

1. ~~(A)~~ (B) (C) ~~(D)~~ 11%
2. (A) ~~(B)~~ (C) ~~(D)~~ 24%
3. (A) (B) (C) (D)
4. (A) (B) (C) (D)
5. (A) (B) (C) (D)
6. (A) (B) (C) (D)
7. (A) (B) (C) (D)
8. (A) (B) (C) (D)
9. (A) (B) (C) (D)
10. (A) (B) (C) (D)
11. (A) (B) (C) (D)
12. (A) (B) (C) (D)
13. (A) (B) (C) (D)
14. (A) (B) (C) (D)
15. (A) (B) (C) (D)
16. (A) (B) (C) (D)
17. (A) (B) (C) (D)
18. (A) (B) (C) (D)
19. (A) (B) (C) (D)
20. (A) (B) (C) (D)
21. (A) (B) (C) (D)

NR 1.	<u>1</u>	<u>0</u>	<u>.</u>	<u>3</u>
NR 2.	<u>2</u>	<u>1</u>	<u>3</u>	<u></u>
NR 3.	<u>0</u>	<u>.</u>	<u>3</u>	<u>2</u>
NR 4.	<u>0</u>	<u>.</u>	<u>4</u>	<u>6</u>
NR 5.	<u>6</u>	<u>.</u>	<u>2</u>	<u>5</u>
NR 6.	<u>0</u>	<u>.</u>	<u>0</u>	<u>8</u>

Short Answer

A lethal recessive condition is responsible for the death of 1 out of every 20,000 babies born in South America.

1. What is the frequency of homozygous recessive individuals in the population? (1)

$$q^2 = 0.00005 \text{ or } 5.0 \times 10^{-5}$$

2. What is the frequency of the recessive allele in the population? (1)

$$q = 0.007$$

3. How many people, out of 1,000 individuals in this population, would carry the recessive allele?

$$0.014 \times 1000 = 14$$

14 people

$$2pq = 2(0.993)(0.007) (1)$$

$$2pq = 0.014$$

Use the following information to answer the next question.

As part of the Eastern Slopes Grizzly Bear Project, a research group was formed in 1994 to assess the impact of human action on grizzly bears (*Ursus arctos horribilis*) in the Bow River Watershed. This study area includes land in Central Alberta Rocky Mountain regions such as Banff National Park and Kananaskis Country. The project focuses on mapping grizzly bear habitat across park boundaries and examining the effects of development and land use on bear behaviour and survival.

There are about 800 grizzly bears in Alberta of which about 60 roam within the 6 641 km² of Banff National Park. There are no estimates for the entire Bow River Watershed study area. Grizzly bears live to between 10 and 20 years and begin to reproduce at an average age of six years. Their litter size is about two cubs, once every three years. Cubs grow to between 150 and 400 kg.

Findings of the Eastern Slopes Grizzly Bear Project have shown that although mountain parks have historically been considered major refuge areas for grizzly bears, only a small area of the critical habitat needed for raising cubs remains. Future development of Rocky Mountain townsites such as Banff, Lake Louise, and Canmore may further reduce the range of these bears. The range necessary for the survival of an individual adult male bear needs to be approximately 2 000 km²/bear, however females roam over a considerably smaller area.

—from Marty, 1997

4. Calculate the population density of grizzly bears in Banff National Park. (2)

$$D_p = \frac{N}{A} = \frac{60}{6641 \text{ km}^2} = 0.009 \text{ or } 9 \times 10^{-3} \text{ grizzlies/km}^2$$

5. On October 15, 1984, at the beginning of the squirrel hunting season for the year, biologists counted 75 grey squirrels in a 30 hectare wooded area. On December 15, 1984, 42 grey squirrels were counted in the same area.

- (a) What was the density of the squirrel population on October 15? (1)

$$D_p = \frac{N}{A} = \frac{75}{30} = 2.5/\text{hectare}$$

- (b) What was the growth rate of the population per month? (1)

$$D_p = \frac{N}{A} = \frac{42}{30} = 1.4/\text{hectare}$$

$$gr = \frac{\Delta N}{\Delta t}$$

$$gr = \frac{33}{2 \text{ mos}} \quad gr = 16.5$$