**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Biology EOC Review Packet**

**Spring 2018**

**Dear Biology students,**

**We have now covered all the material you need to know in order to be successful on your EOC. The next step? *Studying*.**

**Completing his review packet will bring you closer to getting a 4 or 5 on the EOC. We will spend much of our class time next week working through practice questions and reviewing specific concepts. Therefore, you will need to spend time with this packet outside of class in order to complete it.**

**You should spend at least 30 min a night – including weekends! - working on this packet.**

**All of the answers can be found in your wonderful, organized binders!!**

**Due Date: Thurs Jan 17th**

**Organic Molecules**

Organic Molecules: complete the chart below on organic molecules

|  |  |  |  |
| --- | --- | --- | --- |
| **Organic Molecule** | **Subunits (Made up of…)**  | **Function** | **Structure/ picture**  |
| **Carbohydrates** |  |  |  |
| **Lipids (Fats)** |  |  |  |
| **Proteins** |  |  |  |
| **Nucleic Acids** |  |  |  |

1. What are enzymes? What do they do? Why are they so important?

 **Cells**

Complete the chart below on organelles found in cells

|  |  |  |
| --- | --- | --- |
| **Organelle** | **Found in? (plants, animals, or both)** | **Function** |
| Nucleus |  |  |
| Cell Membrane (Plasma Membrane) |  |  |
| Cell wall |  |  |
| Mitochondria |  |  |
| Vacuoles |  |  |
| Chloroplasts |  |  |
| Ribosomes |  |  |

1. Label the following organelles (**cell membrane, cytoplasm, ribosome, nucleus, mitochondria, chloroplasts, cell wall, vacuole**) in each of the plant and animal cells below:



3. Name 3 things plant cells have that animal cells DO NOT:

4. Name 3 ways that **prokaryotes** and **eukaryotes** are different:

**Transport & Homeostasis**

1. a. In osmosis, **water** moves from an area of \_\_\_\_\_\_\_\_ to an area of \_\_\_\_\_\_\_ concentration with no energy used.

b. In diffusion, **molecules** move from \_\_\_\_\_\_ to \_\_\_\_\_\_ concentration with no energy used.

c. In facilitated diffusion, **molecules** move from an area of \_\_\_\_\_\_\_\_\_\_ to an area of \_\_\_\_\_\_\_\_ concentration with no energy used. However, a \_\_\_\_\_\_\_\_\_\_\_\_\_ is used to transport the molecules.

d. In active transport, **molecules** move from an area of \_\_\_\_\_\_\_\_ to an area of \_\_\_\_\_\_\_\_ concentration using energy and a \_\_\_\_\_\_\_\_\_\_\_.

2. Compare/Contrast: fill in the chart below on transport!

|  |  |  |
| --- | --- | --- |
|  | **PASSIVE TRANSPORT** | **ACTIVE TRANSPORT** |
| **Requires energy?** |  |  |
| **Which way do the particles move?** |  |  |

3. If a freshwater plant cell is put in salt water, what will happen to the cell? Draw a picture! Label!



4. If a salt water plant cell is put in freshwater, what will happen to the cell? Draw a picture! Label!



1. In your own words, what is homeostasis? Give an example
2. In each of the situations pictured, indicate whether the cell will **gain water, lose water, or stay the same**.
Draw arrows to show which way the water will move (**REMEMBER: SALT DOESN’T MOVE!**!)
  

10% salt

2% salt

30% salt

**Enzymes**

1. Label the image below using the terms:

**Enzyme, Substrate(s), Active Site, Product(s), Enzyme-Substrate complex**



1. Enzymes are what type of organic molecule?

1. What determines the shape of an enzyme?

1. Are enzymes reusable? Why or why not?
2.  How do pH and temperature alter the activity of an enzyme? What is this called when the enzyme loses its shape?

1. What is the optimum pH for enzyme **X**? \_\_\_\_
Is this an acid or base? \_\_\_\_\_\_\_

What is the optimum pH for enzyme **Y**? \_\_\_\_
Is this an acid or base? \_\_\_\_\_\_\_

**Photosynthesis & Respiration**

1. What are the products & reactants for **photosynthesis**?

2. In what **organelle** does **photosynthesis** occur?

3. A plant **uses** this gas: \_\_\_\_\_\_\_\_\_\_\_. A plant **produces/releases** this gas: \_\_\_\_\_\_\_\_\_\_\_\_\_

4. What are the products & reactants for **respiration**?

5. In what **organelle** **respiration** occur?

6. What is different about aerobic vs anaerobic respiration? List 3 differences

1. Where does lactic acid fermentation take place? What is it?
2. Where does alcoholic fermentation take place? What are the PRODUCTS?
3. What process is happening in this image to the right?

**DNA & Protein Synthesis**



1. Give the nucleotide sequence found on the complementary strand: \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_
2. What are the black **pentagons?** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Draw an arrow to thenitrogen bases**.**

1. If the strand of DNA above undergoes **transcription,** what
will mRNA be? \_\_\_ \_\_\_ \_\_\_ - \_\_\_ \_\_\_ \_\_\_
2. After **translation,** what would the amino
acid sequence be?\_\_\_\_\_\_\_\_\_\_\_\_\_ - \_\_\_\_\_\_\_\_\_\_\_\_
3. What is a codon? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Compare RNA and DNA in the following table

|  |  |  |
| --- | --- | --- |
|  | **RNA** | **DNA** |
| **sugar** |  |  |
| **bases** |  |  |
| **# of strands** |  |  |
| **where in cell** |  |  |
| **function** |  |  |

1. What kind of bond holds amino acids together? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. A bunch of amino acids bonded together form a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ also known as a \_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
| **DNA** | **mRNA** | **Proteins** |
| Function:Process that converts DNA to mRNA: | Function:Process that converts mRNA to protein: | Location: |

1. Transcription occurs in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a cell and makes a message copy of \_\_\_\_\_\_\_\_\_\_\_\_\_ from DNA. Then the mRNA leaves the nucleus and goes to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to bind to a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The anticodon on the \_\_\_\_\_\_\_\_\_\_ molecule binds to the codon on the mRNA. This molecule has an \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ attached to it. Amino acids are linked together to create a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. **True Or False:** All of an organism’s cells has the exact same DNA. \_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. HOW DO CELLS BECOME DIFFERENT CELLS WITH DIFFERENT FUNCTIONS?? Explain!

**Mitosis & Meiosis**

1. Complete the following table:

|  |  |  |
| --- | --- | --- |
|  | **MITOSIS** | **MEIOSIS** |
| Type of reproduction(Asexual or sexual) |  |  |
| Chromosome number of original cell (1N=haploid or 2N=diploid) |  |  |
| Chromosome number of daughter cells (1N=haploid or 2N=diploid) |  |  |
| Number of cell divisions |  |  |
| Number of cells produced |  |  |
| If there are 50 chromosomes in the mother cell, how many are in the daughter cells? |  |  |
| When does replication happen? |  |  |
| SOURCES OF VARIATION | **INDICATE IF THEY HAPPEN IN EACH PROCESS OR NOT** |
| Crossing over |  |  |
| Random assortment of chromosomes |  |  |
| Gene mutations |  |  |
| Nondisjunction |  |  |
| Fertilization |  |  |

4. Put the following stages of mitosis (cell division) in order.

**Genetics**

1. In the Punnett square to the below, T = tall and t=short.

Give the genotype for the parents. \_\_\_\_ X \_\_\_\_

1. Give the **phenotype** for the parents.
2. What are the genotypes and phenotypes of the offspring?

1. What is the genotypic ratio of the offspring?

1. What is the phenotypic ratio of the offspring?

1. What environmental factors might affect the expression of these genes for height? Explain.

1. **Incomplete Dominance=Blending Phenotype!**

Cross a pure-breeding red Four-o’-clock flower (RR) with a pure-breeding white Four-o’-clock flower.

1. What colors will be seen in the offspring [what percent]?
2. What will their genotypes be [what percent]?

Key:

R=

R’=

RR=

RR’=

R’R’=

If two offspring from the above cross are crossed with each other:

1. What colors will be seen in the offspring [what percent]?
2. What will their genotypes be [what percent]?

1. **Co-Dominance= Both show up in the Phenotype!!**

A black cat breeds with a tan cat, and their kittens are all black-and-tan tabby. Set up a Punnett square to show how this could happen.

1. What will be the resulting phenotypes [what percent?]
2. What will be the resulting genotypes [what percent?]
3. What will be the genotypes of the parents?

Key:

1. **Sex-linked traits (X-linked Traits)**
2. What are the male sex chromosomes in humans?
3. What are the female sex chromosomes in humans?
4. Colorblindness and hemophilia are sex-linked traits. What chromosome are these genes found on?
5. Why are males more likely to show a sex-linked disorder?
6. Cross a female who is a carrier for hemophilia (a sex-linked trait) with a normal male:
7. What is the probability that they will have a child (son OR daughter) with hemophilia?
8. What is the probability that they will have a daughter with hemophilia?
9. What is the probability that they will have a daughter who is a carrier for hemophilia?

Key:

1. **Multiple Alleles (Blood types)**

If a woman with type A blood has and a man with type B blood have a child with type O blood, give the genotypes of the woman and the man and do the cross. (Alleles are A, B, and O)

1. What are the odds that they will have a child with type O blood again?
2. What are the odds that they will have a child with homozygous type A blood?
3. What are the odds that they will have a child with type AB blood?

****

Key:

1. A blood test is done to see if one of three men is the father of a child. The child has type O blood, the mother has type A blood. Man #1 has type AB blood, Man #2 has type A blood, Man #3 has type O blood. Are there any men that can be ruled out as the father? Explain
2. **Pedigrees**
3. What is the inheritance pattern shown by this pedigree? (dominant or recessive?)
4. How do you know?
5. Using the letters A and a, write the genotype of as many individuals as possible. If you cannot tell if it is AA or Aa, write “?”
6. What is the genotype of person II4? \_\_\_\_\_
7. What is the genotype of person I3? \_\_\_\_\_\_
8. **Karyotypes= pictures of chromosomes**
9. What is the sex of the person whose karyotype is shown to the left?
10. What is the disorder that this person has? What is your evidence?
11. How is this disorder caused?

**Biotechnology**

1. What is the purpose of the Human Genome Project?

2. What is cloning, in your own words?

3. What process creates a DNA fingerprint?

4. Look at the DNA fingerprint to the right. Which individuals are most closely related?

5. **REMEMBER**: The #1 most frequently asked about use of Genetic Engineering is to MAKE INSULIN or REPLACE MISSING HORMONES/BODY CHEMICALS!!!!

6. Describe what is happening in the image below (transgenic organisms):



**Evolution**

|  |  |
| --- | --- |
|  | What is its importance to evolutionary theory? |
| Patterns in fossil evidence |  |
| Biochemical comparisons(DNA and proteins) |  |
| The role of variations |  |
| The role of geographic isolation |  |
| The importance of the environment |  |

1. Explain why anaerobic heterotrophic prokaryotes had to develop before aerobic eukaryotes. Be sure to include the changing environment (oxygen!) and theory of how organelles evolved (endosymbiosis)!

1. Contrast ABIOGENESIS and BIOGENESIS. Who were the scientists that contributed to disproving abiogenesis?

1. Explain Darwin’s theory of NATURAL SELECTION. Be sure to include the three parts and give an example/draw a picture to illustrate your description.

1. Penicillin is an antibiotic that was developed and used in the early part of the 20th century. At first, the antibiotic was very effective in killing the syphilis bacteria. Over time, more and more syphilis bacteria became resistant to penicillin. Explain how this resistance may have developed:

1. Why does sexual reproduction speed up evolution? (hint: Think about sexual reproduction in comparison to asexual reproduction)

**Classification**

1. What is the current seven-level classification system? (hint: Remember your acronym!)

1. What is **binomial nomenclature**? Give an example and label the two names correctly.

1. How are DNA and biochemical analysis, and anatomy used to classify organisms?



1. To the right is a phylogenic tree of some organisms.
2. According to this tree, give 1 pair of organisms that are most closely related.
3. Which organism is most closely related to the rayfinned fish?
4. Which organisms are the mammals most closely related to?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Bacteria** | **Protista** | **Fungi** | **Plantae** | **Animalia** |
| Eukaryotic or prokaryotic |  |  |  |  |  |
| Multicellular or single-celled |  |  |  |  |  |
| Sexual or asexual reproduction |  |  |  |  |  |
| Autotrophic or heterotrophic |  |  |  |  |  |
| Aerobic or anaerobic |  |  |  |  |  |
| Cell walls or no cell walls |  |  |  |  |  |

1. Fill in the following chart for the characteristics of the various kingdoms.
2. Compare the following two types of cells:

|  |  |  |
| --- | --- | --- |
|  | **Prokaryotic** | **Eukaryotic** |
| Membrane-bound organelles? |  |  |
| Ribosomes? |  |  |
| Types of chromosomes |  |  |
| Size |  |  |

1. Label each description with the correct eukaryotic kingdom or kingdoms: **Plantae, Fungi, Animalia, Protista**
2. Contains autotrophs and heterotrophs: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Contains only heterotrophs: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Contains gymnosperms and angiosperms: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Contains annelid worms, insects, amphibians, and mammals: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. Contains organisms composed of only eukaryotic cells: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. Contains organisms that can carry out photosynthesis: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. Contains decomposers: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
9. Contains only multicellular organisms: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
10. Use the dichotomous key to identify the following organisms:

**Dichotomous Key**

1. A. only 1 cell………………go to 2

B. more than 1 cell…………go to 3

1. A. no nucleus………………Monera

B. Has a nucleus…………Protista

1. A. Autotrophic…………..Plantae

B. Heterotrophic…………go to 4

1. A. Mobile……………….Animalia

B. Immobile……………..Fungi



1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Adaptations**

1. Compare and contrast **viruses** and **bacteria**. Are viruses alive?
2. Different organisms have developed structural adaptations to be more successful in their environments to obtain food, adapt from water to land, and ensure successful reproduction. Explain these adaptations below:
3. A group of finches were isolated on an island and over many generations, the beaks of the species changed from short and hooked to long and pointed. What caused this change to occur to create this new species?
4. Over time the hibiscus flower has developed a tube-shape and bright red coloring. Hummingbirds are the common pollinator of the hibiscus flower. Explain how these two organisms influenced each other during evolution (Why are they dependent on each other?)
5. There are many different physical traits and behaviors that attract mates. Male peacocks have large, brightly colored feathers they show when attracting a mate. However, this could be a disadvantage to the peacock in a way that would make him unable to reproduce. How? (hint: think about who he might be attracting!)
6. Non-vascular plants (mosses) lack actual stems and roots, live in moist areas, and obtain water through osmosis. How have plants, such as trees, changed in structure over time to adapt to a terrestrial (land) environment?

**Animal Behavior**

Select the best lettered choice for each type of behavior. A choice may be used once, more than once, or not at all.

1. Habituation
2. Trial-and-error
3. Conditioning
4. Imprinting
5. Territorial defense
6. Instinct
7. Phototaxis
8. A rat learns to press a button to get food \_\_\_\_\_
9. A dog always salivates that the ringing of a bell \_\_\_\_\_
10. A bird stops responding to a repeated warning call when it is not followed by an attack \_\_\_\_\_
11. A baby mammal suckling milk \_\_\_\_\_
12. A worm moving away from bright light \_\_\_\_\_
13. A spider spinning a web \_\_\_\_\_
14. A baby learns who her parents are by recognizing their faces \_\_\_\_\_

**Ecosystems**

1. List three Biotic factors:
2. List three Abiotic factors:
3. Explain in your own words (and use faces!) what the three types of symbiotic relationships are…

MUTUALISM:

PARASITISM :

Identify the type of relationship described in the following examples (**mutualism**, **parasitism**):

1. The clever Honey-Finder birds lead humans to beehives so that human hands will open the dangerous beehive and expose the precious honeycomb for the bird to access and humans to use.
2. Tapeworms are segmented flatworms that attach themselves to the insides of the intestines of animals such as cows, pigs, and humans. They get food by eating the host's partly digested food.
3. Mistletoe attaches to a tree and sends out roots that penetrate the tree and feeds off of some of the tree’s nutrients and minerals.
4. [Clownfish](http://en.wikipedia.org/wiki/Clownfish) dwell among the [tentacles](http://en.wikipedia.org/wiki/Tentacle) of tropical [sea anemones](http://en.wikipedia.org/wiki/Sea_anemone). The territorial [fish](http://en.wikipedia.org/wiki/Fish) protects the anemone from anemone-[eating](http://en.wikipedia.org/wiki/Eating) fish, and in turn the [stinging](http://en.wikipedia.org/wiki/Sting_%28biology%29) tentacles of the anemone protect the clownfish from its [predators](http://en.wikipedia.org/wiki/Predator) (a special [mucus](http://en.wikipedia.org/wiki/Mucus) on the clownfish protects it from the stinging tentacles).
5. A smaller tree in the rain forest receives less sunlight from an adjacent tree that is larger than it. Both of the trees need this sunlight in order to survive, reproduce and grow.



**Food Webs & Energy Pyramids**

1. What are the **producers** in this food web?
2. What are the primary consumers (herbivores) in this food web?
3. What are the secondary consumers in this food web?
4. What are the tertiary consumers in this food web?
5. What would happen to the ecosystem if the insects were removed from the food web? Be specific- it might affect numerous organisms!!



1. Create an energy pyramid from the food chain: Oak bark 🡪Rabbit 🡪Wolf🡪 Bear
2. Who has the most energy in this pyramid? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Who has the least energy? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Who has the highest biomass in this pyramid? \_\_\_\_\_\_\_\_\_\_\_\_\_ Who has the lowest biomass? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. What happens to energy as it moves through the food chain/web?
5. What is the ultimate source of energy for this food web?
6. What is the role of bacteria and fungi in an ecosystem? What are they called and what is their job?

**Human Impact**

1. Explain the effect each of the following may have on the environment.

|  |  |
| --- | --- |
| **Factor** | **Effect on Environment** |
| Human Overpopulation |  |
| Pollution |  |
| Introduced non-native species (invasive species) |  |
| Pesticide use (Bioaccumulation) |  |
| Habitat Destruction |  |
| Global Warming |  |
| CFC’s |  |
| Burning fossil fuels |  |

1. What processes ADD carbon dioxide to the atmosphere?

1. What process REMOVES carbon dioxide from the atmosphere?

1. What is the number one cause of ALL environmental problems?