

Test Name: Cell Reproduction and Genetics

Test Id: 308393

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Section

1. Gregor Mendel was an Austrian monk that observed the different colors of pea plants in his monastery. He discovered that not all generations of plants ended up having the same colored offspring and that some traits must be inherited separately of each other. Which term best describes the individual traits you receive from each parent that when combined, give you a physical appearance or trait.
 - A. zygotes
 - B. phenotypes
 - C. alleles
 - D. polygenic inheritance

2. Restriction enzymes are commonly used in certain biotechnological processes. What is the most accurate description of the function of restriction enzymes below?
 - A. stop the DNA from replicating
 - B. insert DNA segments to create longer strands for genetic engineering
 - C. cut DNA segments to create shorter strands for genetic engineering
 - D. speed up the reaction of DNA being replicated

3. Genetic engineering is possible because all organisms are based on the same
 - A. proteins
 - B. RNA copies
 - C. plasmid loops
 - D. genetic code

4. Scientists are able to extract the bioluminescence gene from a jellyfish and genetically modify the DNA to include this gene in some pigs. In this case, the new genetically modified DNA in the pigs is known as which of the following terms?
- A. recombinant DNA
 - B. genomic DNA
 - C. transgenic DNA
 - D. informatic DNA
5. A homozygous dominant red carnation mates with a white carnation. After crossing these two parents, you notice that all of their offspring are red in color. What does this cross explain about this particular pattern of inheritance?
- A. flowers having a white color possess the recessive trait, but is not completely dominated by the trait for red color.
 - B. red is completely dominant over white, so in heterozygous mixtures, only red colors will be displayed.
 - C. flowers having a red color possess the dominant trait, but when mixed with white, create red and white flowers.
 - D. red is incompletely dominant over white, so in heterozygous mixtures, pink colors will be displayed.

6. *Figure 1.3*

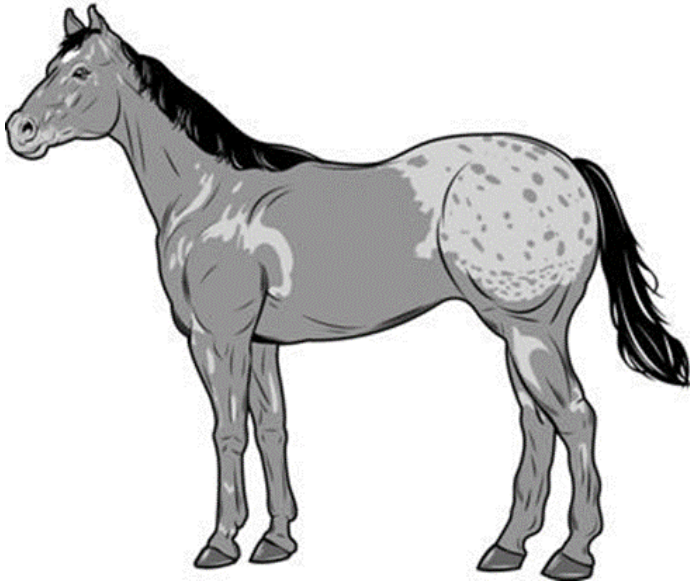
	RF	Rf	rF	rf
RF	RRFF	RRFf	RrFF	RrFf
Rf	RRFf	RRff	RrFf	Rrff
rF	RrFF	RrFf	rrFF	rrFf
rf	RrFf	Rrff	rrFf	rrff

Figure 3 shows a cross between two mice parents. R is dominant for having round eyes as opposed to almond shaped eyes, and F is dominant for having fur as opposed to not having fur. Using the dihybrid cross above, which data represents accurate offspring possibilities from these two parents?

- A. 25% have round eyes but do not have fur
 - B. 50% have fur but do not have round eyes
 - C. 25% do not have round eyes nor do they have fur
 - D. 50% have both round eyes and fur
7. The inheritance of short wings in *Drosophila* fruit flies is an x-linked, recessive trait. Which would most likely result if a short-winged female mates with a long-winged male?
- A. All offspring will be short-winged.
 - B. All females will be long-winged, and all males will be short-winged.
 - C. All females will be short-winged, and all males will be long-winged.
 - D. All females will be short-winged, and all males will be long-winged.

8. The Appaloosa is a breed of American horse known for its leopard-like spotting. The grey color (GG) and the white color (WW) are codominant, making the genotype for the Appaloosa (GW).

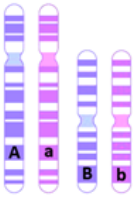
APPALOOSA BREED



What would be the possible phenotype ratio when an Appaloosa horse is crossed with a white horse?

- A. 1 grey, 2 Appaloosa, 1 white
 - B. 2 grey, 0 Appaloosa, 2 white
 - C. 0 grey, 2 Appaloosa, 2 white
 - D. 2 grey, 1 Appaloosa, 1 white
9. A veterinary student wants to produce new cattle. Which class should she take to **best** learn how to produce strong, healthy cattle?
- A. Bacteriology
 - B. Genetics
 - C. Toxicology
 - D. Virology

10. Below are two pairs of homologous chromosomes.



Due to Mendel's law of independent assortment, what is the possible genetic make-up of gametes produced by this organism?

- A. **AaBb**
- B. **Aa, Bb**
- C. **A, a, B, b**
- D. **AB, Ab, aB, ab**

11. An F_1 generation of pea plants produced all round yellow seeds ($WwGg$). These dihybrid seeds grew into plants and produced seeds. The probable genotypes for the F_2 generation are shown in the Punnett square below.

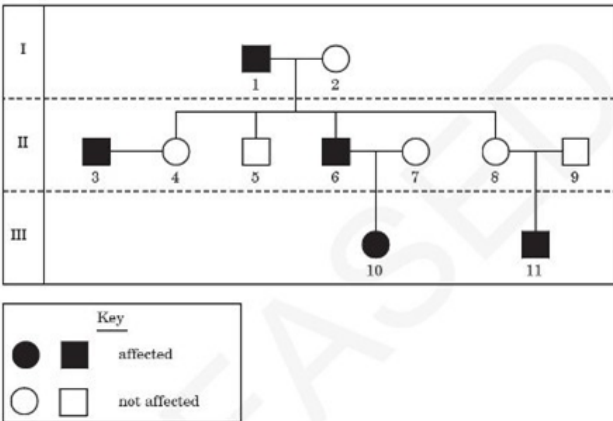
	WG	Wg	wG	wg
WG	WWGG	WWGg	WwGG	WwGg
Wg	WWGg	WWgg	WwGg	Wwgg
wG	WwGG	WwGg	wwGG	wwGg
wg	WwGg	Wwgg	wwGg	wwgg

W = round seed w = wrinkled seed G = yellow seed g = green seed

What is the ratio of plants that will have round yellow seeds to those that will have round green seeds?

- A. 1:1
- B. 3:3
- C. 6:1
- D. 9:3

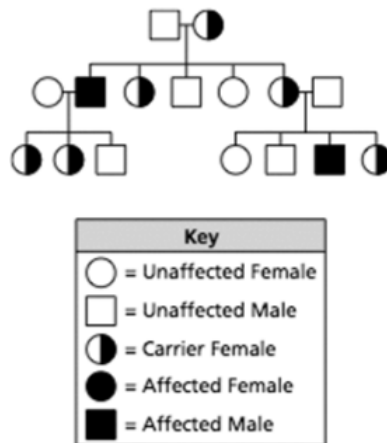
12. This diagram shows a pedigree for a recessive genetic disorder.



What is the genotype of individual 6?

- A. $X^H X^H$
- B. $X^H X^h$
- C. $X^H Y$
- D. $X^h Y$
13. Mary had to do a project on meiosis for her genetics class. Which of the following sets of terms would she most likely include in her paper that would accurately describe meiosis?
- A. diploid, genetically diverse, N , crossing over, sexual reproduction
- B. diploid, genetically identical, $2N$, binary fission, asexual reproduction
- C. haploid, genetically diverse, N , crossing over, sexual reproduction
- D. haploid, genetically identical, $2N$, binary fission, asexual reproduction
14. Gregor Mendel conducted research about genetics by breeding pea plants. Although he could not actually see into cells, he deduced from his results that each of an organism's traits is determined by two factors (alleles). Long after Mendel's work, microscopes were improved and scientists observed that chromosomes in the nucleus occurred in matching pairs. It is now accepted that the two alleles for each trait are located on homologous chromosomes. What does this demonstrate about science?
- A. Advances in science may result from new interpretations of previous work.
- B. Improvements in equipment and data gathering can disprove previous conclusions.
- C. Earlier scientists did not have the proper equipment and materials to make their conclusions.
- D. Much of early scientific research was faulty because the earlier scientists did not practice the same data-gathering practices as modern scientists.

15. A pedigree is shown below.



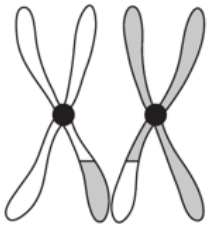
What type of trait is shown in the pedigree?

- A. sex-linked recessive
 - B. sex-linked dominant
 - C. autosomal recessive
 - D. autosomal dominant
16. During meiosis, homologous chromosomes exchange genetic material. What is the significance of the exchange of genetic material?
- A. increases the genetic variation
 - B. reduces the probability of mutations
 - C. reduces the diploid number to the haploid number
 - D. increases the haploid number to the diploid number
17. The cell cycle includes several processes during which the cell grows, replicates its DNA, and divides. Only a small part of the cycle is spent in dividing. During which part of the cell cycle does the cell divide?
- A. Mitosis
 - B. G1 phase
 - C. G2 phase
 - D. Synthesis of DNA

18. When a cell in your skin divides, each daughter cell contains organelles, including a nucleus. The nucleus contains a certain number of chromosomes. What would be the best statement about the number of chromosomes in a daughter cell in your skin?

- A. each daughter cell has half the number of chromosomes as the parent cell
- B. each daughter cell has the same number of chromosomes as the parent cell
- C. each daughter cell has twice the number of chromosomes as the parent cell
- D. each daughter cell has four times the number of chromosomes as the parent cell

19. The diagram below represents a change in composition of homologous chromosomes.



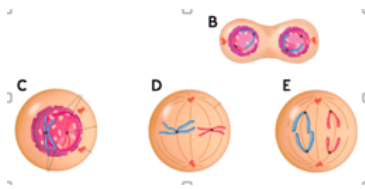
This change is most likely the result of the process of:

- A. Nondisjunction
- B. Gene Linkage
- C. Crossing Over
- D. Polyploidy

20. The M phase of the cell cycle consists of both mitosis and cytokinesis. Mitosis refers to _____, whereas cytokinesis refers to _____.

- A. Cell/cytoplasmic division, cell plate formation in animal cells
- B. Nuclear division, cell/cytoplasmic division
- C. Cell/cytoplasmic division, nuclear division
- D. Nuclear division, replication of nuclear material

21. Which of the following statements correctly identifies the order and phases of Mitosis?



- A. C- Prophase, D- Metaphase, E- Anaphase, B- Telophase
- B. D-Prophase, B-Anaphase, E-Telophase, C-Metaphase
- C. C-Anaphase, D-Prophase, E-Metaphase, B-Telophase
- D. E- Prophase, D- Metaphae, B-Anaphase, C-Telophase

22. Brain cells are known to go through mitosis at a rapid pace due to constantly learning and development of skills. Which of the following is not a cell that can go through the process of mitosis?

- A. Heart Cell
- B. Toenail
- C. Sperm
- D. Liver Cell

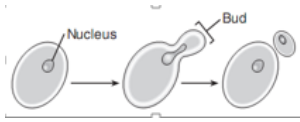
23. A photomicrograph of onion root tip cells during mitosis is shown below.



Which phase of mitosis is occurring in the cell indicated by the arrow?

- A. Prophase
 - B. Metaphase
 - C. Anaphase
 - D. Telophase
24. Unlike mitosis, meiosis occurs only in —
- A. reproductive cells.
 - B. muscle cells.
 - C. connective tissue cells.
 - D. nerve cells.

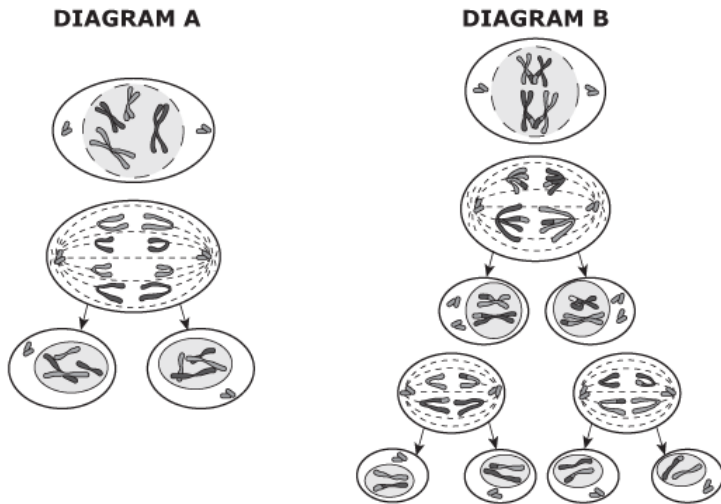
25. The figure below illustrates asexual reproduction in yeast.



What characteristic do the offspring of yeast share?

- A. Genes that are different from those of the parent
- B. Genes that are identical to those of the parent
- C. Half of the genetic information of the parent
- D. Organelles that are not found in the parent

26. Use the diagrams to answer the question.



Which statement **best** describes the diagrams shown?

- A. Diagram A represents meiosis resulting with identical daughter cells. Diagram B represents mitosis resulting with identical daughter cells.
- B. Diagram A represents meiosis resulting with genetically unique daughter cells. Diagram B represents mitosis resulting with genetically identical daughter cells.
- C. Diagram A represents mitosis resulting with genetically identical daughter cells. Diagram B represents meiosis resulting with genetically unique daughter cells.
- D. Diagram A represents mitosis and increased genetic diversity in daughter cells. Diagram B represents meiosis and decreased genetic diversity in daughter cells.

27. Which student has selected the appropriate descriptions for the cells produced during meiosis?

Student	2 Sex Cells	4 Sex Cells	Haploid Cells	Diploid Cells
1	X			X
2		X	X	
3	X		X	
4		X		X

- A. student 1
- B. student 2
- C. student 3
- D. student 4

28. Phytopharmaceuticals are pharmaceutical compounds that are found in plants. They can be naturally occurring or as a result of biotechnology. Recently, scientists created genetically modified (GM) corn that produces the antibiotic penicillin. The seeds of this GM corn contain a large amount of the antibiotic penicillin, making the cost of producing the penicillin much cheaper and making the method of delivering it to patients in need much easier. **Given the benefits of this GM corn, which of the following may be a concern regarding its production?**

- A. The GM corn may develop infections from bacteria that are sensitive to the antibiotic.
- B. The GM corn might pass resistance genes to other organisms, like birds, that may eat the seeds.
- C. Because corn uses the wind for pollination, people allergic to penicillin may be at risk for exposure to the antibiotic in the air.
- D. Increased availability of the antibiotic may increase the development of antibiotic resistance in the infectious agents penicillin is used to treat against.

29. Which of the following terms applies to traits, such as human eye color, that are controlled by more than one gene?

- A. codominant
- B. polygenic
- C. recessive
- D. sex-linked

30. During an investigation, tall pea plants were crossed with short pea plants. All of the offspring from this cross were tall. Which term **best** describes the tall trait for the pea plants?
- A. linked
 - B. dominant
 - C. recessive
 - D. codominant

31. In a certain variety of chicken, some offspring have a feather pattern that is black-and-white checkered. Chickens with this checkered feather pattern result from the cross of a black chicken with a white chicken.

Which of the following types of inheritance is **most likely** responsible for the checkered feather pattern?

- A. codominant
 - B. dominant
 - C. polygenic
 - D. sex-linked
32. Alleles for the A and B blood cell antigens are codominant. The condition where no antigens are present on the blood cells (type O blood) is a recessive trait. Which set of parents can most likely produce a child with type O blood?
- A. one parent with type AB blood, and the other parent with type A blood
 - B. one parent with type AB blood and the other parent with type O blood
 - C. one parent with heterozygous type A blood, and the other parent with type O blood
 - D. one parent with homozygous type A blood, and the other parent with homozygous type B blood

33. The hair on a baby's head is likely to be wavy or gently curled when a straight-haired person and a curly-haired person have a child. The phenotypic result is a blend between the phenotypes of the homozygous parents.



Which pattern of inheritance does a wavy hair baby show?

- A. Codominance
 - B. Incomplete dominance
 - C. Intermediate inheritance
 - D. Traits passed between the sex chromosomes.
34. Red blood cells are classified as type A or type B, based on their surface antigens. Type O blood does not contain any antigens. The chart below shows the possible phenotypes of each blood type.

Blood Types

Blood Type	Phenotype Alleles
A	$I^A I^A; I^A i$
B	$I^B I^B; I^B i$
AB	$I^A I^B$
O	ii

Which mechanism explains how both A and B antigens produce type AB blood?

- A. complete dominance
- B. polygenic inheritance
- C. codominance
- D. incomplete dominance

35. Genetic screening is a procedure where a person's DNA is analyzed to identify a genetic predisposition to lethal diseases. One advantage of genetic screening is that it allows doctors to prevent and treat diseases before patients have symptoms. Which of the following is a **disadvantage** of genetic screening?
- A. Genetic screening results could be used to determine inheritance patterns in families.
 - B. The likelihood of a child contracting an inheritable disease could be predicted by genetic screening.
 - C. A doctor could combine a patient's current symptoms with genetic screening results to diagnose and treat the patient.
 - D. Insurance companies could drop a patient's medical coverage based on potential medical issues projected by genetic screening

36. The characteristic for curly hair (C) is dominant to the characteristic for straight hair (c). A cross between two individuals for hair type is shown in the Punnett square below.

	?	?
?	CC	Cc
?	CC	Cc

What must the genotype of the parents be to produce the results shown in the Punnett square?

- A. homozygous dominant × homozygous dominant
 - B. homozygous dominant × heterozygous
 - C. homozygous recessive × homozygous dominant
 - D. heterozygous × heterozygous
37. Which of these is an example of a heterozygous genotype?
- A. Rr
 - B. RR
 - C. wrinkled
 - D. round

38. One parent has blond hair and blue eyes. The other parent has brown hair and brown eyes. The couple has two children with brown hair and blue eyes. According to Mendel's law of independent assortment, which statement identifies how it is possible that the children's features do not match the features of either parent?
- A. The genes for one trait from one parent always stay together.
 - B. The parents each give alleles for half of their traits to each child.
 - C. Brown hair and blue eyes are dominant to blond hair and brown eyes.
 - D. The alleles for different traits are distributed separately to the children.



You have reached the end of this section.