Review for Test 1-ANSWERS

Cell Cycle, DNA, Chromosomes, Genes, and Genetics

***Note****: It is impossible to include everything we have taken in this test review. Studying this test review does not guarantee you will get 100% on the test. I have emphasized particularly common areas of difficulty. I have also highlighted some important connections to the next topics we will take so you can begin to make these connections.*

Cell Cycle (1 01, 1 02)

**The Big Picture 🡪 What’s the Purpose of the Cell Cycle?**

* What is the purpose of the cell cycle? 1) To make new cells so organisms can grow 2) To replace injured or dead cells
* Are body cells, sex cells or both involved in the mitosis phases? body cells only
* Why not sex cells? Because they only have half the amount of chromosomes (We say that they are haploid)
* What do sex cells do instead of mitosis then? meiosis
* Why do sex cells need a different process? Because they only have half the amount of chromosomes (haploid). The sex cells also need to be genetically different than eachother so that the population has some variety in it.
* How many cells result when a cell cycle involving mitosis is complete? 2
* What is their proper name? daughter cells
* Are they **diploid or haploid**? Diploid (they BOTH contain the full number of chromosomes for that organism). The diploid number for humans for example, is 46 chromosomes

What does haploid mean? The cell only has half the amount of chromosomes as the body cells. For example,e the haploid number for human cells is 23 chromosomes)

* What cells in the human body have to have half of the number of chromosomes at the end of the cell

cycle? sex cells

* Why do these cells need half of the chromosome number compared to body cells? Because the other parent gives the other half. Haploid cell from biological mother + haploid cell from biological father = diploid cell as the first cell of a new organism
* (try to use the words gamete, fertilization, and zygote – see your sheet called Patterns in Human

Characteristics. You will have to use these words for the next half of the unit as well)

Another way of saying that is a female gamete (haploid cell) + a male gamete (haploid cell) unite in the process of fertilization to produce a zygote (diploid cell)

* Which cells in the human body have to be haploid? sex cells
* Fill in the appropriate word in the blanks: Choices may be given under the blank.

1. In a human cell, the original cell (in prophase) would contain 46 **double**

stranded chromosomes and the two daughter cells would contain 46 **single**

stranded chromosomes.

1. The chromosomes become double stranded during the following phase of the cell cycle:

**Interphase** This process is called **Replication**

(choose one of 6 phases) (insert best word from the unit)

1. **Body** cells use the cell cycle to replace themselves OR to replace injured cells.

(Body, Sex)

1. **Sex** cells do a slightly different(but related) process called meiosis to reproduce themselves.

(Body, Sex)

**Details About the Cell Cycle**

* What are the official names of the 3 general stages of the cell cycle (ie before, during and after)? **Interphase, mitosis , Cytoplasmic Division**
* Name the 6 individual phases in proper order (Remember IPMAT and Cytoplasm Division) **interphase,the 4 phases of mitosis (prophase metaphase,anaphase,telophase) and finally, cytoplasmic division**
* Which of the stages is also called cytokinesis? **Cytoplasmic division**
* Draw, label, and explain the 6 phases of the cell cycle. (ON AN ATTACHED SHEET PLEASE)
* Include

cell membrane, nuclear membrane, chromatin, double stranded chromosomes, centromere

single stranded chromosomes, spindle fiber, and centriole

(SEE p.17-23 text)

**Differences Between Plant & Animal Cell Cycles**

* A plant cell has a **cell wall** while an animal cell does not. This means that during cytoplasm division (cytokinesis), there must be an extra structure that forms between the daughter cells to make the cell wall. This structure is called the **cell plate**. A difference in PROPHASE is that the animal cell has **centrioles** to hold the spindle fibers in place. The plant cell does not.

**Common Errors from Quizzes and Assignments**

When **exactly** do the chromosomes become double stranded?

\*During which phase of the cell cycle does this happen? **Interphase** This process is called

**Replication** Are the chromosomes still double stranded in prophase? Yes When do they

first become single stranded? When centromeres divide, which phase must the cell be in? **Anaphase**

What exactly is the difference between chromatin & double stranded chromosomes?

\*When the cell is in interphase, the chromosomes are at first in the form of **Chromatin**. This is

like a ball of wool that has been unwound. Draw this:

In interphase, replication happens and the chromosomes become **Double stranded** . After

mitosis, the chromosomes will become chromatin again, until mitosis starts again.

**DNA, Genes, Chromosomes (1 13)**

Draw and label a model of DNA. Label sugar, phosphate, at least 4 nitrogen bases (A, T, C, G).

The DNA molecule is very long and is shaped like a twisted ladder. We say it is a double helix. The idea of double is because the “sides” of the ladder are identical on both sides. The sides of the ladder are made of sugar and phosphate. The “rungs” of the ladder going across are made of PAIRS of nitrogen bases. For example, one pairof nitrogen base might be T (thymine) with A (adenine); or G (guanine) with C (cytosine).

Chromosomes are **Strands of DNA found in the nucleus, thread like structures of nucleic acids and protein carrying genetic information**. They are made entirely of tightly wound **DNA**. DNA is made of a bunch of nucleotides strung together in the shape of a twisted ladder called a **double helix**.

Draw a chromosome. Draw a homologous chromosome beside it. Homologous chromosomes carry **traits** for the same **genes**. Give an example of a possible genotype for the trait of blue/brown eye color on your drawing.

What is a gene? **A small segment of DNA on a chromosome which carries genetic information for a certain trait.**

**Genetics )(1 11, 1 12, 1 13)**

**(Single Trait Inheritance only**

**Single Trait Inheritance (1 11)**

Be prepared to look at graphed results of a survey on human traits and IMPROVE the labeling on it using proper vocabulary!! Be ready to interpret (analyze) the graph by describing **patterns** in the inherited traits.

**Writing Genotypes and Phenotypes (1 12)**

* In this type of inheritance, there is a trait that is “either-or”. For example, **either** blue eyes or brown eyes.
* When you receive a trait from your biological parents, we say you “inherited” traits.
* **Dominant and Recessive**
* In terms of traits, describe what it means for one form (allele) of a trait to be dominant **If one allele is dominant over another it will be expressed in the phenotype (the look) of the organism EVEN IF it is paired with an allele for the recessive trait.**
* How do you know whether a form (allele) for a trait is dominant or recessive? **Scientists have researched and prepared a chart for us to look up this information.**
* (Choose the most reliable way. Simply surveying people is not as reliable because you might just get a sample of the population that does not show the dominant trait as often as a larger more reliable sample of the population).

**Homozygous and Heterozygous**

* Write a checkmark beside the genotypes that show a human who is **heterozygous** for brown eye color:

BB \_\_\_\_ Bb\_\_\_\_\_ bb\_\_\_\_\_ **(note that brown eyes are dominant over blue eyes)**

* Write a checkmark beside the genotypes that show a human who is **homozygous** for brown eye color:
* BB \_\_\_\_ Bb\_\_\_\_\_ bb\_\_\_\_\_
* **Write Genotypes**
* Write the following genotypes (and practice using the corrected answers on your worksheet).PRACTICE IS WHAT MAKES YOU STRONG WITH THIS CONCEPT!!!!
* YOU WILL BE GIVEN A COPY OF THE DOMINANT/RECESSIVE CHART ON THE TEST

1. heterozygous for dimpled cheeks **Dd (dimpled = D = dominant)**
2. **homozygous for curly hair CC (curly hair = C = dominant)**
3. **homozygous for smooth chin SS (smooth chin = S = dominant)**
4. Write the following genotypes .
5. heterozygous tongue roller **Tt (T = tongue roller = dominant)**

What does it mean when an organism is “homozygous” for a certain trait**? To be homozygous for a certain trait means that you have two of the same form (allele) for the trait.**

What is a genotype? **A 2- letter description of the forms (alleles) of the trait found on the chromosome**

**For example, Bb is a two-letter description of the 2 forms of the trait of eye color that this person has. This person has one allele for brown eyes and one allele for blue eyes. Because the brown allele is dominant, the person will appear brown-eyed.**

What is a phenotype? **An observable characteristic that informs you somewhat about the genotype of the organism you are studying.**

**2Genotypes for One Phenotype**

* There can sometimes be 2 genotypes for 1 phenotype. For example, if I observe a human and I see that they have free (detached) earlobes, that description is called their phenotype. I can observe the expression of that trait in that human. However, I do not see their genotype. There are two possible genotypes. What are they and why?
* **Detached earlobes are dominant. Let’s use the letter D for detached earlobes. This person has EITHER a Tt genotype or tt genotype.**
* **Biotechnology(1 16, 1 17)**

Be able to describe at least one of the following:

Human Blueprint Project, Wheat Breeding, tree DNA, Shepody potato

* **Remember that you watched the videos about these topics already on your sheet “Patterns in Human Traits” Watch these now if you haven’t yet!!**
* **Format of the Test**

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**Things I was Told to Add to this Review Package**

