

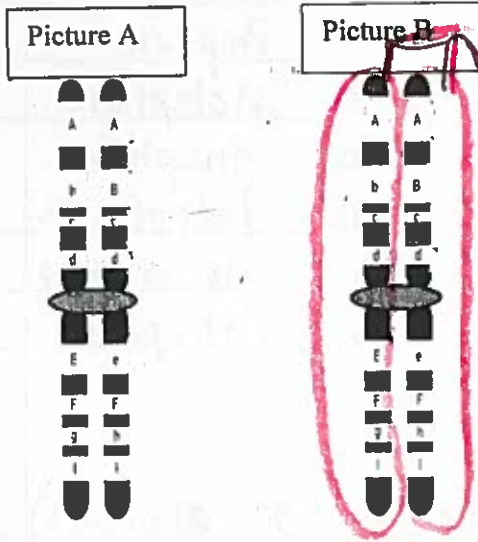
KEY

Name _____ Date _____ Period _____

Biology Unit 5 Test: Mitosis Meiosis and Genetics

Word Bank
A. Chromatid
B. Sister Chromatids
C. Alleles
D. Centromeres
E. Homologous Chromosomes
F. Duplicated Chromosome

2a. Use the word bank to identify the correct response to the questions and the labeled parts of the diagram. Follow the directions and identify the following. Answers to numbers 1-6 are in the word bank!



1. With a RED colored pencil circle the sister chromatids of one chromosome.
2. A single one of these is? A
Chromatid
3. The center that holds them together? D
Centromere
4. White bands are? C
alleles
5. Picture A and B together are described as E
homologous chromosomes
6. Just picture A is a F
duplicated chromosome
7. The human cell contains how many chromosomes?
46

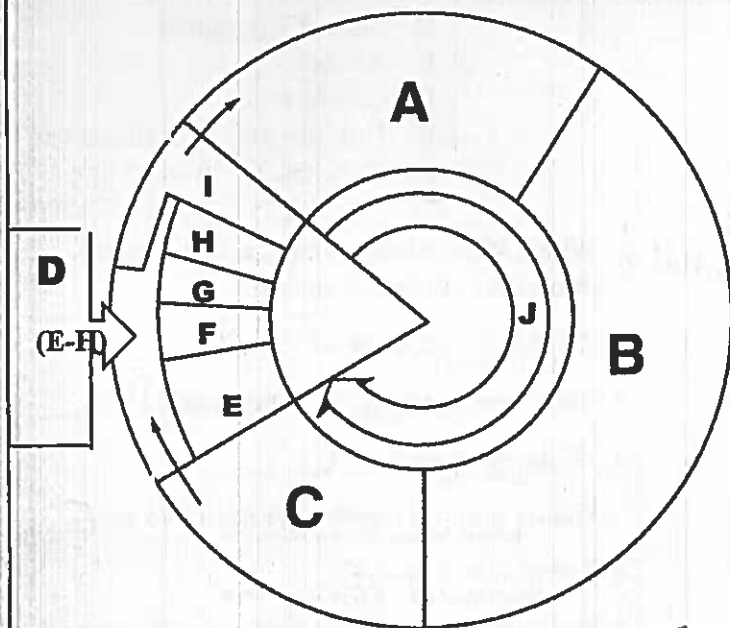
2c. List the two categories of stem cells (hint: what life stage are they found in). Next to each one determine if it is pluripotent or multipotent.

- A. Embryonic Stem cells: *pluripotent because can become any type of cell*
- B. Adult Stem cells: *multipotent: these cells are limited to specific types of tissues in organ systems*

3b. Explain cell differentiation and why it's important to an organism's development.

1. Explain cell differentiation *when cells become more specialized for their function. Important in multicellular animals because these cells have specific tasks like the fingers & thumbs of your hand*
2. What are stem cells?
Cells that can become any type of cell even embryonic. They are undifferentiated cells
3. Describe the ethical issues surrounding stem cell research.
stem cell research is controversial because much of the research was conducted using embryonic stem cells & in order to harvest these cells they would end up killing the embryo.

2b. For each of the letters write the name of the part of the cell cycle.



- A. G₁
- B. S phase
- C. G₂ phase
- D. Mitosis
- E. Prophase
- F. Metaphase
- G. Anaphase
- H. Telophase
- I. cytokinesis
- J. Interphase

K. The end result of this cycle produces what? two ^{new} daughter cells (cell division)

2d. Match the definition with the correct term from the word bank (Write the letter).

- B 1. Production of genetically identical offspring from a single parent?
- D 2. Sequence of DNA that codes for a protein and thus determines a trait; factor that is passed from parent to offspring.
- F 3. Thread like structure of DNA and protein that contains genetic information.
- J 4. Protein disc that holds sister chromatids together
- K 5. Pair of chromosomes.
- O 6. Act of the cytoplasm pinching in half creating two new daughter cells.
- Q 7. Cells of the body not used in reproduction.
- R 8. Cell death.
- P 9. Process in which a cell becomes specialized.
- Q 10. All cells besides sex cells in the body
- E 11. DNA is wrapped around these to help organize the chromatin

Word Bank

- A. Sexual Reproduction
- B. Asexual Reproduction
- C. DNA
- D. Gene
- E. Histone
- F. Chromatin
- G. Chromosome
- H. Chromatid
- I. Sister Chromatid
- J. Centromere
- K. Homologous Chromosomes
- L. Diploid
- M. Mitosis
- N. Interphase
- O. Cytokinesis
- P. Differentiation
- Q. Somatic
- R. Apoptosis

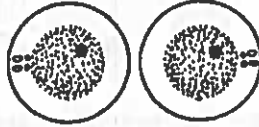
3a. Label each of the phases of Mitosis (they are not in order) and describe what is happening. (A-J)



A. Name of Phase prophase

B. Describe what is happening

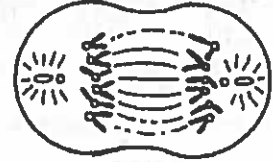
- Chromosomes thicken
- centrioles move toward opposite poles (North/South)
- nucleus breaks down
- spindle fibers form



C. Name of Phase Cytokinesis

D. Describe what is happening

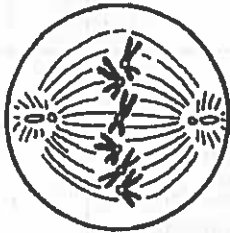
- the splitting of the cytoplasm & cell contents.



E. Name of Phase Anaphase

F. Describe what is happening

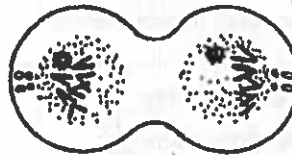
- chromatids are pulled to opposite sides of cell by spindle fibers
- cell elongated - egg shape



G. Name of Phase Metaphase

H. Describe what is happening

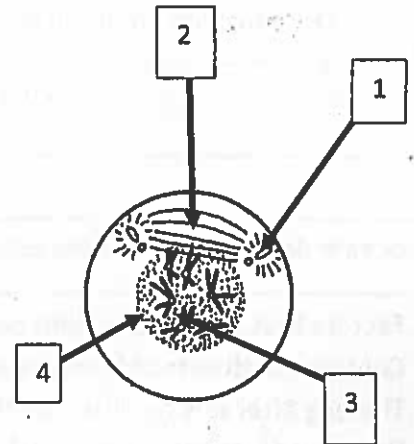
- Duplicated chromosomes line up in the center of cell
- spindles attach at the centromere



I. Name of Phase telophase

J. Describe what is happening

- cell starts to pinch off
- nucleis reform
- chromosomes unravel back into chromatin



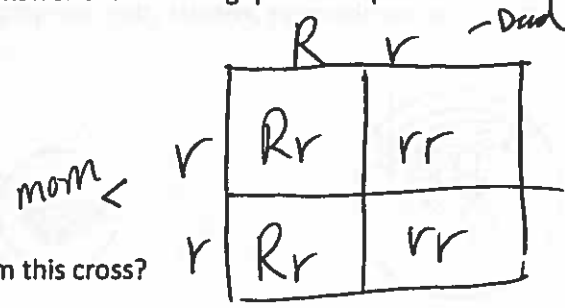
Write the name for the following structures

1. centrioles
2. spindle fibers
3. chromosomes
4. nucleus

Unit 5b Biology Exam- Principles of inheritance & meiosis- Version A

2b. The ability to roll your tongue is a dominant trait. A heterozygous man who can roll his tongue has a child with a woman who cannot roll her tongue. Create a Punnett square to answer the following questions (must show Punnett square on answer sheet)

1. What are the possible genotypes for children?
Rr & rr
2. What are the possible phenotypes for children?
50% tongue rollers 50% non tongue rollers
3. What is the genotype for a hybrid from your answer?
Rr
4. What is the % chance that a purebred genotype can occur from this cross?
50%



2c. For each number below write the letter for the type and provide an example that supports your answer.

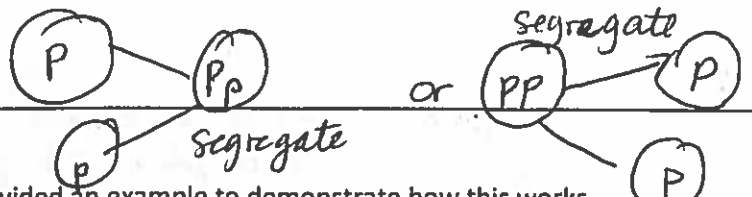
1. A situation in which a gene has more than two alleles? *D*
2. A situation where phenotypes produced by both alleles are clearly expressed? *B*
3. Red flowers (RR) that are crossed with white flowers (WW) produce offspring with pink (RW) flowers, an example of? *A*
4. Traits that are produced by the interaction of several genes? *C*

- A. incomplete dominance
- B. codominance
- C. polygenic traits
- D. multiple alleles

2c. For each definition provide the letter of the term it represents

1. Factors that are passed from parents to offspring *D*
2. Contains both sets of homologous chromosomes *B*
3. The egg after it is fertilized by the sperm *M*
4. Different forms of a gene *A*
5. Specific characteristics of an individual, heritable differences *L*
6. Organism's that have two alleles that are different *G*
7. Location of a particular gene on a chromosome *J*

- A. Alleles
- B. Diploid
- C. Gametes
- D. Genes
- E. Genotype
- F. Haploid
- G. Heterozygous
- H. Homozygous
- I. Hybrid
- J. Loci (locus)
- K. Phenotype
- L. Trait
- M. Zygote



3a. Respond to each of the following questions

1. What does Mendel's Law of Segregation state? Provide an example to demonstrate how this works.

Each person has at least 2 alleles for each trait, during anaphase I of meiosis these alleles segregate (or separate) during gamete production.

2. What does Mendel's Law of Independent Assortment state? Provide an example to demonstrate how this works for the parental cross and F1 generation cross.

During gamete formation, in meiosis during metaphase I homologous chromosomes are sorted: independently of each other see back →

3b. Are an organism's characteristics determined only by its genes? Explain and be sure to discuss genotype, phenotype to support your answer.

(mutations) No your environment can cause differences in your genes, that's how identical twins can be different heights & have slightly different characteristics, & by chance during independent assortment. See Back →

2d. Identify the outcomes of mitosis and meiosis.

A) If a cell with 24 chromosomes went through Mitosis how many cells would be produced? 2

B) Would these cells be haploid or diploid? Diploid

C) If a cell with 24 chromosomes went through Meiosis how many cells would be produced at the end of Meiosis II? 4

D) Would these cells be haploid or diploid? haploid

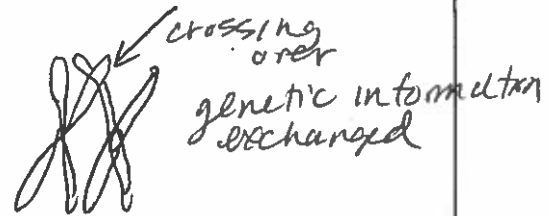
E) True or False Oocytes are sperm. they are eggs

3c. Comparing Mitosis and Meiosis:

1. Which of the following is Mitosis NOT used for?

- a) Repair (of a wound) in multicellular organisms
- b) Asexual reproduction in unicellular organisms
- c) Development of baby in mother's womb
- d) Production of gametes
- e) All of the above use mitosis

D



2. How does Prophase in Mitosis differ from Prophase I of Meiosis? (Explain and use diagrams to support your response)

Prophase I meiosis has crossing over of homologous chromosomes & mitosis does not

3. How does Metaphase of Mitosis differ from Metaphase I of Meiosis? (Explain and use diagrams to support your response)

Mitosis

Meiosis

— Single chromosomes with two chromatids each line up in middle of the cell.

— paired homologous chromosomes (tetrads) line up in the middle of the cell.

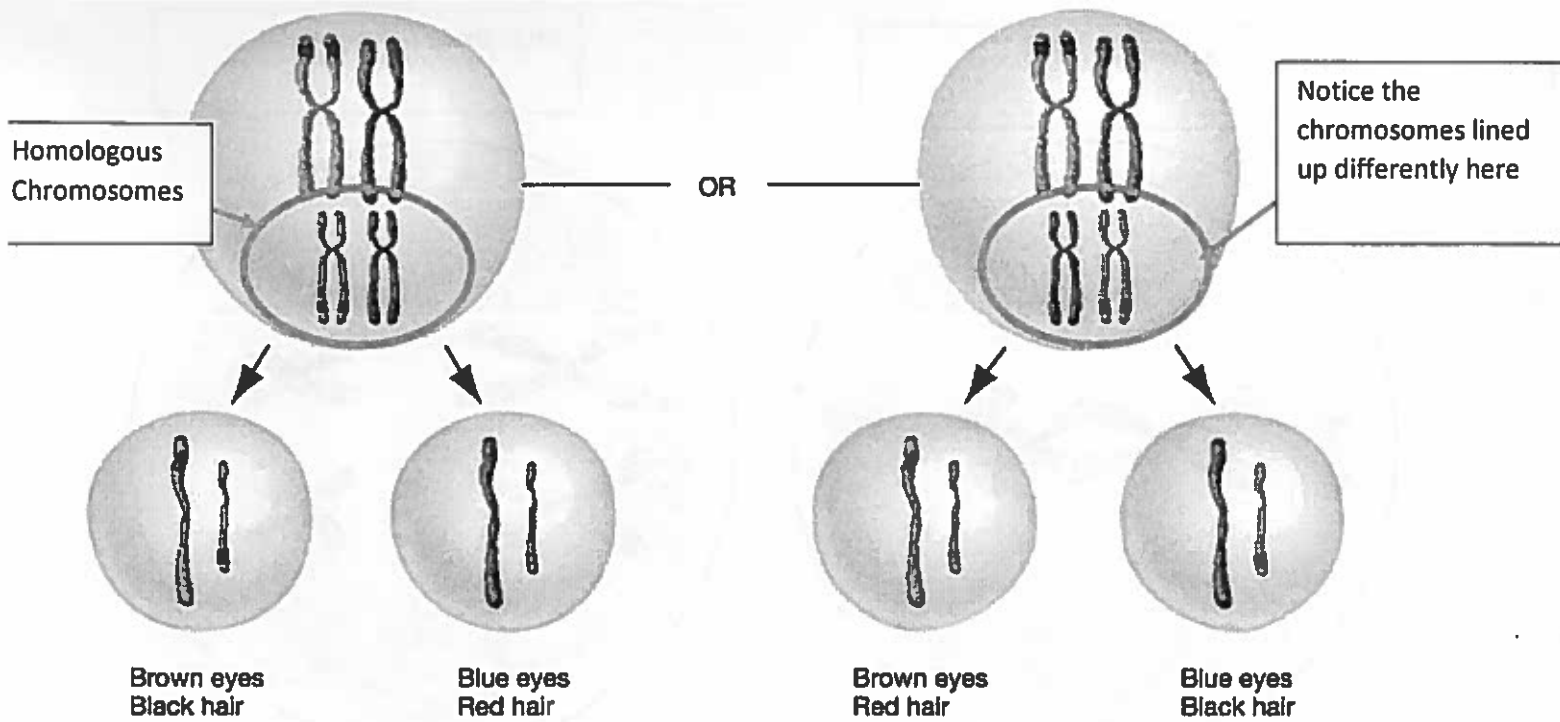
— Both chromatids are genetically similar

— All 4 chromatids are genetically different

→ see back

Independent Assortment

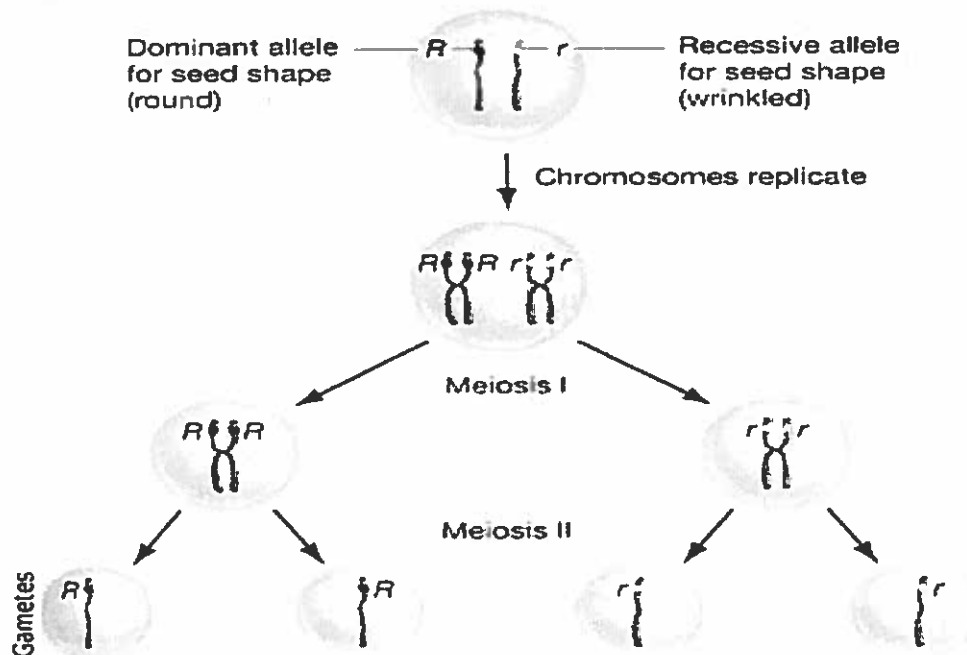
Homologous chromosomes line up in the middle of the cell, during metaphase I how they line up can be different which then affects the traits that will present in each gamete.



Law of Segregation

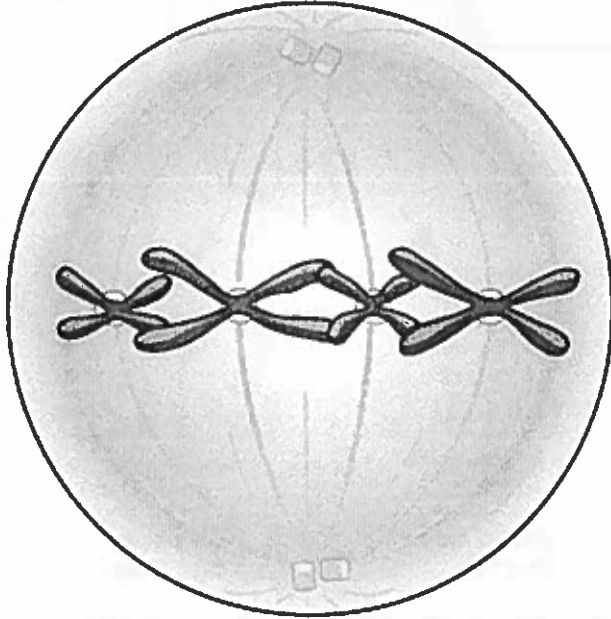
Each person has at least 2 alleles for each trait, during anaphase I of meiosis these alleles segregate, (separate) independently of each other when gametes are produced.

Principle of segregation



Each gamete carries only one allele for seed shape because the alleles have segregated during meiosis.

Metaphase - mitosis



Metaphase I- meiosis

