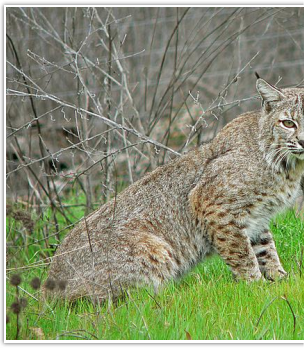
Fractals and Scaling (2020)

7.9 Test » Test for Unit 7

Instructions 1

You may use any course materials, websites, calculators, etc. for this test. Just don't ask another person for the answers or share your answers with other people. If you have questions about the test, please send them to us via email.



The following facts about bobcats (*lynx rufus)* may be useful. Bobcats have an average mass of 9.4 kg and a resting metabolic rate of 23.5 Watts. Their heart rate is 110 beats per minute and their typical lifespan is 7 years.

African lions (*panthera leo*) have an average mass of 98 kg.

Question 2

If animals' metabolic rate was determined by their surface area, what would you predict for the metabolic rate of lions?

- A. 100 Watts
- B. 112 Watts
- C. 124 Watts
- D. 136 Watts

Question 3

Assuming that Kleiber's law is correct, what would you predict for the metabolic rate of lions?

- A. 100 Watts
- B. 112 Watts
- C. 124 Watts
- D. 136 Watts

Question 4

Based on the metabolic scaling theory, what would you predict for the heart rate of a lion?

- A. 61 bpm
- B. 94 bpm
- C. 110 bpm
- D. 198 bpm

Question 5

Based on the metabolic scaling theory, what would you predict for the lifetime of a lion?

- A. 3.9 years
- B. 7 years
- C. 12.6 years
- D. 73 years

Question 6

According to the metabolic scaling theory, how would the total number of heartbeats in a bobcat's life compare to the total number of h a lion's life?

- A. The bobcat would have more heartbeats.
- B. The lion would have more heartbeats.
- C. Their total number of heartbeats would be about the same.

Question 7

Which of the following is **not** an assumption of the WBE model of metabolic scaling?

- A. The vascular network is a fractal.
- B. Capillaries are the same size in all organisms.
- C. Metabolic rate is determined by surface area.
- D. Metabolic rate is proportional to rate of blood flow through capillaries.