

36. A population of cats has individuals varying in fur colour; there are white cats (**bb**), black cats (**BB**), and grey cats (**Bb**). White cats typically have a smaller litter of kittens compared to the other coloured cats. If black cats have, on average, 8 kittens, while grey cats have 2 kittens on average, what is the relative fitness of white cats?

- A. 1.0
- B. 0.6
- C. 0.30
- D. 0.25
- E. 0.125**

37. Which statement best defines evolution?

- A. A predictable change from simple to complex organisms
- B. Difference between individuals in survival and reproduction
- C. The generation of new traits in a population
- D. Organisms developing the characteristics they need to be successful in their environment
- E. A process of change over generations**

38. Which of the following statements is/are example(s) of trade-offs?

- 1. A turtle laying its eggs in a swamp where eggs will not be at risk of drying out instead of on a beach where eggs are available to predators.
 - 2. During the summer when food availability is high, a hungry squirrel at risk of starvation caches (hides) nuts in order to survive the winter despite the probability of the nuts rotting or being lost.
 - 3. A larger leaf increases the rate at which photosynthesis can occur (increasing the energy available to the plant), while also increasing the rate of water loss.
- A. 2 only
 - B. 1 and 3 only
 - C. 2 and 3 only**
 - D. 1 only
 - E. All of 1, 2 and 3 are examples.

39. In a mouse population at Hardy-Weinberg equilibrium, hair colour is controlled by a gene with two alleles, **D** and **d**, which are expressed by simple dominance. The **D** allele occurs with a frequency of 20%. What is the predicted frequency of the dominant phenotype in this population?

- A. 0.64
- B. 0.36**
- C. 0.04
- D. 0.32
- E. 0.20**

BONUS

40. In a city of 150,000 people, there are 50 deaths annually due to a rare lethal recessive allele. What is the probability of meeting a **male** who carries this allele?

- A. 0; the disease is lethal.
- B. 0.003
- C. 0.018**
- D. 0.036
- E. 0.500

~~41.~~ The following table summarizes the number of individuals of each genotype for four populations, labeled 1, 2, 3, and 4. Which of the four populations are at Hardy-Weinberg Equilibrium?

Population	AA	Aa	aa
1	20	40	20
2	10	50	30
3	6	48	96
4	5	40	5

- ~~A. 1 only~~
- ~~B. 2 and 4 only~~
- ~~C. 1 and 4 only~~
- ~~D. 1, 2, and 3 only~~
- ~~E. 2 and 3 only~~

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