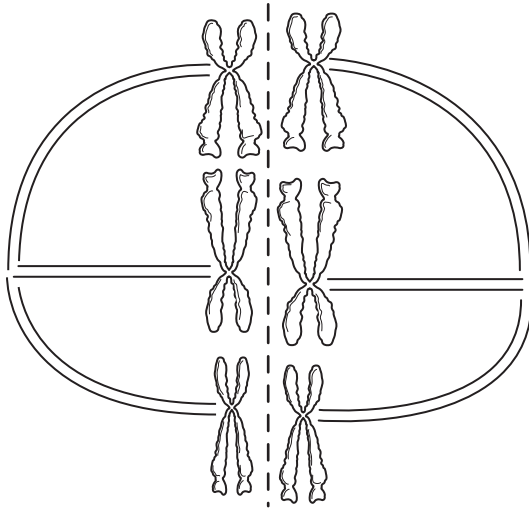


Benchmark Test 3

Choose the letter of the best answer.

1



The figure shows homologous chromosomes lined up at the equator of a cell. What is the name of the process that this cell is undergoing?

- A cytokinesis
 - B meiosis
 - C mitosis
 - D DNA replication
- 2 The formation of sperm cells and egg cells is necessary for which of the following processes?
- A sexual reproduction
 - B asexual reproduction
 - C genetic linkage
 - D growth

3 Human sperm and eggs are gametes. How many copies of each chromosome does each sperm and egg have?

- A three
- B two
- C one
- D zero

4 A student wishes to examine animal cells undergoing meiosis. Which sample should be collected in order to observe this process?

- A any body tissue
- B muscle cells in tissues lining body cavities
- C germ cells in reproductive organs
- D the uterus

5 Gametes are haploid cells. Which of the following processes would two gametes have to undergo in order to produce diploid cells?

- A mitosis
- B meiosis
- C fertilization
- D crossing over

6 A man can produce millions of sperm cells a day. Each of these is likely to carry a slightly different combination of alleles. What can explain this?

- A** halving the chromosome number during cell division
- B** segregation and independent assortment during meiosis
- C** cell changes during sperm formation
- D** gene rearrangement following sperm formation

7 Gametes are produced by meiotic division of a diploid cell. From whom were the chromosomes in these gametes originally inherited?

- A** only from the individual's mother
- B** only from the individual's father
- C** from both of the individual's parents
- D** from one of the individual's grandparents

8 What determines the arrangement of a pair of homologous chromosomes at the cell equator in meiosis I?

- A** chance
- B** the arrangement of other chromosomes
- C** crossing over
- D** the nuclear membrane

9 A family has two daughters and a son. Which of the following best describes the alleles carried in one daughter's DNA?

- A** a combination of those found in her parents
- B** the same as those found in her sister
- C** the same as those found in her brother
- D** a combination of those found in her maternal grandparents

10

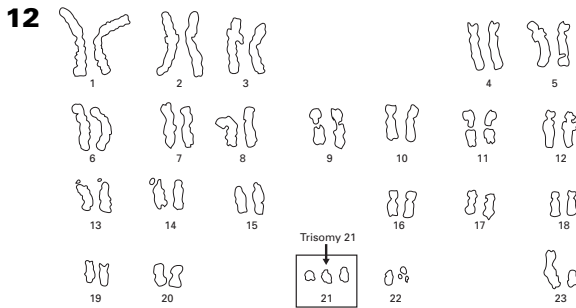
Species	Number of Chromosomes in a Sperm Cell
Human	23
Giraffe	15
Dog	39
Mouse	10
Chicken	39

The table shows the number of chromosomes found in the sperm of various animal species. Which species has zygotes that have more than 70 chromosomes?

- A** dog and giraffe
- B** human and dog
- C** dog and chicken
- D** mouse and chicken

11 Which of the following partially explains why sexual reproduction allows for new combinations of alleles?

- A** Union of gametes is random.
- B** All gametes are identical.
- C** Several offspring are produced.
- D** Mitosis independently assort chromosomes.



The figure shows an illustration of a human karyotype. The karyotype of the person shown has an extra copy of chromosome 21. Compared with people without an extra chromosome, this person has more

- A** gametes.
- B** cells.
- C** lipids.
- D** DNA.

13 Approximately how much of a boy's DNA sequence is inherited from his father?

- A** one-third
- B** one-half
- C** one-fourth
- D** two-thirds

14 Mendel used the term "units of heredity" to refer to what we now call genes. Which of the following *best* describes a gene on the molecular level?

- A** a segment of RNA
- B** a segment of DNA
- C** a segment of amino acid
- D** a segment of chromosome

15 A woman pregnant with her second child is hoping that it will be a boy. Which of the following influences the sex of her child?

- A** circulating hormone levels during her pregnancy
- B** chromosomes in her egg cells
- C** the sex of her first child
- D** chromosomes in the sperm that fertilized her egg

16 In some high-risk pregnancies, testing for genetic disorders can be done before birth by taking samples of cells from the fetus and examining the fetal chromosomes. How could the sex of the fetus be determined at the same time?

- A** by counting the number of sex chromosomes
- B** by counting the number of autosomes
- C** by looking for chromosomal breakage
- D** by determining the identities of the sex chromosomes

17

Sex Chromosomes	Individual Designation
X	Turner syndrome, female
XXX	Triplo-X, female
XXXY	Klinefelter syndrome, male
XXY	Klinefelter syndrome, male
XXYY	Klinefelter syndrome, male

The chart lists the sex chromosomes present in various chromosomal disorders, along with the sex of the individuals who have the disorder. What causes people who have Turner syndrome to be female?

- A** the ratio of their X chromosome to autosomes
- B** the presence of an X chromosome
- C** the absence of a Y chromosome
- D** the presence of only one sex chromosome

18 A brown-eyed man with genotype *Bb* for a gene controlling eye color has children with a brown-eyed woman of genotype *Bb*. What are all the possible genotypes of their children?

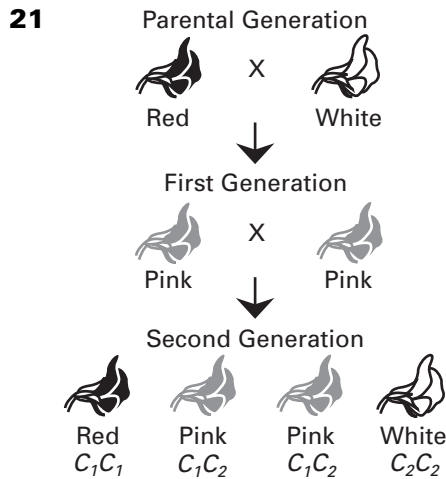
- A** *bb* and *Bb*
- B** *BB* and *bb*
- C** *BB* and *Bb*
- D** *Bb*, *bb*, and *BB*.

19 Brachydactyly is an autosomal dominant disorder in which a person's fingers are shortened. If a man with brachydactyly and genotype *Dd* has a child with a non-brachydactyly woman (genotype *dd*), what is the chance that a child will have the same genotype as the father?

- A** 25%
- B** 50%
- C** 07%
- D** 100%

20 A red tomato plant with the genotype *RR* is crossed with a yellow tomato plant with genotype *rr*. What percentage of the offspring will have genotype *rr*?

- A** 25%
- B** 50%
- C** 0%
- D** 100%



The figure shows flower coloration in several generations of plants, along with their associated genotypes. What is the *most* likely relationship between alleles C_1 and C_2 ?

- A C_1 is dominant; C_2 is recessive.
 B C_1 is recessive; C_2 is dominant.
 C C_1 and C_2 are incompletely dominant.
 D C_1 and C_2 are recessive.
- 22 In summer squash, the allele for white fruit (W) is dominant to the allele for yellow fruit (w). A particular plant has yellow fruit. What has to be true about the parent plants?
- A Neither carried the W allele.
 B Both carried the w allele.
 C One carried the W allele.
 D One carried the w allele.

23 Woolly hair is an autosomal dominant trait identified in Norwegian families. A person with woolly hair has brittle hair that breaks easily. If two individuals who are heterozygous for the woolly hair allele have a child, what is the chance that the child will have woolly hair?

- A 25%
 B 50%
 C 75%
 D 100%

24 Mendel observed that the seed color of pea plants was not dependent upon the height of the plant. This was *most* likely because height and seed color are controlled by

- A genes on separate chromosomes.
 B one gene.
 C genes on the same allele.
 D incompletely dominant genes.

25 In multicellular organisms, gametes are usually haploid and most non-reproductive cells are diploid. This supports Mendel's hypothesis that an organism receives

- A two alleles of a gene from each parent.
 B one allele of a gene from each parent.
 C two alleles of a gene from one parent.
 D two alleles of a gene from one sibling.