding structure has been changed.

27) In an experiment to study the effect of proteases on proteins, what is the MOST LIKELY effect of a major change in pH?

A) increased rate of product formation
B) a change in the substrate concentration
C) the formation of new active sites of the enzyme
D) a change in shape of the active sites of the enzyme

28) A group of students has performed an experiment to study the ideal temperature for the maximum activity of biological enzymes. Enzymes are specific to their environment; in other words, they work best at a specific pH and specific temperature. Which graph represents optimum enzyme activity at approximately 37 degrees Celsius?
The chemical digestion of food is dependent on a whole range of hydrolase enzymes produced mostly by the cells lining the gut as well as other associated organs such as the pancreas, salivary glands, stomach, liver and small intestine. The end goal is to break large food molecules into very much smaller building block units or monomers. These can then be readily absorbed through the into the bloodstream for transport to the liver and from there to other parts of the body.

Enzymes are both pH and temperature specific. Seen here are the reaction rates of three common digestive enzymes. Based on the data, which enzyme(s) require(s) the addition of HCl for optimum activity?

A) pepsin  
B) trypsin  
C) amylase  
D) none of the three