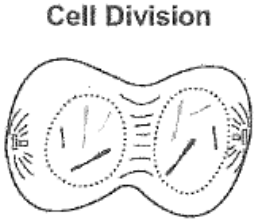
Keystone Practice Questions #2
Cell Division, DNA & RNA, Genetics= Module 2

1. Mitosis and meiosis are processes by which animal and plant cells divide. Which statement **best** describes a difference between mitosis and meiosis?

A. Meiosis is a multi-step process.
B. Mitosis occurs only in eukaryotic cells.
C. Meiosis is used in the repair of an organism.
D. Mitosis produces genetically identical daughter cells.

2. Use the illustration below to answer the question.



Which statement **best** describes the phase of the cell cycle shown?

A. The cell is in prophase of mitosis because the number of chromosomes has doubled.
B. The cell is in prophase I of meiosis because the number of chromosomes has doubled.
C. The cell is in telophase of mitosis because the cell is separating and contains two copies of each chromosome.
D. The cell is in telophase of meiosis because the cell is separating and contains two copies of each chromosome.

3. Which process helps to preserve the genetic information stored in DNA during DNA replication?

A. The replacement of nitrogen base thymine with uracil.
B. Enzymes quickly linking nitrogen bases with hydrogen bonds
C. The synthesis of unique sugar and phosphate molecules for each nucleotide
D. Nucleotides lining up along the template strand according to base pairing rules

4. Which statement describes a cell process that is common to both eukaryotic and prokaryotic cells?

A. Both cell types carry out transcription in the nucleus.
B. Both cell types use ribosomes to carry out translation.
C. Both cell types assemble amino acids to carry out transcription.
D. Both cell types carry out translation in the endoplasmic reticulum.

5. The endoplasmic reticulum is a network of membranes within the cell, and it is often classified as rough or smooth, depending on whether there are ribosomes on its surface. Which statement **best** describes the role of rough endoplasmic reticulum in the cell?

A. It stores all proteins for later use.
B. It provides an attachment site for larger organelles.
C. It aids in the production of membrane and secretory proteins.
D. It stores amino acids required for the production of all proteins.

6. A genetic mutation resulted in a change in the sequence of amino acids of a protein, but the function of the protein was not changed. Which statement **best** describes the genetic mutation?

A. It was a silent mutation that caused a change in the DNA of the organism.
B. It was a silent mutation that caused a change in the phenotype of the organism.
C. It was a nonsense mutation that caused a change in the DNA of the organism.
D. It was a nonsense mutation that caused a change in the phenotype of the organism.

7. In a flowering plant species, red flower color is dominant over white flower color. What is the genotype of any red-flowering plant resulting from this species?

A. red and white alleles present on one chromosome
B. red and white alleles present on two chromosomes
C. a red allele present on both homologous chromosomes
D. a red allele present on at least one of two homologous chromosomes

8. Use the table below to answer the question.

Blood Types

Genotype(s)	Phenotype
ii	O
I^AI^A, I^Ai	A
I^BI^B, I^Bi	B
I^AI^B	AB

Blood type is inherited through multiple alleles, including I^A, I^B, and i. A child has type A blood. If the father has type AB blood, what are all the possible phenotypes of the mother?

A. phenotypes O or A
B. phenotypes A or AB
C. phenotypes A, B, AB
D. phenotypes O, A, B, AB

9. Patau syndrome can be a lethal genetic disorder in mammals, resulting from chromosomes failing to separate during meiosis.

Part A: Identify the step during the process of meiosis when chromosomes would **most likely** fail to separate.
Part B: Describe how chromosome separation in meiosis is different from chromosome separation in mitosis.
Part C: Compare the effects of a disorder caused by chromosomes failing to separate during meiosis, such as Patau syndrome, to the effects of chromosomes failing to separate during mitosis.

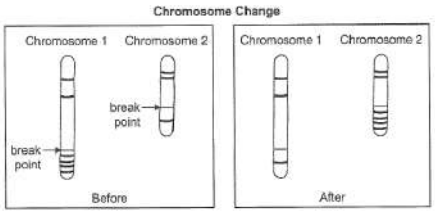
10. A cattle farmer genetically crosses a cow (female) with a white coat with a bull (male) with a red coat. The resulting calf (offspring) is roan, which means there are red and white hairs intermixed in the coat of the calf. The genes for coat color in cattle are co-dominant.

Part A: Although a farm has cattle in all three colors, the farmer prefers roan cattle over white or red cattle. Use a Punnett square to show a cross that would produce only roan offspring.

Part B: Explain how a roan calf results from one white- and one red-coated parent. In your explanation, use letters to represent genes. Be sure to indicate what colors the letters represent.

Part C: Predict the possible genotypes and phenotypes of the offspring produced from two roan cattle.

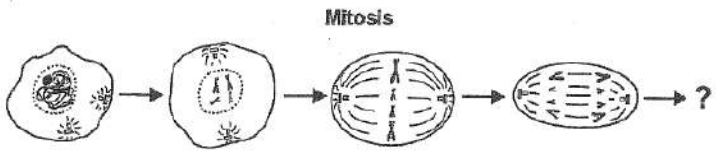
11. Use the diagram below to answer the question.



Which type of change in chromosome composition is illustrated in the diagram?

A. deletion
B. insertion
C. inversion
D. translocation

12. Use the diagram to answer the question.



Which event **most likely** occurs next in mitosis?

A. The chromatin condenses.
B. The nuclear envelope dissolves.
C. The chromosomes double in number.
D. The cell membrane pinches inward to divide the cytoplasm.

13. A scientist observes that a certain trait is determined by a single allele. An organism inherited one version of the trait from one parent and another version from the other parent. Both versions of the trait are expressed in the phenotype of the offspring. Which pattern of inheritance **best** classifies the observed trait?

A. dominance
B. sex-linked
C. co-dominance
D. incomplete dominance

14. The bacterium *Acetobacter aceti* is found in acidic environments and has an acidic cytoplasm. For this reason, most of its proteins are able to function in acidic conditions. This property distinguishes *Acetobacter aceti* proteins from those of most other organisms. Which characteristic does *Acerobacter aceti* **most likely** share with other organisms?

A. the method that the organism uses to reproduce itself
B. the physical and chemical responses to environmental changes
C. the type of organelle used to produce energy for cellular functions
D. the process used to form proteins by transcription and translation

15. A mutation occurs at the midpoint of a gene, altering all amino acids encoded encoded after the point of mutation. Which mutation could have produced this change?

A. deletion of two nucleotides
B. deletion of three nucleotides
C. insertion of six nucleotides
D. insertion of twelve nucleotides