Numbers in Biology

Reading numbers and measurements:

31% k^3 y^2 **-70°F**   **x**

     1,203.4   **10°C** $3a^4$ **:**

                                          0.002

3.14   **0.631**   **=**   **30.7°**

6.7x10⁻⁹km   **2376.69**   **0.735μm**   **42.9 kmh⁻¹**

How Many Carbon Atoms Are in a Cell? A cell with a volume of 1 μm3 and a density of about 1 g/ml has a total mass of 10−12 grams. From the formula C4H7O2N1 and the weights of the elements, we derive a carbon content of about 12 × 4/(12 × 4 + 7 + 2 × 16 + 14) = 48/101 or about one half of the dry mass. With 30% dry mass (70% water), we obtain ?10−13 gm of carbon. Next we transformed the number of molecules using Avogadro's constant: 6 × 1023 × 10−13/12 = 5 × 109 carbon atoms per cell. To verify this, we have done the calculation in a different way: assuming there are about 3 × 106 proteins, each one consisting of about 300 amino acids, we get a total of ?109 amino acids. An amino acid has about five carbon atoms, so we arrive at a similar value. Both estimates depend linearly on the cell volume, which can vary significantly based on growth conditions.
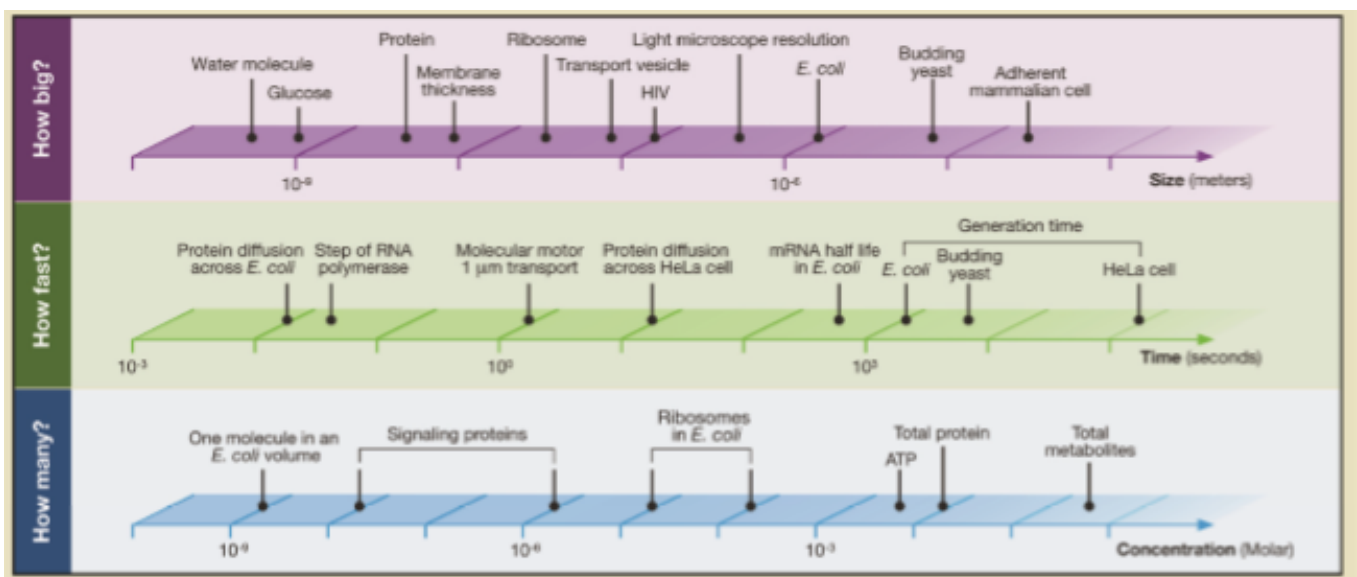
11 (34) Listen and answer questions **1–10**.

Complete the table. Write **NO MORE THAN THREE WORDS AND/OR A NUMBER** for each answer

Animal	Brought by	Reason
1 _____	settlers	for food
fox	settlers	**2** _____
cane toad	**3** _____	to kill beetles

Questions 4 and 5
Complete the flowchart below.
Write **NO MORE THAN TWO WORDS AND/OR A NUMBER** for each answer.

Beetles' effect on sugar cane

Beetle lays eggs

Eggs become grubs

Grubs eat the **4** _____ .

Sugar cane **5** _____ .

Questions 6–10
Choose the correct letter, **A**, **B** or **C**.

6 The cane toad originated in
  A Central America.
  B Hawaii.
  C Australia.

7 In Australia, the toads
  A grew extremely large.
  B multiplied in number.
  C ate the cane beetles.

8 The farmers' plan failed because
  A there were too many beetles.
  B their own research was faulty.
  C they believed the reports they read.

9 The sugar cane industry
  A thrives today.
  B has died out in some areas.
  C survives alongside the beetle.

10 The second lesson to be learned from this story is that
  A the environment is constantly at risk.
  B first-hand research is not always necessary.
  C caution is necessary when dealing with nature.

Questions 1–3
Complete the summary. Write **NO MORE THAN TWO WORDS AND/OR A NUMBER** for each answer.

ROVER ROBOT

The robot does the same work as a **1** _____ . Some people think it looks like a **2** _____ on wheels. It is quite small, weighing only 16.5 kg and it moves relatively slowly, with a maximum speed of **3** _____ km an hour.

Questions 4–7
Label the diagram of the rover robot.
Write **NO MORE THAN THREE WORDS** for each answer.

4 _____

6 _____

7 _____ wheels   **5** _____

Questions 8–10
Answer the questions below.
Write **NO MORE THAN THREE WORDS AND/OR A NUMBER** for each answer.

8 How long does it take the radio signal to travel from Earth to Mars? _____

9 What stops the scientists from steering the rover in real time? _____

10 What do scientists believe Mars has, which is similar to Earth? _____