

Name _____ Block _____ Date _____

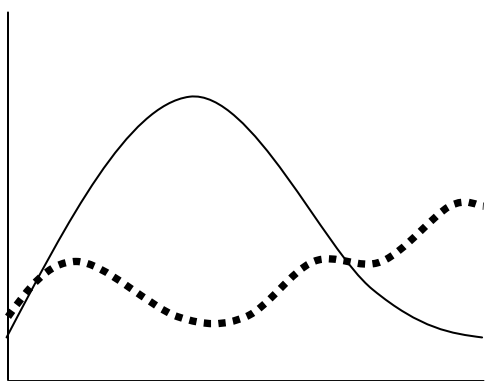
Biology Midterm Exam Review – Spring 2014

Scientific Method (Packet 1)

Parts of an Experiment

- | | |
|--|---|
| 1. _____ Dependent Variable | A. Variable that is changed in the set-up |
| 2. _____ Constant/Standardized Variables | B. Group that serves as a standard of comparison |
| 3. _____ Control Group | C. Just ONE aspect is changed in this group |
| 4. _____ Experimental Group | D. Variables that are kept the same in each setup |
| 5. _____ Independent Variable | E. Variable that is measured |

6. Use the info from the table to **LABEL the missing parts of the graph.** Be sure to include all parts of the graph!!!



| Number of Students with the Flu at MCHS | | |
|---|-------|-------|
| Date | 05-06 | 06-07 |
| Oct 1-15 | 2 | 4 |
| Oct 16-31 | 26 | 25 |
| Nov 1-15 | 39 | 10 |
| Nov 16-30 | 61 | 3 |
| Dec 1-15 | 55 | 12 |
| Dec 16-31 | 41 | 19 |
| Jan 1-15 | 27 | 28 |
| Jan 16-31 | 14 | 29 |
| Feb 1-15 | 3 | 42 |

◆ **What is the independent variable?** _____

◆ **What is the dependent variable?** _____

7. The following are necessary components for a good experiment:

- The first step in any experiment is to make an _____
- In order to know what is causing the changes in an experiment, the experimental design should contain _____ (#) independent variable(s).
- The purpose of having a control group in an experiment is for _____
- After an experiment has concluded, the experiment should be _____ to make sure the results are not just a coincidence (shows that the results are valid).

8. **Use the following description of the experiment to complete the questions below:**

John and Sally wanted to conduct an experiment with bread mold. They took 8 slices of white bread that Sally's mom had made and put each on the counter. Sally then placed 25 drops of water on each piece, trying to spread it evenly. John placed each slice in a plastic bag, sealed them and put the bags in various locations around the kitchen.

- Two bags were placed in a box **in the freezer**
- Two bags were placed in a box **in the refrigerator**
- Two bags were placed in a box **on top of the refrigerator**
- Two bags were placed were in a box **in front of the window.**

They left the bags alone for the first two days, and then checked the bread on days 3 - 8, looking for the amount of surface area covered by bread mold and the appearance (color, texture) of the mold.

A. Independent variable? _____

B. What is(are) the **dependent** variable(s) in this experiment _____

C. List at least 2 variables that should be **standardized**: _____

Chemistry/Biochemistry (Packet 2):

9. Use the words in the word bank to complete the following table:

- Amino acid
 - Carbohydrate
 - Fats
 - Fatty acids
 - Glycerol
- Lipid
 - Monosaccharide
 - Nucleic Acid
 - Nucleotide
 - Oils
- DNA & RNA
 - Polypeptide
 - Polysaccharide
 - Protein
 - Waxes

| Organic Compound | Name for monomer(s) or subunits | Name for polymer or subunits | Function(s) |
|------------------|---------------------------------|------------------------------|---|
| | | | <ul style="list-style-type: none"> • Forms majority of cell membrane • Long-term energy storage • Insulation & waterproofing • Chemical signals |
| | | | <ul style="list-style-type: none"> • Short-term energy storage (basis of food chain) • Provides structure & support |
| | | | <ul style="list-style-type: none"> • Form muscle, hair & skin. • Helps with transport in/out of a cell. • Speeds up reactions using less energy (enzyme) |
| | | | <ul style="list-style-type: none"> • Stores genetic information • Contains instructions for making proteins. |

Fill in the blank with the word from the Biochemistry unit that best matches each statement:

10. _____ Term for compounds that contain carbon (and hydrogen).
11. _____ Compounds that join together to form polymers
12. _____ An enzyme is what type of organic compound?
13. _____ Sugars and starches are this type of organic compound.
14. _____ Chemical process in which **larger compounds are broken down** into their monomers using water to break the bonds.
15. _____ Building **larger compounds by joining many building blocks together** (releases water)
16. _____ Part of the enzyme that holds/grabs the substrate.
17. _____ Monomer sugar that is the building block of carbs.
18. _____ How plants store excess sugar.
19. _____ Carbohydrate found in the cell wall of plants.
20. _____ Protein that covers the red blood cells and helps carry oxygen.

Use the graph on the right to answer questions 21-23.

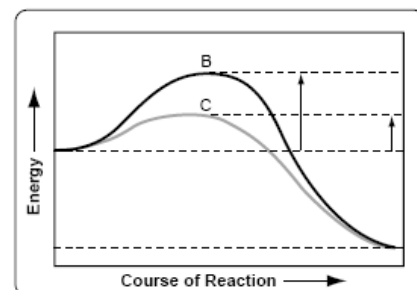
21. Which reaction (B or C) needs more energy to get the reaction to begin?

22. The energy needed to start a reaction is called _____

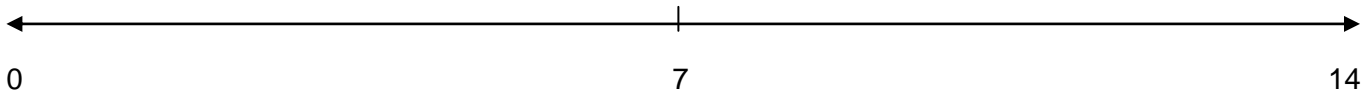
_____.

23. In the graph, line B represents a reaction progressing _____

(with/without) an enzyme; however line C represents a reaction _____ (with/without) an enzyme. Explain why. _____



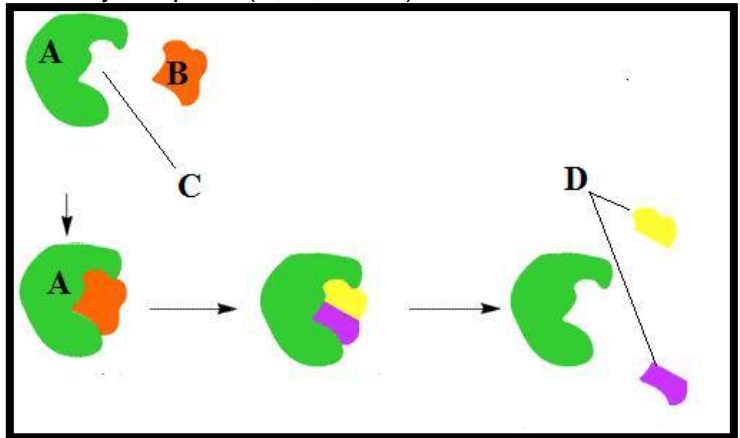
24. Label the numbers on the pH scale below and the terms **weak acid**, **weak base**, **strong acid**, **strong base** and **neutral**.



25. What substances are found in the blood stream to prevent changes in pH thereby maintaining homeostasis? _____

26. Below is the picture of an enzymatic reaction. Identify the parts (A, B, C & D):

- A. _____
- B. _____
- C. _____
- D. _____



27. Identify two conditions that could change how quickly an enzyme can do its job.

_____ and _____

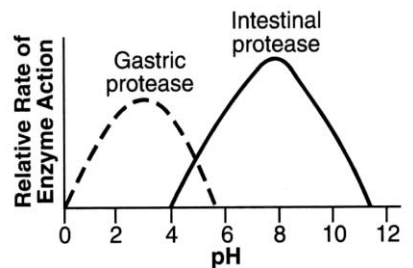
28. Explain how the above conditions affect an enzyme's ability to do its job.

29. How do enzymes speed up biological chemical reactions?

- A. Enzymes increase the energy required for a reaction to occur.
- B. Enzymes decrease the energy required for a reaction to occur.
- C. Enzymes have no affect on the energy required for a reaction to occur.
- D. Enzymes maintain the energy needed for a reaction to occur.

30. In this graph, what is the **optimal** pH for Gastric protease? _____

31. In this graph, what is the **optimal** pH for Intestinal protease? _____



32. What happens to the enzyme activity of gastric protease if the pH starts off at 3.0 and raises to a pH of 8.0 (see the graph).

33. What happens to the enzyme activity of intestinal protease if the pH starts off at 3.0 and raises to a pH of 8.0? _____

34. Why would a distance runner consume carbohydrates instead of proteins before a race?

- A. Carbohydrates provide insulation for heat.
- B. Carbohydrates provide structure for tissues.
- C. Carbohydrates provide genetic material for muscle cells.
- D. Carbohydrates provide energy for endurance.

35. Determine which organic compound best matches with each example listed below (answers may be used more than once).

- | | |
|-----------------------|-----------------|
| 1. _____ Starch | |
| 2. _____ RNA | |
| 3. _____ Triglyceride | a. Carbohydrate |
| 4. _____ Glycogen | b. Lipid |
| 5. _____ Insulin | c. Protein |
| 6. _____ Cellulose | d. Nucleic Acid |
| 7. _____ Hemoglobin | |
| 8. _____ DNA | |
| 9. _____ Fats | |
| 10. _____ Enzymes | |
| 11. _____ Glucose | |
| 12. _____ Wax | |

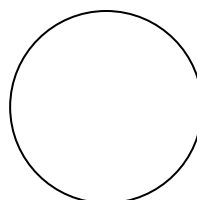
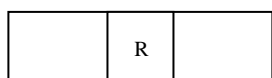
36. Which compound listed above is a monomer (only one)? _____

Cells & Cell Transport (Packet 3)

37. If the R on the above slide was viewed under high power with the 40x objective lens, what would the total magnification be if the eyepiece has a magnification of 10x? _____

38. While you are looking through the eyepiece you push the slide on the microscope stage to the right. Which way will the specimen appear to move in your field of view? _____

39. Draw the image seen on the slide below, as it would appear in the field of view of a compound light microscope.



40. What is a benefit of using a compound light microscope?

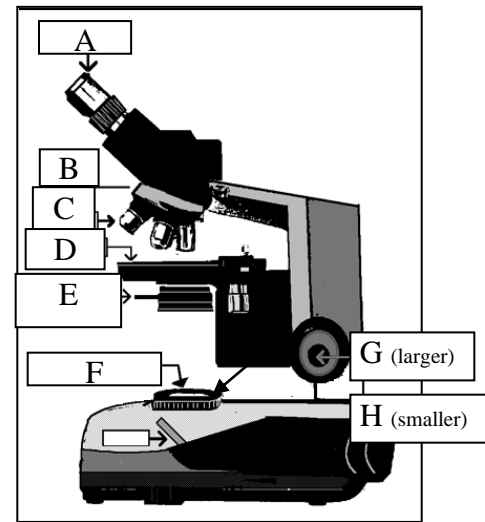
41. What is a benefit of using an electron microscope?

Match the description of each part of the compound light microscope with the proper term.

- | | |
|---|---------------------------|
| 42. _____ allows light to reflect upward | A. ocular lens / eyepiece |
| 43. _____ lenses with varying magnification | B. stage |
| 44. _____ regulates amount of light | C. objective lens |
| 45. _____ platform to support slide | D. coarse adjustment |
| 46. _____ holds and turns objectives | E. base |
| 47. _____ contains lens to look through | F. fine adjustment |
| 48. _____ only used to focus images on the lowest power | G. light source |
| 49. _____ focuses image under high power only | H. diaphragm |
| | I. nosepiece |
| | J. arm |

50. Identify the parts labeled on the microscope to the right:

- A. _____
- B. _____
- C. _____
- D. _____
- E. _____
- F. _____
- G. _____
- H. _____



51. List the eight characteristics that are shared by all living things: (Packet 1)

| | |
|-------|-------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

52. Put the terms in order from least to most complex: organ, cell, organism, organelle, organ system, tissue (Packet 2) _____

53. Which of the above terms is the **basic unit of life**? _____

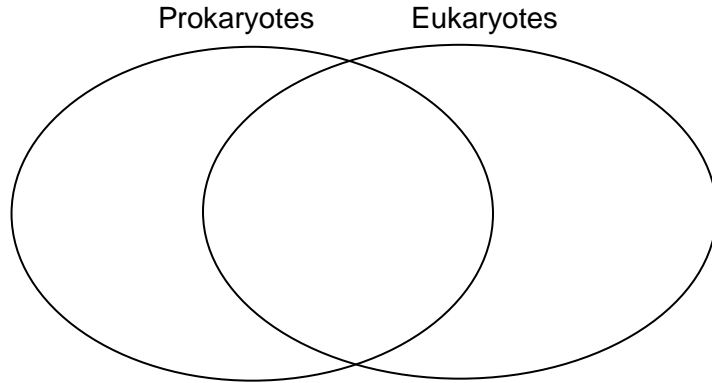
54. List the three components of the cell theory.

- ❖ _____
- ❖ _____
- ❖ _____

55. Organisms must maintain _____ by keeping the internal environment constant. They must control chemical traffic into & out of the cell through the _____ and the minimize change in _____ by using buffers.

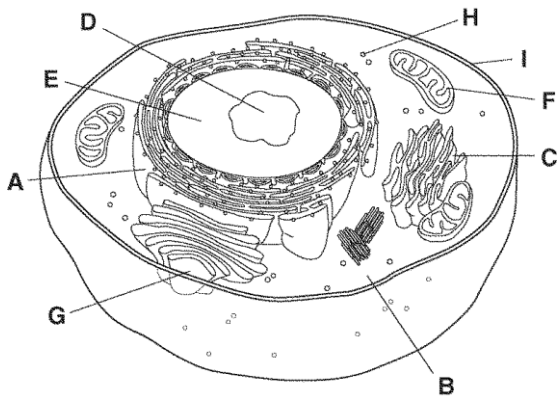
56. Fill in the Venn diagram with the **letters** of the characteristics of a prokaryotic cell and a eukaryotic cell.

- A. Ribosomes
- B. membrane bound organelles
- C. bacteria
- D. cell membrane
- E. nucleus
- F. animals
- G. no membrane bound organelles
- H. cytoplasm
- I. plants
- J. DNA
- K. No nucleus



57. The _____ theory suggests that the **origin of eukaryotic cells** comes from the merging of several prokaryotic cells in a mutually beneficial relationship.

58. Identify organelles found in the cell seen below:



A – **Rough Endoplasmic reticulum**

B – **Centrioles**

E – _____

F – _____

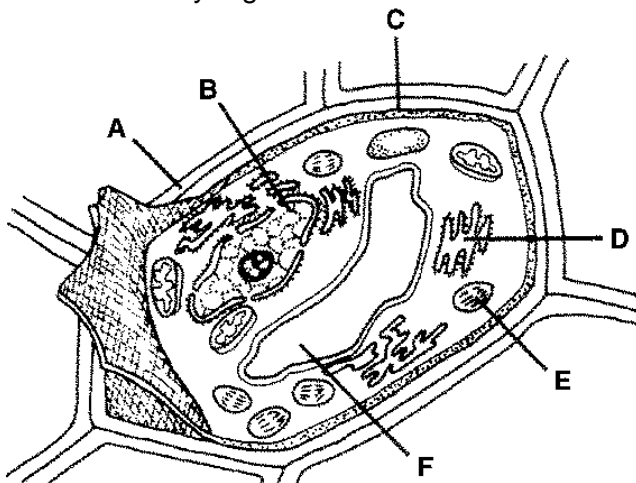
G – **Golgi apparatus**

H – _____

I – _____

59. What type of cell is pictured in Question 61? _____ Explain why you came to this conclusion.

60. Identify organelles found in the cell seen below:



A – _____

B – _____

C – _____

D – **Rough ER**

E – _____

F – _____

61. What type of cell is pictured above? _____ Explain why you came to this conclusion. _____

62. Identify at least 3 differences between a plant and an animal cell:

- ❖ _____
- ❖ _____
- ❖ _____

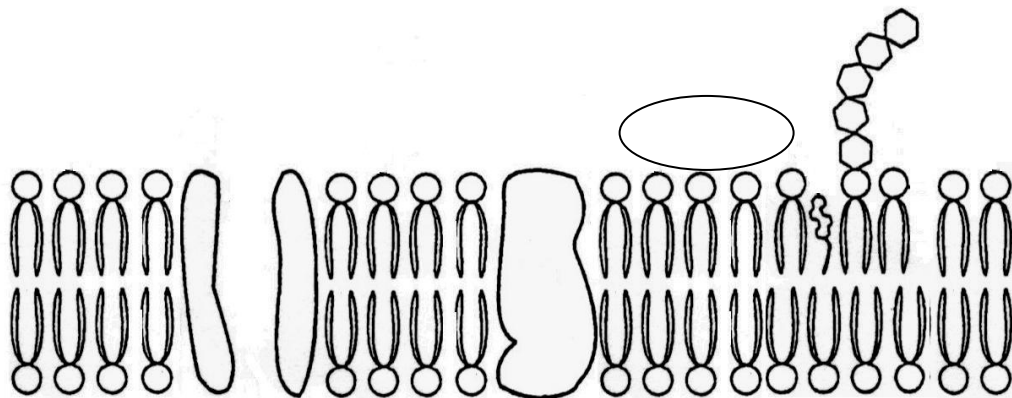
Identify the correct organelle for Questions 66-72.

63. _____ Converts chemical energy from food (sugar) into ATP
64. _____ Found outside the cell membrane; provides support.
65. _____ Protein factory found in all cells
66. _____ Converts solar energy into chemical energy (food/sugar).
67. _____ Control center of the cell which contains the DNA in eukaryotic cells.
68. _____ Found in both plants & animals and stores liquids & dissolved materials
69. _____ Helps maintain homeostasis by controlling what enters and leaves the cell.
70. In multicellular organisms cells often become specialized; As a result one organism may have cells that vary in shape and structure based on each cell's _____.

71. Examples of cells with specialized structures in the human body include:

- Cells in the trachea (windpipe) are lined with _____ to trap particles in the air and move mucus up and out.
- Sperm have _____ which allow them to swim through fluid.

72. Label the following components: **phospholipid bilayer, hydrophobic tail, hydrophilic head, cholesterol, integral protein, peripheral protein, carbohydrate**



73. Describe the function or identify the part of the components of the cell membrane:

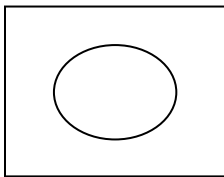
- ❖ _____: make up a majority of the cell membrane. Has both polar and nonpolar parts to help control what goes in and out.
- ❖ Proteins: _____
- ❖ Carbohydrates: _____

74. Explain what it means when we say that living cells are selectively permeable?

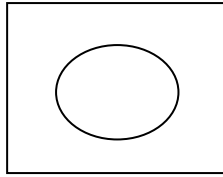
75. Identify the three forms of **passive transport**.

- ❖ _____ - movement of small or uncharged solute (or dots) from a high to low concentration.
- ❖ _____ - movement of large or charged solute across the cell membrane, from a high to low concentration, with the help of a protein.
- ❖ _____ - movement of water across the cell membrane

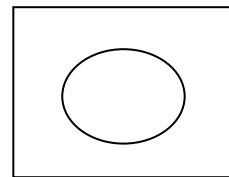
76. Draw the dots in the 3 pictures so that each cell is in the solution indicated below the pictures.



A. Hypotonic **solution**



B. Hypertonic **solution**



C. Isotonic **solution**

77. Which of the above diagrams (A, B, or C) shows the ideal conditions for a red blood cell? _____

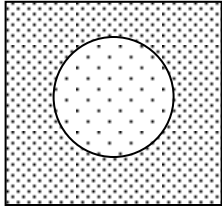
78. Which of the above diagrams (A, B, or C) shows the ideal conditions for a plant cell? _____

Describe how this benefits the plant. _____

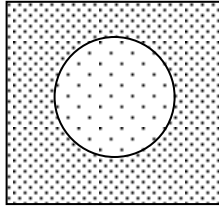
79. Which of the above pictures shows what might occur if a freshwater fish were placed into a saltwater fish tank? _____

80. What might happen to the fish? Explain. _____

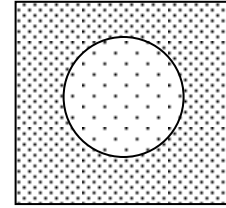
81. Draw an arrow on each diagram to indicate the movement of molecules for the process described below. **Be sure to label your arrows with *what is moving*.**



OSMOSIS



DIFFUSION



PUMP

82. Unlike passive transport, _____ is required for **active** transport in the form of _____.

83. Distinguish between the terms endocytosis and exocytosis. _____

Cell Energy (Packet 4)

84. The process in which ATP is produced **without** oxygen is called _____
respiration or _____; In this process _____ (#) ATP can be produced from 1 molecule of glucose.

85. The process in which ATP is produced **with** oxygen is called _____
respiration; In this process _____ (#) ATP can be produced from 1 molecule of glucose.

86. Which part of the ATP molecule stores the energy? _____

87. How is that energy released so the cell can do work? _____

88. When ATP releases energy what new molecule(s) is/are formed? _____

89. Identify the process utilized by the cells below to produce ATP. Then list the byproducts that they produce in the **absence of oxygen**.

- **Yeast** utilize a process called _____ **fermentation**. They use **sugar** and **water** to produce _____ & _____
_____ & _____ ATP

- **Muscle cells** utilize a process called _____ **fermentation**. They use **sugar & water** to produce _____ & _____ ATP

| 90. Fill in the chart | Photosynthesis | Cellular Respiration (aerobic) |
|---|----------------|--------------------------------|
| An example of an organism that utilizes this process: | | |
| Organelle in eukaryotes where process takes place | | |
| Reactants (what's needed to start the process) | | |
| Products (what the process makes) | | |

91. A runner is competing in a 10 km track meet and just before completing the race, the runner is nearly out of breath and the energy needed to finish the race. Which cell structure is **most** affected by this lack of energy?
- Nucleus
 - Ribosome
 - Mitochondrion
 - Plasma membrane
92. How does the process of photosynthesis in plants provide energy for animals?
- The water and carbon dioxide used in photosynthesis are converted into glucose and oxygen for animals.
 - The glucose and ATP used in photosynthesis are converted into water and carbon dioxide for animals.
 - The glucose and carbon dioxide used in photosynthesis are converted into proteins for animals.
 - The oxygen and glucose produced through photosynthesis are converted into lipids for animals.

DNA & Protein Synthesis (Packet 5)

93. DNA and RNA are made from many _____ joined together (what are their monomers?) .

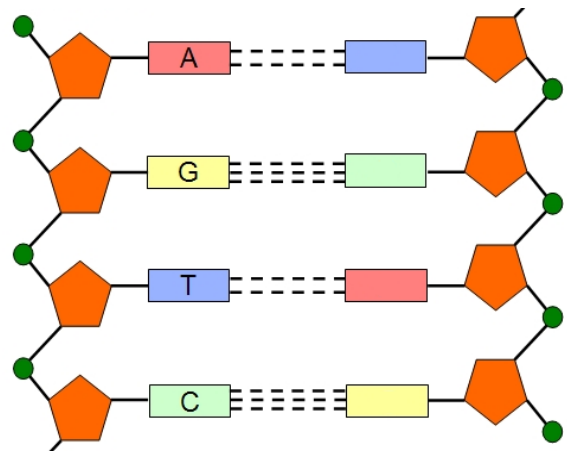
94. The shape of each DNA molecule is called a _____

95. Name the 3 parts that make up all nucleotides:

- _____
- _____
- _____

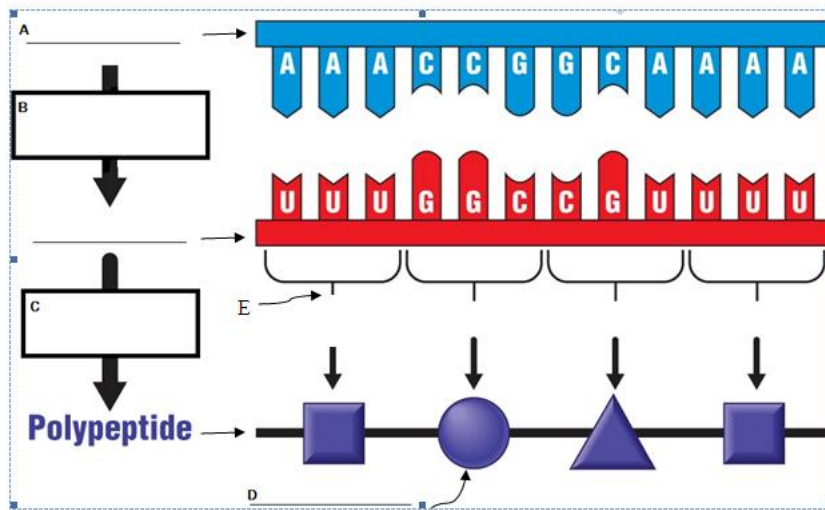
96. Fill in the complementary DNA strand on the picture to the right. Also circle one nucleotide.

97. Being able to determine one side of DNA from another side is known as the _____ Rule.



98. Two opposing strands of DNA are held together by a **weak** _____ bonds. These bonds are weak so DNA can _____ for replication and transcription.
99. The two strands are said to be _____ (Since by knowing one half you can figure out the other).
100. The process in which DNA makes an exact copy of itself is called _____.
101. Why is it necessary for a cell to make an exact copy of its DNA. What is it getting ready to do? _____
102. A / An enzyme called _____ causes the double stranded DNA to split or “unzip” by breaking the bonds between the base pairs which.
103. A second enzyme called _____ is responsible for building the new strand of DNA (and also checking it for mistakes).
104. Changes or mistakes in DNA are called _____.
105. List three basic differences between DNA and RNA:
- A. DNA _____ RNA _____
- B. DNA _____ RNA _____
- C. DNA _____ RNA _____
106. Identify the RNA that would form from the following strand of DNA: **G C A T T C A T G**

107. If the above strand of DNA was changed to: **GCA GTC ATG** **CIRCLE THE MUTATION.**
What type of mutation caused this change? _____
108. **Where** are the following types of RNA found in a cell.
- A. mRNA - _____
- B. tRNA - _____
- C. rRNA - _____
109. Label boxes B & C with the name of the process (translation or transcription) and A, D & E with the name of the structure (amino acid, DNA, codon or mRNA)



110. Transcription and translation are the two steps involved in _____.
111. Three nucleotides of mRNA are called a/an _____.
112. Three nucleotides of tRNA are called a/an _____.
113. Where are the proteins made in a cell (which organelle)? _____
114. Proteins (or polypeptides) are made out of many _____ that are bonded together.
115. When using the amino acid table, the codons that **do not** code for an amino acid are called _____.
116. What is the purpose of the above codon? _____
117. What type of mutation is most likely to cause the biggest change in a protein (point of frameshift)?
 _____ Explain why. _____

118.

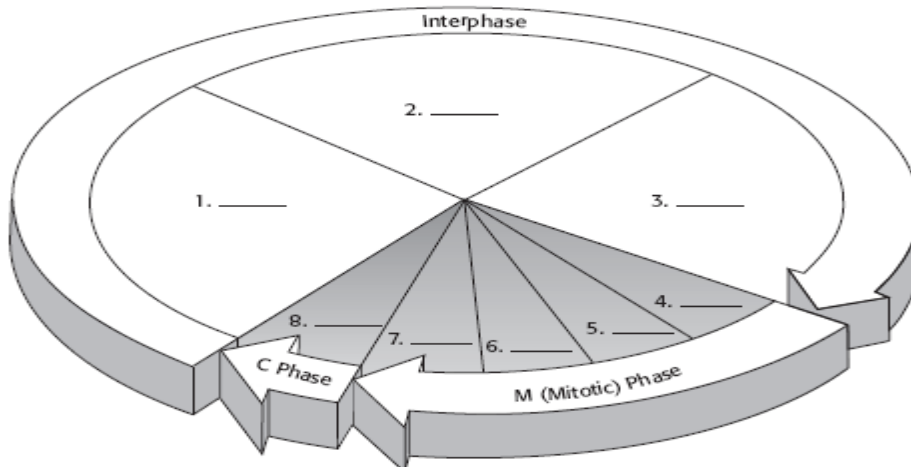
What amino acids would be coded for by the following DNA?

| | |
|--------------------|-------------------------|
| DNA | T A C G C T A A G A C T |
| _____ | |
| Amino Acids | |

| | | | | | |
|---|---------------|------------|---------------|-----------|---|
| A | Lysine | Arginine | Isoleucine | Threonine | A |
| | Lysine | Arginine | Methionine | Threonine | G |
| | Asparagine | Serine | Isoleucine | Threonine | U |
| | Asparagine | Serine | Isoleucine | Threonine | C |
| G | Glutamic acid | Glycine | Valine | Alanine | A |
| | Glutamic acid | Glycine | Valine | Alanine | G |
| | Aspartic acid | Glycine | Valine | Alanine | U |
| | Aspartic acid | Glycine | Valine | Alanine | C |
| U | Stop codon | Stop codon | Leucine | Serine | A |
| | Stop codon | Tryptophan | Leucine | Serine | G |
| | Tyrosine | Cysteine | Phenylalanine | Serine | U |
| | Tyrosine | Cysteine | Phenylalanine | Serine | C |
| C | Glutamine | Arginine | Leucine | Proline | A |
| | Glutamine | Arginine | Leucine | Proline | G |
| | Histidine | Arginine | Leucine | Proline | U |
| | Histidine | Arginine | Leucine | Proline | C |
| | A | G | U | C | |

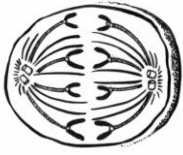
Cell Reproduction (Packet 6)

119. Label the steps of the cell cycle below:



120. What two main things happen during interphase?

121. Match the appropriate picture with the phase. Note – one phase is not present. Leave the line next to that phase blank.



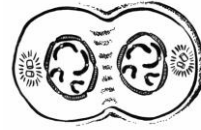
A.



B.



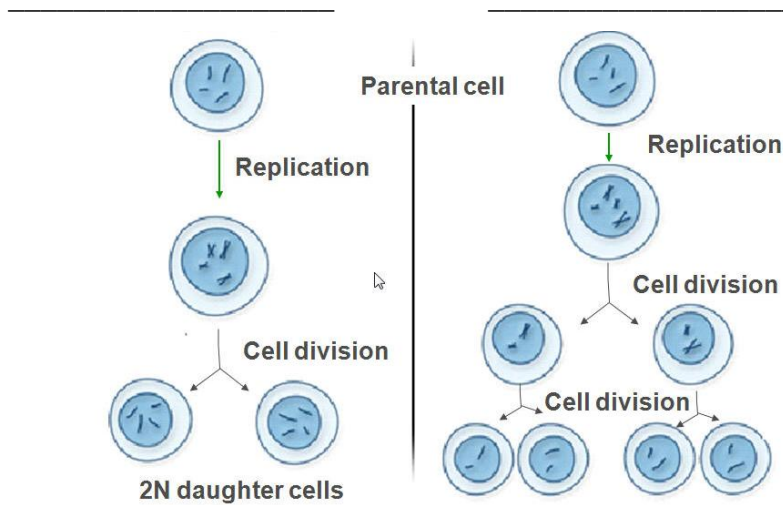
C.



D.

_____ Interphase _____ Prophase _____ Metaphase _____ Anaphase _____ Telophase

122. Label each picture as either meiosis or mitosis

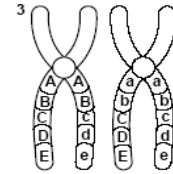
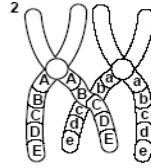
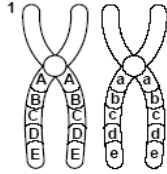


123. Comparison of Mitosis and Meiosis

| Description | MITOSIS | MEIOSIS |
|--|---------|---------|
| Involved in Sexual or Asexual Reproduction? | | |
| At the end of the process, how does the daughter cell compare to the parent? | | |
| Creates Diploid or Haploid cells? | | |
| Does the process increase genetic variation? | | |
| How many cells are produced at the end? | | |
| Describe a human cell that would be produced by each process (include information about the chromosome number) | | |

124. The greatest advantage of meiosis and sexual reproduction is GENETIC DIVERSITY. This is seen in several ways. Identify factors that contribute to genetic diversity below:

A. _____... during meiosis I, your homologous chromosomes pair up. The chromosome from your mom and the one from your dad swap pieces (seen below):



1. Homologous chromosomes before crossing over has occurred

2. Homologous pairs exchanging genes (may contain different forms of the same trait).

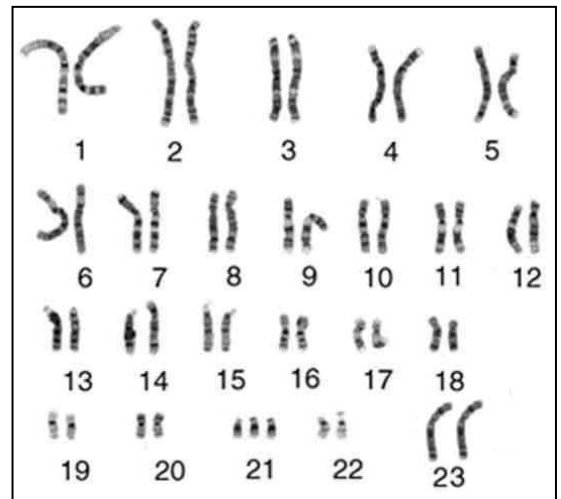
3. Homologous pairs contain new combinations of traits.

B. _____ – random alignment of homologous pairs at the equator... there's nothing that says mom's chromosomes line up on the left and dad's on the right... it is random.

C. _____ - which ever sperm makes it to the egg first gets the chance to become a child. And thanks to crossing over & independent assortment, each gamete is genetically different from another.

125. Use the karyotype to the right to answer the following questions.

- Total number of chromosomes ? _____
- Number of autosomes? _____
- Boy or Girl? _____
- Normal or Disorder? _____



126. What causes a person to have too many or too few chromosomes? _____

Genetics (Packet 7)

127. Genetics is the study of _____
128. A _____ is the segment of DNA that codes for a trait (protein)
129. The different forms of a trait are called _____;
130. The appearance of a trait is determined by the two alleles that a person has. One allele comes from their _____ and the other allele comes from their _____.

| 131. Fill in the missing term that matches with each definition. | |
|---|--|
| _____: The genetic makeup of an organism represented by a pair of symbols. | _____: The physical appearance of a trait (described by a word). |
| _____: Having a pair of alleles that are the same (ex: TT or tt) | _____: Having a pair of alleles that are different (ex: Tt) |
| _____: The allele that is shown even when paired with a different allele. | _____: The allele that is hidden when paired with a different allele. |

132. Show the Punnett square for the following cross: Rr X Rr

| |
|----------------------|
| R = red r = white |
|----------------------|

- **Genotypic Ratio** . _____ : _____ : _____
- **Phenotypic Ratio** _____ : _____