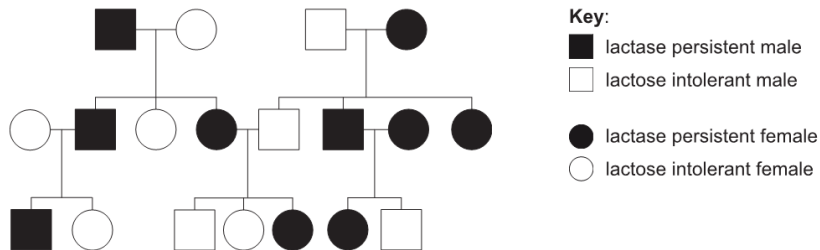


## Exercises 3.4. Inheritance [6 marks]

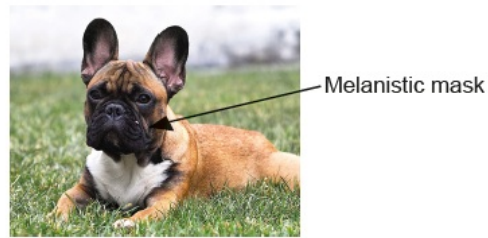
1. An allele for lactase persistence allows humans to digest milk as adults. People who lack this allele are lactose intolerant in adulthood. [1 mark]



What is the pattern of inheritance?

- A. Lactase persistence is sex-linked recessive.
  - B. Lactase persistence is autosomal recessive.
  - C. Lactase persistence is sex-linked dominant.
  - D. Lactase persistence is autosomal dominant.
2. A child has blood group A. The father of the child has blood group B. What are the possible genotypes of the mother? [1 mark]
- I.  $I^A I^A$
  - II.  $I^A I^B$
  - III.  $I^A i$
- A. I only
  - B. I and II only
  - C. II and III only
  - D. I, II and III

3. Some breeds of dogs are characterized by the presence of a melanistic mask, which is [1 mark]  
a darkening of the fur near the nose, as shown by the arrow in this photograph.

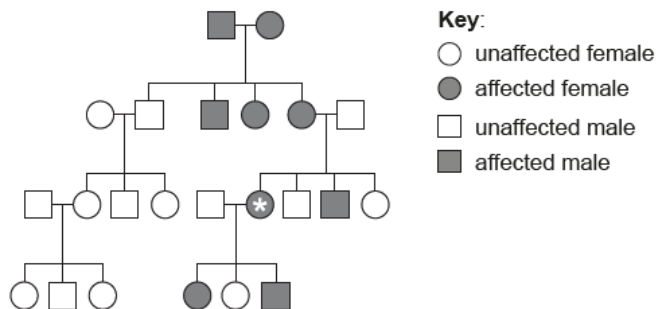


[Source: [https://commons.wikimedia.org/wiki/File:French\\_bulldog\\_on\\_the\\_grass.jpg](https://commons.wikimedia.org/wiki/File:French_bulldog_on_the_grass.jpg)]

Which outcome is matched with a valid conclusion if dogs that were pure breeding for melanistic masks were crossed with dogs without melanistic masks?

- A. If 0 % of the puppies have a mask, the character is recessive.
- B. If 25 % of the puppies have a mask, the character is dominant.
- C. If 75 % of the puppies have a mask, the character is dominant.
- D. If 100 % of the puppies have a mask, the character is recessive.

This is a pedigree chart of a family with hypophosphatemia, an X-linked condition, in which bone deformities occur because of poor absorption of phosphates into the blood.



- 4a. Using the pedigree chart, deduce the type of allele that causes hypophosphatemia. [2 marks]

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- 4b. Identify the genotype of the individual marked with a star in the pedigree chart, using appropriate symbols for your answer. [1 mark]

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