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PASSAGE III

A scientist wanted to observe the effects of altitude on the respiratory system of mammals. Four different species of mammals were placed in a chamber that underwent gradual changes in pressure (measured in atmospheres, or atm) to simulate the atmosphere at high altitudes. After 5 minutes at each atmospheric pressure tested, the average number of

breaths per minute (*respiratory rate*) was determined for each of the 4 mammals while they remained at rest. The data from the experiment are shown in the following graph. (Note: Larger animals typically have slower respiratory rates. Higher respiratory rates indicate rapid breathing, a sign of distress in some mammals.)

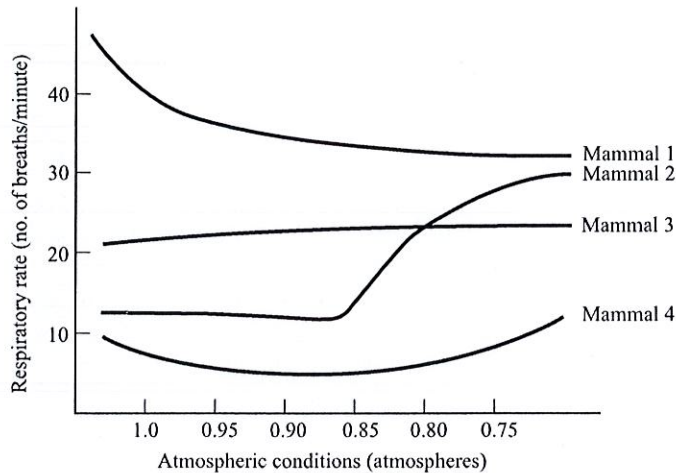


Figure 1

14. What is the relationship between respiratory rate and atmospheric pressure for Mammal 2?

F. Decreases in pressure decrease the respiratory rate.
 G. Decreases in pressure increase the respiratory rate.
 H. Pressure changes have no effect on the respiratory rate.
 J. Increases in pressure increase the respiratory rate.

15. At approximately which pressure, in atmospheres, did Mammals 2 and 3 have the same respiratory rate?

A. 1.0
 B. 0.95
 C. 0.80
 D. 0.75

16. Further measurements showed that Mammal 4 used significantly more oxygen per minute than Mammal 2. This would be consistent with the data from the graph if:

F. Mammal 4 was in a warmer environment than Mammal 2.
 G. Mammal 4 was significantly larger than Mammal 2.
 H. Mammal 2 was significantly larger than Mammal 4.
 J. Mammals 2 and 4 were the same weight.

17. A higher respiratory rate causes mammals to have a higher metabolic rate. Which of the mammals would have a higher metabolic rate at a pressure of 1.0 atm than at .80 atm?

A. 1 only
 B. 2 only
 C. 4 only
 D. 1 and 4 only

18. Based on the data in the graph, which of the mammals might be native to higher-altitude environments (meaning that they are more comfortable at higher altitudes than at lower altitudes)?

F. 1 only
 G. 2 only
 H. 3 only
 J. 4 only

GO ON TO THE NEXT PAGE.