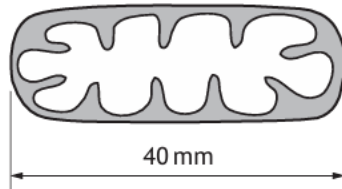


Magnification & unit conversion Past Papers

1. The diagram below represents a mitochondrion which has been magnified 10 000 times.

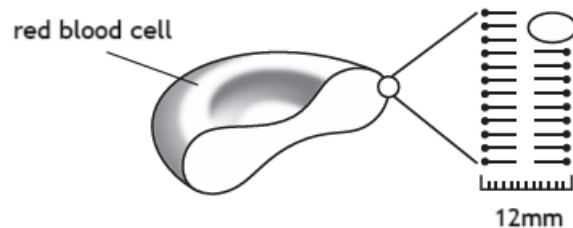


What is the actual length of this mitochondrion?

(1 mm = 1000 micrometres)

- A 0.04 micrometres
- B 0.4 micrometres
- C 4 micrometres
- D 40 micrometres

2. The diagram below represents part of the plasma membrane of a red blood cell.



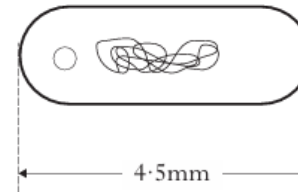
The membrane is shown magnified 2 million times.

What is the width of the membrane in micro metres.

1mm = 1000 micro metres

- A 12000
- B 0.006
- C 0.6
- D 12

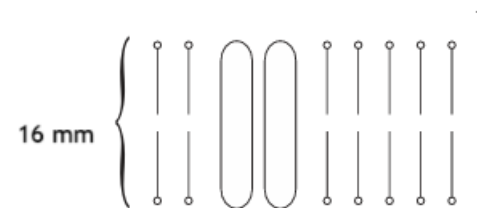
3. The diagram below shows an image of a bacterial cell that has been magnified 1500 times.



What is the actual length of the cell in micrometres (μm)?

- A 0.003
- B 3.000
- C 6750
- D 6.750

4. The diagram below represents part of the plasma membrane of a red blood cell.



The membrane has been magnified 10 000 times.

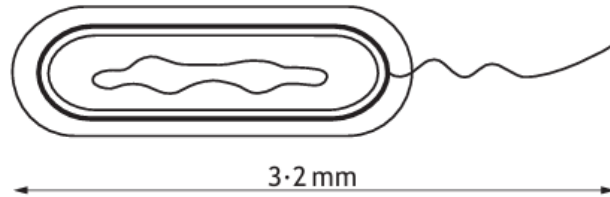
What is the width of the membrane in micro metres.

1mm = 1000 micro metres

- A 1.6
- B 0.16
- C 160
- D 1600

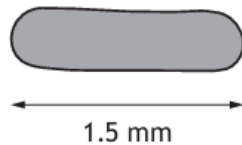
Magnification & unit conversion Past Papers

5. The diagram shows a bacterial cell that has been magnified 800 times.



The length of the cell in micrometres (μm) is

- A 0.004
 - B 0.04
 - C 0.4
 - D 4.0
6. The diagram represents a species of archaea as viewed under a microscope.



(1 mm = 1000 μm)

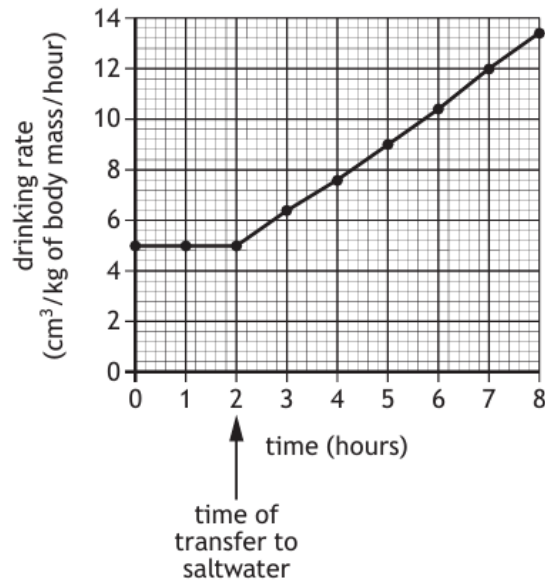
The actual length of this cell was 3 micrometres (μm).

The microscope had a total magnification of

- A $\times 5$
- B $\times 50$
- C $\times 500$
- D $\times 5000$

Unit conversion Past Papers

1. A sea trout (*Salmo trutta trutta*) was transferred from freshwater to saltwater. The graph shows the change in the drinking rate of the sea trout.



The sea trout weighed 3 kg at 0 hours.

Calculate the volume of water the sea trout drank over the 2 hour period before it was transferred to saltwater.

- A 5 cm³
- B 10 cm³
- C 15 cm³
- D 30 cm³

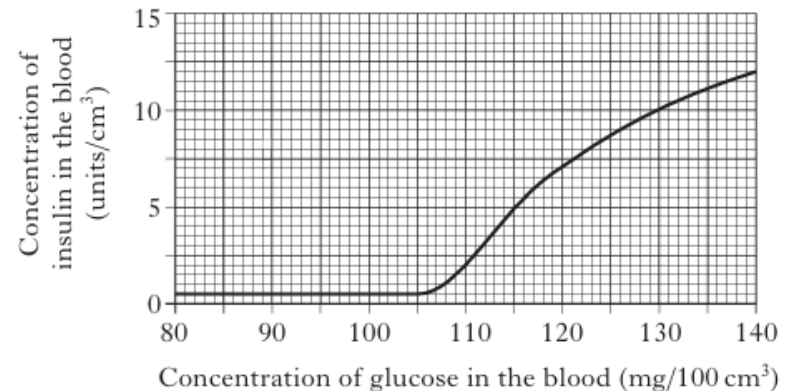
2. The bar-tailed godwit is a species of bird that migrates from Alaska to New Zealand each autumn. A satellite tracker was used to study one bar-tailed godwit on this migration.

The bird completed the 11 000 km journey in 9 days.

The average speed of the bar-tailed godwit during migration was

- A 0.02 km/hr
- B 50.93 km/hr
- C 458.33 km/hr
- D 1222.22 km/hr

3. The graph below shows how the concentration of insulin in the blood is affected by changes in the concentration of glucose in the blood.



What total mass of glucose would be present in an individual with 5 litres of blood and an insulin concentration of 5 units/cm³?

- A 115 mg
- B 575 mg
- C 1150 mg
- D 5750 mg

Unit conversion Past Papers

4. The table below contains information about four individuals who lost weight by reducing their daily energy intake through dieting.

A reduction in energy intake of 30 MJ results in the loss of 1 kg.

Individual	Starting weight (kg)	Target weight achieved (kg)	Daily energy reduction during diet (MJ/day)
A	84	78	2
B	90	81	3
C	95	85	4
D	105	90	5

Which individual was first to reach their target weight?

5. The table contains information about the genome of four different species.

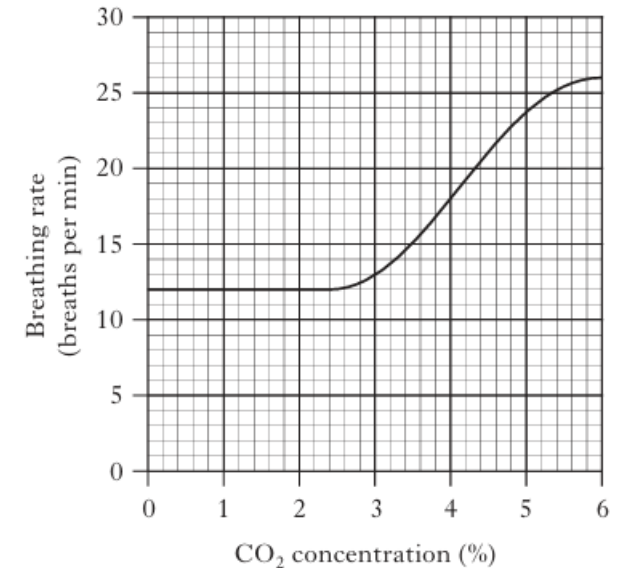
Genome size is measured in megabase pairs (Mb). 1 Mb = 1 000 000 base pairs.

Species	Estimated Genome Size (Mb)	Estimated Number of Genes
Chimpanzee	3100	25 000
Human	2900	25 000
Mouse	2750	30 000
Rat	2600	21 000

Which organism has the highest number of genes per megabase pair (Mb)?

- A Chimpanzee
- B Human
- C Mouse
- D Rat

6. The graph below shows the effect of the carbon dioxide concentration of inhaled air on the breathing rate of an individual.



If the volume of one breath is 0.5 litre, what volume of air will be breathed in one minute when the CO₂ concentration is 4%?

- A 6 litres
- B 9 litres
- C 18 litres
- D 36 litres

Magnification & micrometre conversion answers

1. C

2. B

3. B

4. A

5. D

6. D

1. D

2. B

3. D

4. C

5. B

6. B