ALBERTA BIOLOGY 30 · UNIT C · 25 QUESTIONS

Cell Division, Genetics & Molecular Biology — Practice Test

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

1 **The diploid chromosome number in dogs is 78. A skin cell of a dog divides by mitosis. The number of chromosomes in each daughter cell is**

- A 39
- B 78
- C 156
- D 23

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2

In organisms that reproduce sexually, the primary purpose of meiosis is

A to produce genetically identical body cells

B to repair damaged chromosomes

C to produce gametes with half the chromosome number

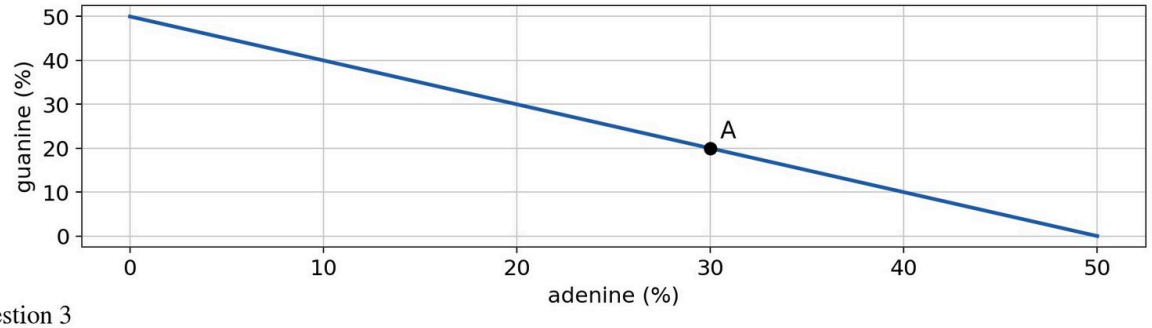
D to double the chromosome number before fertilization

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3

The graph shows the percentage of guanine in DNA for different percentages of adenine. Point A marks the position for a DNA molecule with 30% adenine. The percentage of the bases that are guanine is



Question 3

The graph shows the percentage of guanine in DNA for different percentages of adenine. Point A marks the position for a DNA molecule with 30% adenine. The percentage of the bases that are guanine is

A) 20%

B) 30%

C) 25%

D) 70%

A 20%

B 30%

C 25%

D 70%

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4 **In pea plants, the allele for tall stems (T) is dominant to the allele for short stems (t). A heterozygous tall plant is crossed with a short plant. The probability that an offspring will be short is**

- A 0.00
- B 0.25
- C 0.75
- D 0.50

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5 **A segment of the template strand of a gene has the base sequence TAC TTT. The base sequence of the mRNA transcribed from this segment is**

- A ATG AAA
- B AUG AAA
- C UAC UUU
- D AUG UUU

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6 **The phase of mitosis during which sister chromatids separate and move toward opposite poles of the cell is**

A prophase

B metaphase

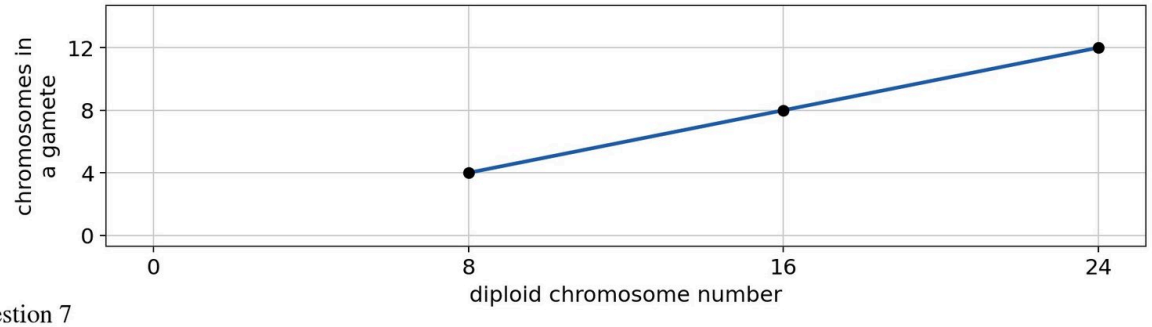
C anaphase

D telophase

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7

The graph shows chromosomes in a gamete for species with different diploid numbers. A grasshopper has a diploid chromosome number of 24. The number of chromosomes in a grasshopper gamete is _____. Record your answer as a number.



Question 7

The graph shows chromosomes in a gamete for species with different diploid numbers. A grasshopper has a diploid chromosome number of 24. The number of chromosomes in a grasshopper gamete is ____. Record your answer as a number.

ANSWER

Understand It with Pulse

Flag a mistake

8 **In guinea pigs, black coat colour (B) is dominant to brown coat colour (b). A black guinea pig is crossed with a brown guinea pig, and half of the offspring are brown. The genotype of the black parent is**

A Bb

B BB

C bb

D cannot be determined

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9 **In snapdragons, flower colour shows incomplete dominance. A red flower (CR CR) crossed with a white flower (CW CW) produces pink offspring. When two pink snapdragons are crossed, the probability that an offspring will be white is**

A 0.00

B 0.50

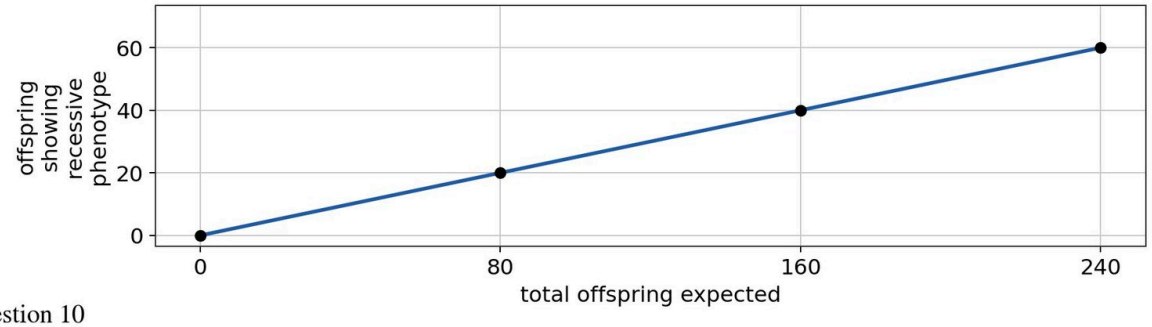
C 0.75

D 0.25

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10

The graph shows the expected number showing the recessive phenotype for two heterozygous parents (Aa × Aa). If 240 offspring are expected, the expected number showing the recessive phenotype is ____. Record your answer as a number.



Question 10

The graph shows the expected number showing the recessive phenotype for two heterozygous parents (*Aa* × *Aa*). If 240 offspring are expected, the expected number showing the recessive phenotype is ____. Record your answer as a number.

ANSWER

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11 **Red-green colour-blindness is an X-linked recessive disorder. A woman who is a carrier ($X^N X^n$) and a man with normal vision ($X^N Y$) have children. The probability that a son of this couple will be colour-blind is**

- **A** 0.50
- **B** 0.25
- **C** 0.00
- **D** 1.00

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12 **Two genes assort independently. In a cross between two double heterozygotes (AaBb × AaBb), the probability that an offspring will show the dominant phenotype for both traits is**

- **A** $\frac{1}{16}$
- **B** $\frac{9}{16}$
- **C** $\frac{3}{16}$
- **D** $\frac{6}{16}$

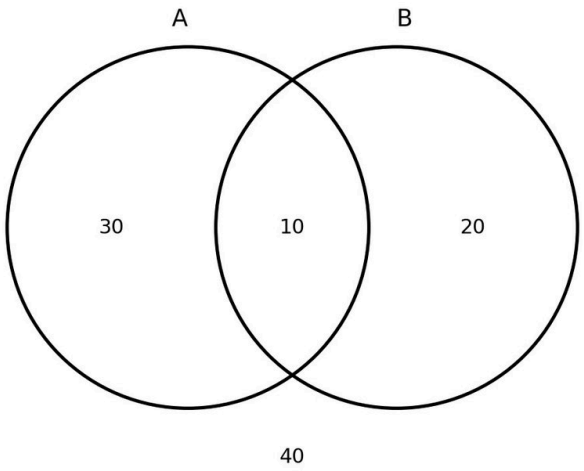
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13 **In the dihybrid cross AaBb × AaBb, 160 offspring are expected. The expected number of offspring that will show the recessive phenotype for both traits is**

ANSWER

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14 **The Venn diagram shows, for 100 people, who has the A antigen (set A) and who has the B antigen (set B). How many people in the sample have the A antigen?**



Question 14

The Venn diagram shows, for 100 people, who has the A antigen (set A) and who has the B antigen (set B).

How many people in the sample have the A antigen?

A) 30

B) 40

C) 10

D) 20

A 30

B 40

C 10

D 20

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15 **A woman with genotype IA i and a man with genotype IA IB have children. The blood type that their children could NOT have is**

- A type A
- B type B
- C type AB
- D type O

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16 **Hemophilia is an X-linked recessive disorder. A woman whose father had hemophilia marries a man with normal blood clotting. The probability that their first child will have hemophilia, as a decimal, is**

ANSWER _____

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17 **In mice, coat colour is controlled by two genes. Mice with genotype B_ produce black pigment, and mice with genotype bb produce brown pigment. A second gene determines whether pigment is deposited in the fur: E_ allows deposition, while ee blocks deposition and produces a cream coat. In a cross BbEe × BbEe, the probability that an offspring will be brown is**

A $\frac{3}{16}$

B $\frac{1}{16}$

C $\frac{9}{16}$

D $\frac{4}{16}$

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18 **A section of mRNA has the base sequence AUG UUU GGC UAA. Use the following codon information: AUG = methionine (start), UUU = phenylalanine, GGC = glycine, and UAA = stop. The amino acid sequence produced from this section of mRNA is**

- **A** phenylalanine-glycine-methionine
- **B** methionine-phenylalanine-glycine
- **C** methionine-glycine-phenylalanine
- **D** phenylalanine-methionine-glycine

Understand It with Pulse | Flag a mistake

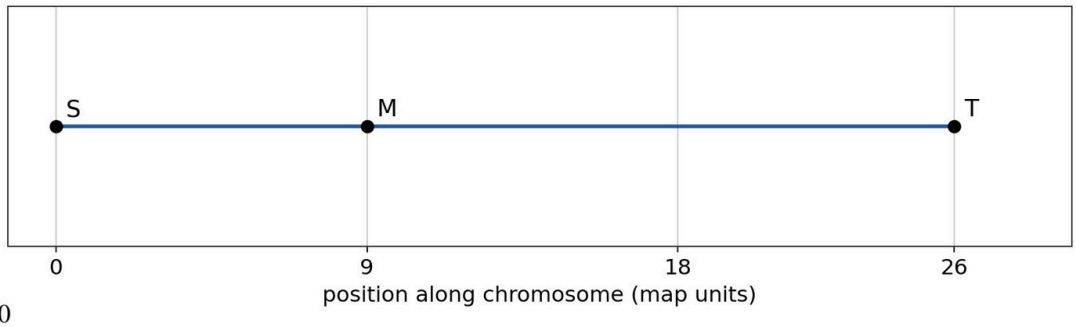
19 **A mutation in a gene changes a codon in the mRNA from UGU, which codes for the amino acid cysteine, to UGA, which is a stop codon. This mutation is classified as a**

- **A** silent mutation, because the amino acid sequence is unchanged
- **B** missense mutation, because one amino acid is replaced by another
- **C** nonsense mutation, because translation stops early and the protein is shortened
- **D** frameshift mutation, because the reading frame of the gene is shifted

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20

The diagram shows the positions of genes S, M and T along a chromosome. The distance, in map units, between gene M and gene T is _____. Record your answer as a number.



Question 20

The diagram shows the positions of genes S, M and T along a chromosome. The distance, in map units, between gene M and gene T is ____. Record your answer as a number.

ANSWER

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Flag a mistake

21 **To produce bacteria that make human insulin, scientists cut both a bacterial plasmid and the human insulin gene with the same restriction enzyme. The same enzyme is used so that**

A both DNA molecules have complementary sticky ends that can join together

B the insulin gene is cut into the smallest possible fragments

C introns are removed from the human insulin gene

D the plasmid is prevented from closing back on itself

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22 **Nondisjunction of one pair of sister chromatids occurs during meiosis II of spermatogenesis. The proportion of the sperm produced that will contain an extra chromosome is**

A 1.00

B 0.75

C 0.50

D 0.25

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23 **A man with type AB blood and a woman with type O blood have children. The probability that a child of this couple will have type A blood, as a decimal, is**

ANSWER _____

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24 **Two unaffected parents have a child who has an autosomal recessive metabolic disorder. The probability that their unaffected son is a carrier of the disorder allele is**

A $\frac{1}{3}$

B $\frac{2}{3}$

C $\frac{1}{2}$

D $\frac{1}{4}$

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25 **A karyotype of a newborn baby shows 47 chromosomes, including an XXY set of sex chromosomes. This karyotype indicates that the baby is**

A a female with Turner syndrome

B a male with an extra Y chromosome

C a male with Klinefelter syndrome

D a female with Down syndrome

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ANSWER KEY

1. B
2. C
3. A
4. D
5. B
6. C
7. 12
8. A
9. D
10. 60
11. A
12. B
13. 10
14. B
15. D
16. 0.25
17. A
18. B
19. C
20. 17
21. A
22. D
23. 0.50
24. B
25. C

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