Grade 9 Science

Test #2 Review

Body Cells (Mitosis)/Sex Cells (Meiosis) (1 01, 1 02)

Fill in the blank to solidify the following concepts. Some blanks have words/phrases below the blanks to help you choose proper vocabulary. Pages 46 & 47 (in your text) have clear information on this topic.

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

For a human, what number is the diploid number?46 chromosomesWhat is the haploid number? 23 chromosomes

Are these numbers the same for all organisms? No

What does haploid mean? Half the number of chromosomes as body cells

Body cells are called diploid because they have the full number of chromosomes for that organism.

Body cells are made by mitosis and therefore, have no genetic variation

Some organisms use mitosis as their way of reproducing. Their offspring are

genetically identical to the parent. In some situations, this is an advantage because

\*if the parents were well-adapted to the environment then their offspring will be as well

\*reproducing by mitosis (asexually) is fast because the organism does not need to find a mate

\*organisms can quickly populate (colonize) an area, forcing competing organisms to retreat or be unable to find space in that area

Sex cells are called haploid because they have half of the number of chromosomes for that organism.

The process involved in making these sex cells with half the number of chromosomes as sex cells

could not be mitosis. (Mitosis creates genetically identical diploid cells so there must be another process for

 making sex cells which are genetically unique)

The two sex cells (called egg cell in the female and sperm cell in the male)

will join to create a new organism with genetic variation. Genetic variation can be good in some situations because

\*in a changing environment or a disease that affects the entire population, there may be certain genetic variations that allow some individuals in the population to survive the drastic change or disease. It is helpful for your species to survive when you are not ALL susceptible (weak) to the same thing.

Genetic Information from Each Parent

Draw a chromosome. Draw a homologous chromosome from the other parent beside it. Homologous chromosomes carry alleles for the same trait

Human body cells have 23 pairs of chromosomes (46 chromosomes in total). The pairs are called homologous chromosomes. One exception is the chromosomes that determine your gender. They are not paired.

Notice

\*each pair has a similar shape and size

\*you received ONE member of each pair from your biological mom and one member from your

 biological dad

Model the chromosomes in the egg cell Model the chromosomes in the sperm cell



MEIOSIS is the process that ensures that each egg cell and sperm cell get only 23 chromosomes each

Does each egg cell get a genetically different set of chromosomes? Yes. Otherwise, all of the siblings from the same parents would be the same

To be clear, 2 brothers form the same mother are not genetically identical unless they are twins.

To make sure that each egg cell gets a different set of genetic information, the single strands must CROSS OVER and “trade” or “exchange” segments of DNA.

Give an example of a possible genotype for the trait of blue/brown eye color on your drawing. Answers vary but may be BB, Bb, or bb

Give the phenotype for that genotype BB = brown, Bb = brown, bb = blue

 What is a gene? A small strand of DNA on a chromosome

 Is eye color a sex-linked trait? (ie does it travel attached to the x-chromosome)

No eye color does not travel on the X chromosome therefore it is not sex-linked.

**Genetics**

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

**Single Trait Inheritance (1 11)**

In this type of inheritance, there is a trait that is “either-or”. For example, **either** blue eyes or brown eyes.

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)**

1. When you receive a trait from your biological parents, we say you “inherited” traits. One allele for the trait of eye color for example came from your biological mom and one of the alleles for the trait of eye color came from your biological dad.

**Dominant and Recessive**

1. In terms of traits, describe what it means for one form (allele) of a trait to be dominant

A dominant allele for a trait is expressed (shown) in your phenotype even when paired with a recessive allele.

(A recessive allele for a trait is NOT expressed (shown) in your phenotype when paired with a dominant allele.)

Give 2 ways that you could know whether a form (allele) for a trait is dominant or recessive.

1. If you knew the genotypes of the parents you could cross them (breed them together) and see what phenotype shows when you have a heterozygous genotype.

For example, if Bb genotype shows blue eyes in the phenotype, the dominant allele must be blue eyes (we know for humans that brown eyes are dominant)

**Homozygous and Heterozygous**

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

BB \_\_\_\_ Bb CHECKMARK bb\_\_\_\_\_ Bbbb \_\_\_\_\_\_\_ b\_\_\_\_\_

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

BB CHECKMARK Bb\_\_\_\_\_ bb \_\_\_\_\_\_ Bbbb \_\_\_\_\_\_\_ b\_\_\_\_\_

1. Write a checkmark beside the genotypes that show a human who is **homozygous** for blue eye color:

BB \_\_\_\_ Bb\_\_\_\_\_ bb CHECKMARK Bbbb \_\_\_\_\_\_\_ b\_\_\_\_\_

**Write Genotypes**

7) Write the following genotypes

1. heterozygous for dimpled cheeks Dd (dimpled is dominant, or D)
2. homozygous for curly hair HH (curly hair is dominant, or H)
3. homozygous for smooth chin SS (smooth chin is dominant, or S)
4. heterozygous tongue roller Tt (tongue rolling is dominant, or T)
5. homozygous recessive for eye color bb (blue is the recessive allele, or b)

8) What does it mean when an organism is “homozygous” for a certain trait? Homozygous means that the 2 alleles you have on your chromosomes are the same

9) What is a genotype? A 2-letter symbol representing the 2 alleles on your chromosomes

10) What is a phenotype? A phenotype is the physical expression (look) of a trait based on the genotype

**2 Genotypes 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?

The genotype EE will give detached earlobes in the phenotype. Ee will also give detached earlobes in the phenotype.

Punnett Squares for Predicting Traits

Cross a heterozygous tongue roller with a homozygous non-tongue roller. Remember to give all possible genotypes and phentoypes of the offspring including percentages.

Be sure to complete the PUNNETT SQUARE REVIEW that is on the homework on-line.

**Sex-Linked Traits**

Females carry the chromosomes X and X. Males carry the X and Y chromosomes.

Some traits are attached to the X chromosome.

When using a Punnett Square, you must pay attention to what chromosome is coming from each parent.

Be sure to review the PUNNETT SQUAREs for sex-linked traits that we did in class.

Mutations (1 15)

Be sure you have completed and reviewed the text questions on mutations (p. 118-121)

**Mutations:** a change in genes, produced by an “error” occurring during the process of copying DNA.

**Examples**: part of the chromosome gets reverse, duplicated, lost or deleted, or moved to a different

 area on the chromosome.

These may be useful, harmful or have no effect on the organism.

Causes of mutation (called mutagenic agents) include:

\*radiation (high energy X-rays for example)

\*temperature extremes

\*chemicals such as pesticides etc

Cancer is a mutation that causes the cell to lose control of its own reproduction – mitosis happens again and again, resulting in a tumor sometimes.

If mutations happen in a body cell, the cell may still survive. If the mutation happens in a sex cell, the cell will likely die (and so the mutation will not be passed on to the offspring).

**Common Errors from Last Test**

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 messy ball of wool that has been unwound. In interphase, replication happens and the chromosomes

become **double-stranded**

During which phase of the cell cycle do the chromosomes become double stranded? interphase

This process is called **replication** Are the chromosomes double stranded in prophase? yes

In which phase do double stranded chromosomes first become single stranded? anaphase

In which phase must the cell be in when the centromere is ripped apart to separate the two strands of DNA into

separate cells? Anaphase – centromere is ripping so the double strands become single-stranded

 Telophase – the cells are starting to separate (but do not become 2 separate cells until cell

 Division) Telophase has 2 nuclei in 1 cell!

 After cell division, the chromosomes will become chromatin again, until mitosis starts again.

**Biotechnology(1 16, 1 17)**

 Be able to describe at least one of the following issues that we explored. This time you must CHOOSE a side: are

 you PRO (for) this form of biotechnology or CON (against) this type of technology.