

According to Kooyman et al (*Science* 217:726) avian energy utilization (E = kilocalories/day) is 2.8 times the standard metabolic rate (SMR = kilocalories/day), which in turn depends on body mass (M = kg).

$$E = 2.8 * SMR = 2.8 * b M^{0.723}$$

The parameter b has a numerical value of 78.3

1. Calculate the expected energy utilization of a 5 kg penguin. _____ [2]
Be sure to show your calculations by writing values underneath each symbol in the equation.

2. Write a data equation for 5 kilogram penguin with a measured energy utilization of 750 kilocalories/day.

_____ = _____ + _____ [6]

3. The parameter $b = 78.3$ has units of $E M^{-0.723}$
Write its units _____ [1]

4. The parameter b has what dimensions ? _____ [1]
(Use the symbol E for the dimension that includes kcal and kJ)

5. Convert a 10 cubic km volume of seawater to cubic miles of seawater
Be sure to show your calculations.
1 mile = 1.609344 km _____ [2]