1. Choose an answer and EXPLAIN why

Height is a polygenic trait in humans. Which of the following statements best explains the genetics of this trait?
- A. Height is controlled by more than one gene.
- B. Height is controlled by a single dominant gene.
- C. The gene for height is located on the X chromosome.
- D. The gene for height is located on the Y chromosome.

6 pts

2. Choose an answer and EXPLAIN why

In guinea pigs, the allele for black hair (B) is dominant to the allele for brown hair (b). Two black-haired guinea pigs are crossed. One of the guinea pigs is homozygous for black hair and one is heterozygous. What percentage of the offspring are expected to have black hair?
- A. 25%
- B. 50%
- C. 75%
- D. 100%

100%

6 pts

3. Choose an answer and EXPLAIN why

The table below shows the genotypes that result in four different blood types in humans.

<table>
<thead>
<tr>
<th>Genotype</th>
<th>Blood Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA/IA</td>
<td>A</td>
</tr>
<tr>
<td>IA/IB</td>
<td>B</td>
</tr>
<tr>
<td>IB/IB</td>
<td>B</td>
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<td>IB/IA</td>
<td>A</td>
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<td>IA/IB</td>
<td>B</td>
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<tr>
<td>IB/IB</td>
<td>B</td>
</tr>
<tr>
<td>IB/IA</td>
<td>A</td>
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</table>

Based on the information in the table, which of the following describes alleles IA and IB?
- A. The IA and IB alleles show sex linkage.
- B. The IA allele is recessive to the IB allele.
- C. The IA allele is dominant to the IB allele.
- D. The IA and IB alleles show codominance.

6 pts

4. Choose an answer and EXPLAIN why

In mussels, the allele for brown coloring (B) is dominant and the allele for blue coloring (b) is recessive. For which parental genotypes are 100% of the offspring expected to be blue?
- A. Bb × Bb
- B. BB × bb
- C. bb × bb
- D. BB × BB

100%

6 pts

5. Choose an answer and EXPLAIN why

In tomato plants, the allele for red fruit color (R) is dominant to the allele for yellow fruit color (Y). Two tomato plants, heterozygous for fruit color and fruit shape, are crossed. The Punnett square for this dihybrid cross is shown below.

6 pts

6. Choose an answer and EXPLAIN why

- Female cattle that have white coats are crossed with male cattle that have red coats. Both male and female offspring have roan coats, which are coats with both red hairs and white hairs. Which of the following best describes the genetics of coat color in the cattle?
- A. The red and white alleles are sex-linked.
- B. The red and white alleles are codominant.
- C. The red allele is recessive to the white allele.
- D. The red allele is dominant to the white allele.
Choose an answer and EXPLAIN why

7. Which type of cell must contain a mutation in order for the mutation to be passed from a woman to her offspring?
   - A. blood cell
   - B. brain cell
   - C. egg cell
   - D. skin cell

8. Choose an answer and EXPLAIN why
   - In tomato plants, the tall vine allele (T) is dominant to the short vine allele (t). Two tomato plants are crossed. Among the offspring plants grown from seed, 45% have tall vines and 55% have short vines. What are the most likely genotypes of the parent plants?
     - A. TT and tt
     - B. Tt and TT
     - C. Tt and tt
     - D. tt and tt

9. Choose an answer and EXPLAIN why
   - In fish of the species Perissodus microlepis, some individuals have mouths that open to the right and some individuals have mouths that open to the left. The direction of the mouth opening is a genetic trait controlled by a single gene. The allele for a right-opening mouth (R) is dominant to the allele for a left-opening mouth (r). If two fish heterozygous for the mouth trait are crossed, what is the expected ratio of phenotypes in the offspring?
     - A. 1:1 right-opening mouth : 1 left-opening mouth
     - B. 2:2 right-opening mouth : 2 left-opening mouth
     - C. 3:1 right-opening mouth : 1 left-opening mouth
     - D. 4:0 right-opening mouth : 0 left-opening mouth

10. Choose an answer and EXPLAIN why
    - Garden pea plants can have yellow seeds or green seeds. In a pea plant that is heterozygous for seed color, the allele for yellow seeds masks the effects of the allele for green seeds. Which of the following terms best describes the allele for yellow seeds?
      - A. codominant
      - B. dominant
      - C. recessive
      - D. sex-linked

11. Choose an answer and EXPLAIN why
    - Which of the following crosses does not follow Mendel's law of segregation?
      - A. Two tall pea plants (Tt x Tt) are expected to produce some tall offspring plants.
      - B. Two tall pea plants (Tt x Tt) are expected to produce some short offspring plants.
      - C. A tall pea plant and a short pea plant (Tt x tt) are expected to produce all tall offspring plants.
      - D. A tall pea plant and a short pea plant (TT x tt) are expected to produce all tall offspring plants.

12. Choose an answer and EXPLAIN why
    - A pedigree is a diagram that traces the inheritance of a trait through a family. Which of the following patterns is typical in a pedigree for an autosomal dominant trait?
      - A. The trait affects only males.
      - B. The trait appears in every generation.
      - C. The trait appears in only one-fourth of the individuals.
      - D. The trait affects all the individuals of the second generation.
13. Choose an answer and EXPLAIN why
   • An inherited metabolic disorder called phenylketonuria (PKU) can result in serious problems in infancy. The chance that two parents who are heterozygous will have a child with PKU is 25%. Which of the following terms best applies to the inheritance pattern for PKU?
     A. codominant  B. dominant  C. recessive  D. sex-linked

14. Choose an answer and EXPLAIN why
   • In fruit flies, the gene for eye color is located on the X chromosome, and the red eye allele (R) is dominant to the white eye allele (r). A female fly with genotype XRXr is mated with a male fly with genotype XrY. Which of the following statements best describes the expected outcome of the cross?
     A. The chance of offspring having red eyes is .
     B. The chance of offspring having white eyes is .
     C. The chance that a male offspring will have white eyes is .
     D. The chance that a female offspring will have red eyes is .

15. Gregor Mendel developed an understanding of heredity through his experiments with pea plants. The diagram below shows a cell with two pairs of homologous chromosomes and a genotype of AaBb.

   • A. Identify all the possible allele combinations that could be formed if this cell undergoes meiosis.
   • B. Identify one of Mendel's laws that is illustrated when you write out these allele combinations. Explain this law.

16. Choose an answer and EXPLAIN why
   Hawaiian hammerhead spiders from the island of Maui can have different markings. The diagram below shows a cell with two pairs of homologous chromosomes and a genotype of AaBb. A single gene determines the markings on the spiders. A plain spider is crossed with a patterned spider. The patterned spider is homozygous. The pattern allele is dominant to the plain allele.

   What percentage of the offspring from this cross are expected to be patterned instead of plain?
     A. 25%  B. 50%  C. 75%  D. 100%
1. red & round - 9/16
   yellow & round - 3/16
   red & pear - 3/16
   yellow & pear - 1/16

2. 12:45

3. 12:4

4. They sort independently because round is a red gene dominant so they have the same ratio. This includes yellow and pear they have the same ratio & they're both recessive.

5. B. They are codominant because the female cattle has white coat & male has red so in order to mix to round coats the trait is codominant.

6. This is because of the Punnett Square there are about 50% of both traits.

7. The inheritance pattern for PKU is 25% so that's pretty low so it is recessive. It's not guaranteed that you'll get in.

8. A.  

<table>
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<tr>
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<th>Xr</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Xr</td>
<td>Xrxr</td>
<td>Xrxr</td>
</tr>
<tr>
<td>Y</td>
<td>Xry</td>
<td>Xry</td>
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</tbody>
</table>

50% will have a red eye.
B. 50% will have white eyes.
C. 50% will have white eyes (male)
D. 50% will have red eyes (female)

<table>
<thead>
<tr>
<th>AB</th>
<th>Ab</th>
<th>ab</th>
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<tbody>
<tr>
<td>AABB</td>
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15. B. Mendal’s law is that all allele pairs separate or segregate during gamete formation and randomly white at fertilization.

Because of this!