B3.1 Gas exchange: data-based questions

What the Cell · DP Biology · data-based questions

Name _____ **Date** _____ **Total** _____ / 11

Read the data carefully before you answer. The number of marks shows how many separate points to make. Show your working in calculations.

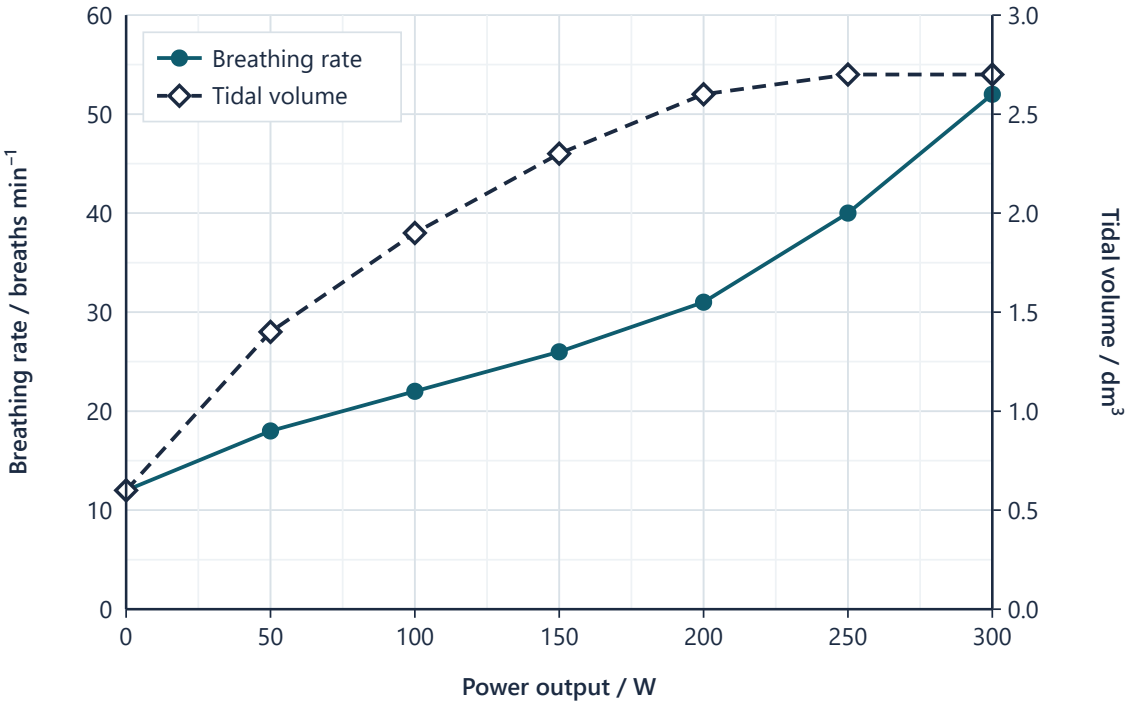
1 Breathing during exercise

11 marks



Photo: NASA, Public domain, Wikimedia Commons.

A fit adult pedalled an exercise bike (a cycle ergometer) for 3 minutes at each power output, starting at rest. Breathing rate and tidal volume were measured in the last minute of each stage.



a **Outline** how tidal volume changes with power output (i) from rest to 200 W and (ii) from 200 W to 300 W. **[2]**

b **Compare** the changes in breathing rate and tidal volume between 200 W and 300 W. **[2]**

c Ventilation rate = breathing rate × tidal volume. **Calculate** the ventilation rate at 200 W. Give the units. **[2]**

d The ventilation rate at rest is 7.2 dm^3 min^{-1}. **Calculate** the percentage increase in ventilation rate from rest to 300 W. **[2]**

e **Explain** why ventilation rate needs to increase during exercise. **[2]**

f **Suggest** one reason why tidal volume stops increasing above 250 W. **[1]**