Maths for Biology: Magnification

Magnification

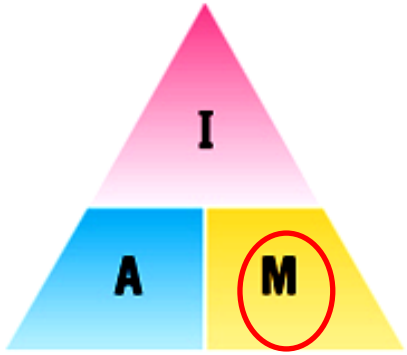
- Magnification is how large an image is compared to the object's real size

The magnification is given on the image, alongside the scale bar

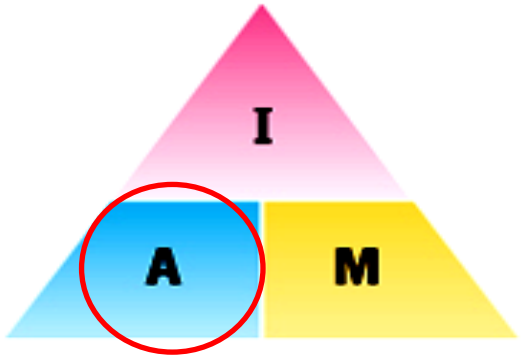
The image is what is printed on the page

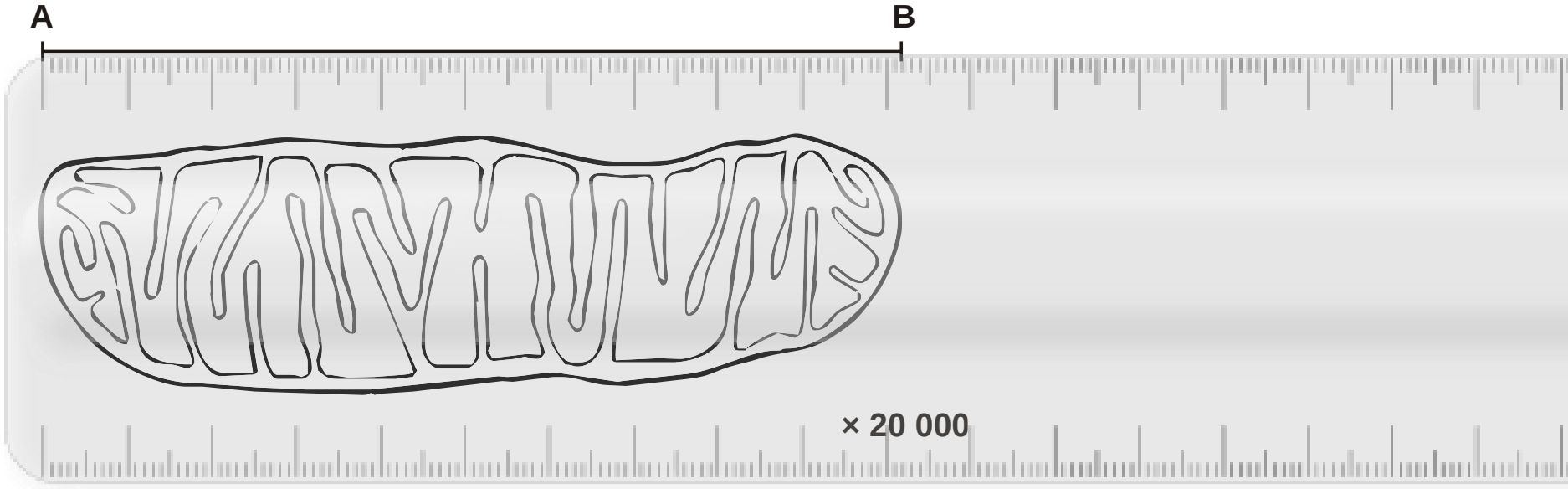
$$\text{magnification} = \frac{\text{Image size}}{\text{Actual size of object}}$$

The actual size of the object should be given in µm or nm



The diagram below is a drawing of an organelle from a ciliated cell as seen with an electron microscope.



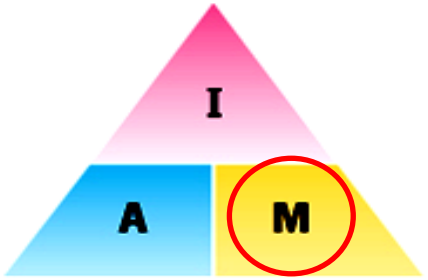


Calculate the actual length of the organelle as shown by the line AB in the diagram. Express your answer to the nearest micrometer (μm).

Show your working. $\text{Actual size} = \frac{\text{Image size}}{\text{Magnification}} = \frac{102\text{mm}}{20000} = \frac{102000\mu\text{m}}{20000}$

Answer = ... 5.1 ..... μm

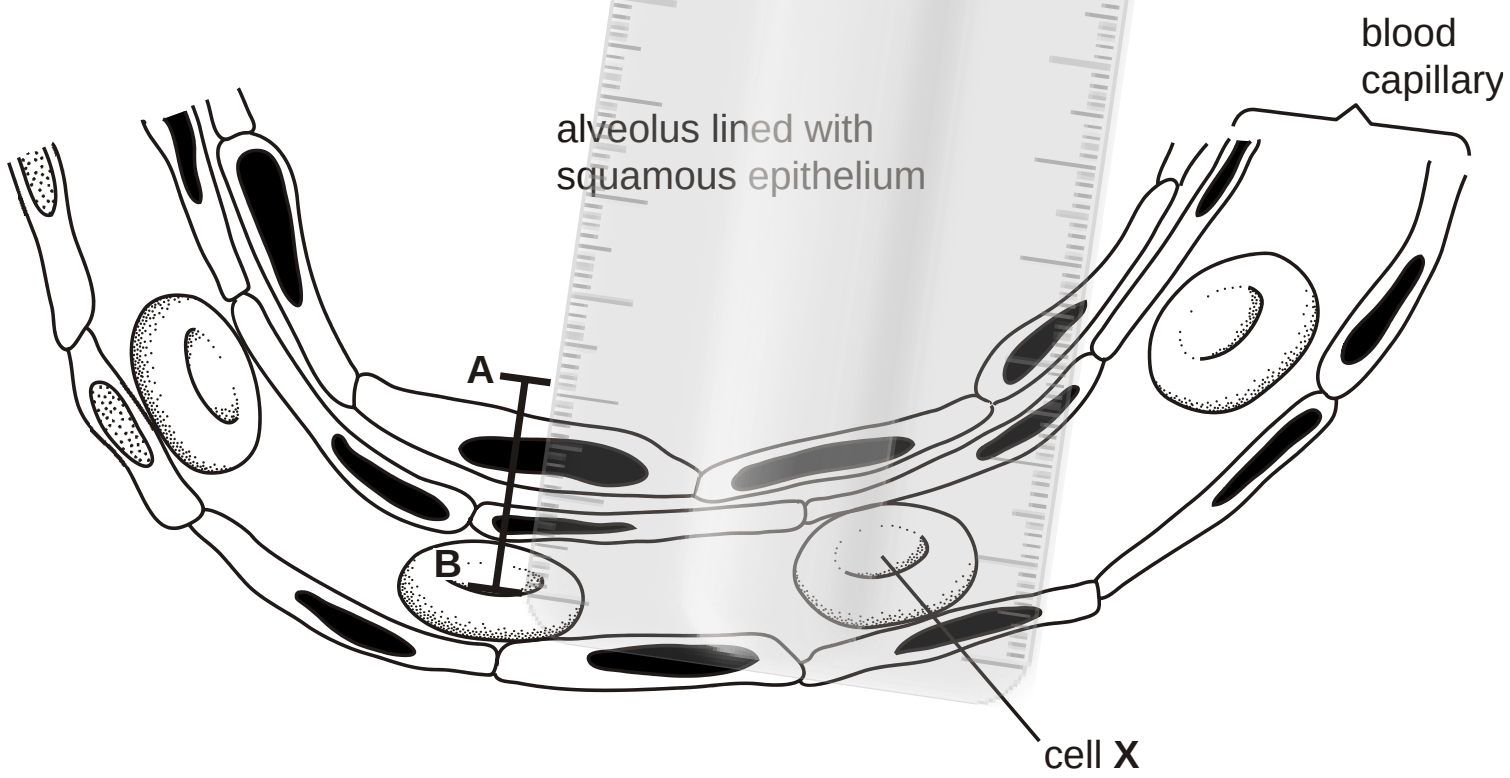
The diagram below is a drawing of an alveolus together with an associated blood capillary.



Magnification = $\frac{\text{Image size}}{\text{Actual size}}$

$= \frac{21\text{mm}}{1.5\mu\text{m}}$

$= \frac{21000\mu\text{m}}{1.5\mu\text{m}}$

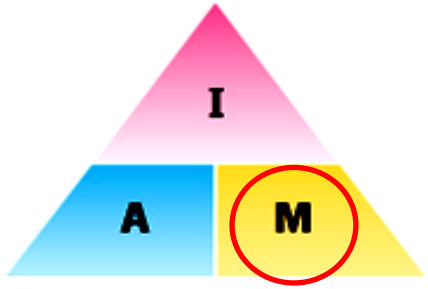


The line **AB** in the diagram represents an actual distance of 1.5 µm.

Calculate the magnification of the drawing. Show your working.

Answer = × **14000**

The diagram below shows the general structure of an animal cell as seen under an electron microscope.

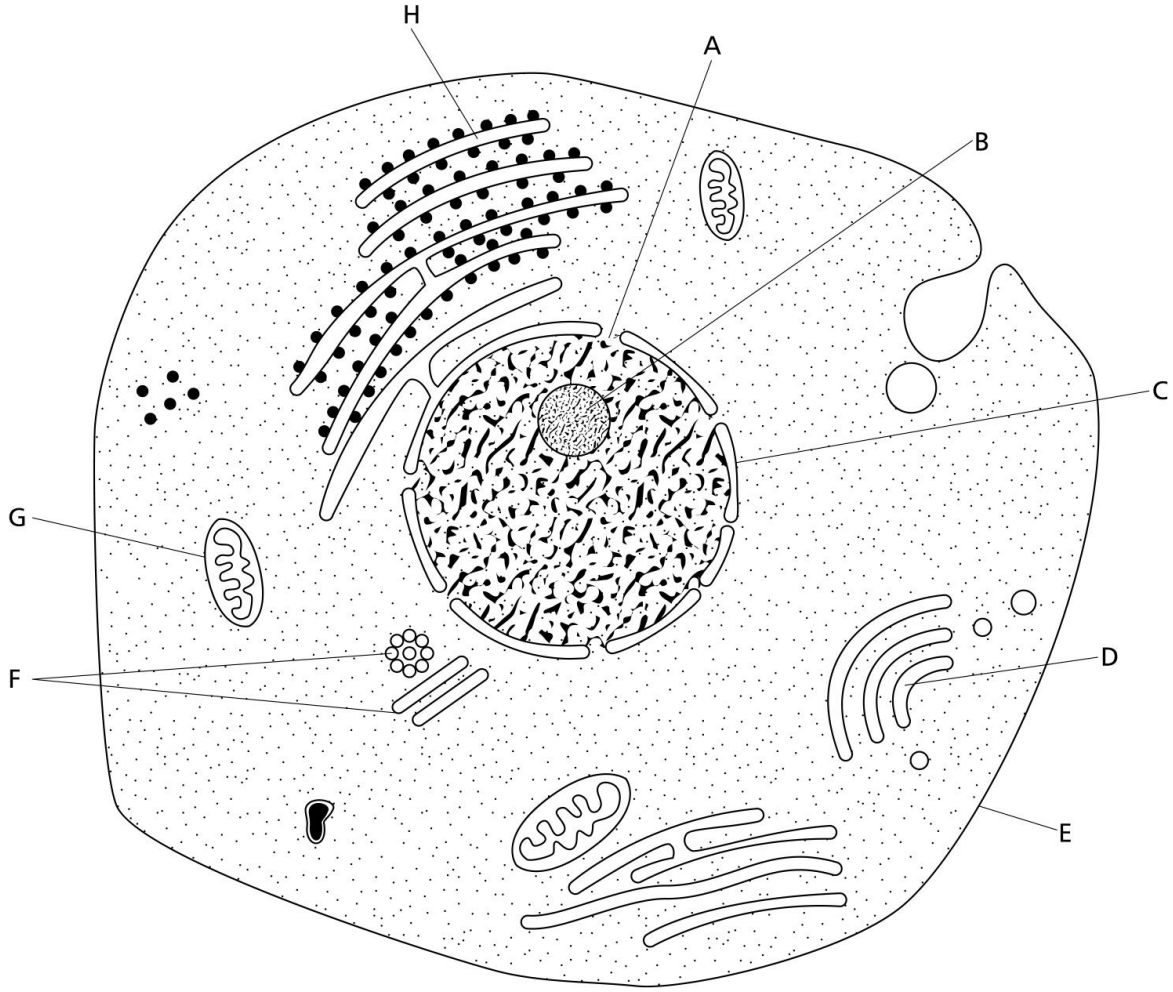


$$\text{Magnification} = \frac{\text{Image size}}{\text{Actual size}}$$

$$= \frac{24\text{mm}}{5\mu\text{m}}$$

$$= \frac{24000\mu\text{m}}{5\mu\text{m}}$$

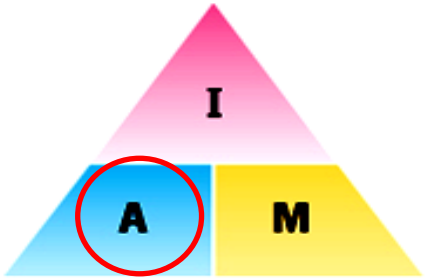
= x 4800



5μm

1) Calculate the magnification factor of the diagram

The diagram below shows the general structure of an animal cell as seen under an electron microscope.

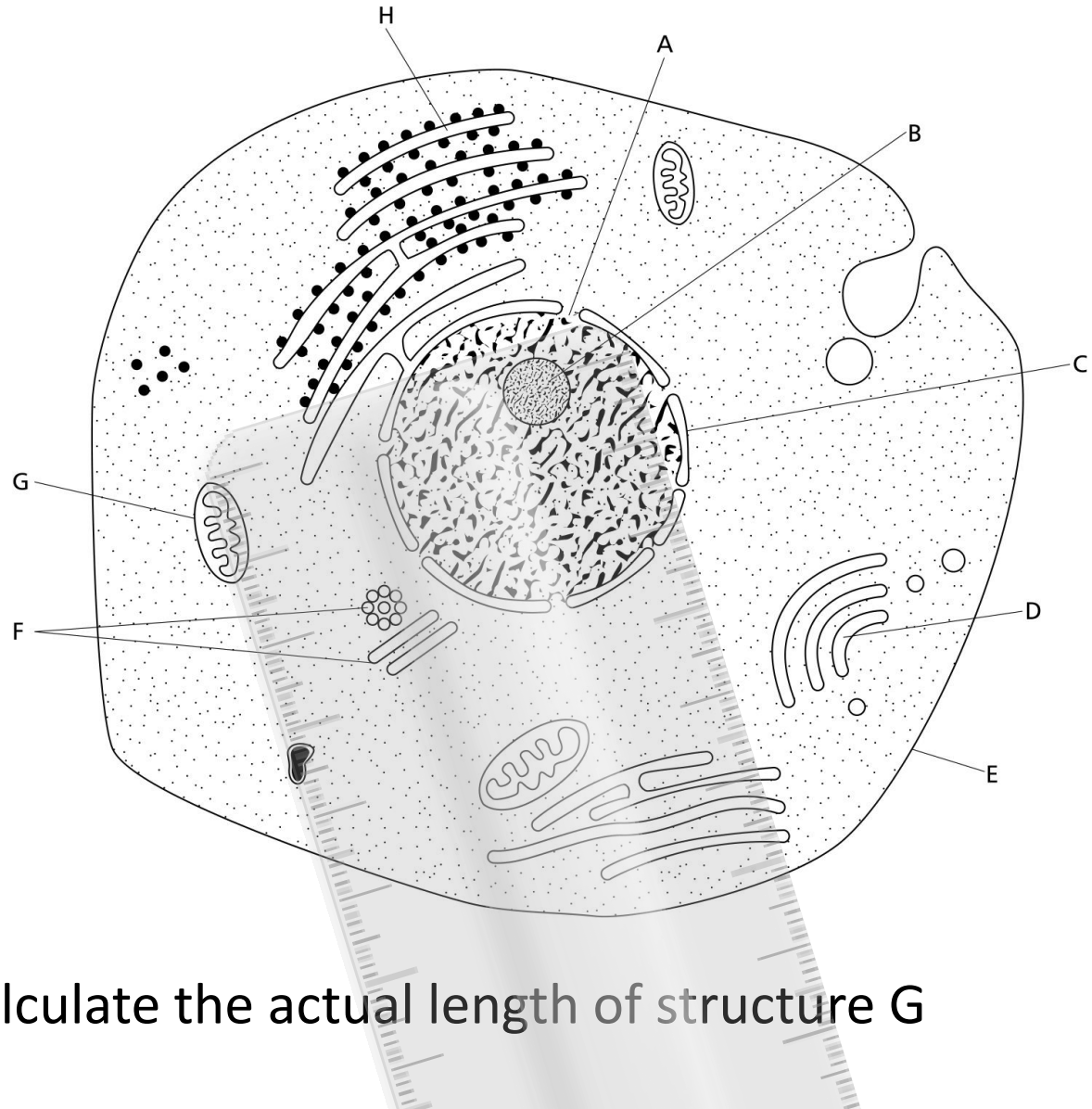


$$\text{Actual size} = \frac{\text{Image size}}{\text{Magnification}}$$

$$= \frac{12\text{mm}}{4800}$$

$$= \frac{12000\mu\text{m}}{4800}$$

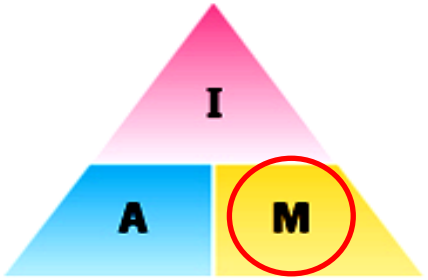
$$= \mathbf{2.5\mu m}$$



5μm

2) Calculate the actual length of structure G

The diagram below shows the general structure of a plant cell when viewed under an electron microscope.

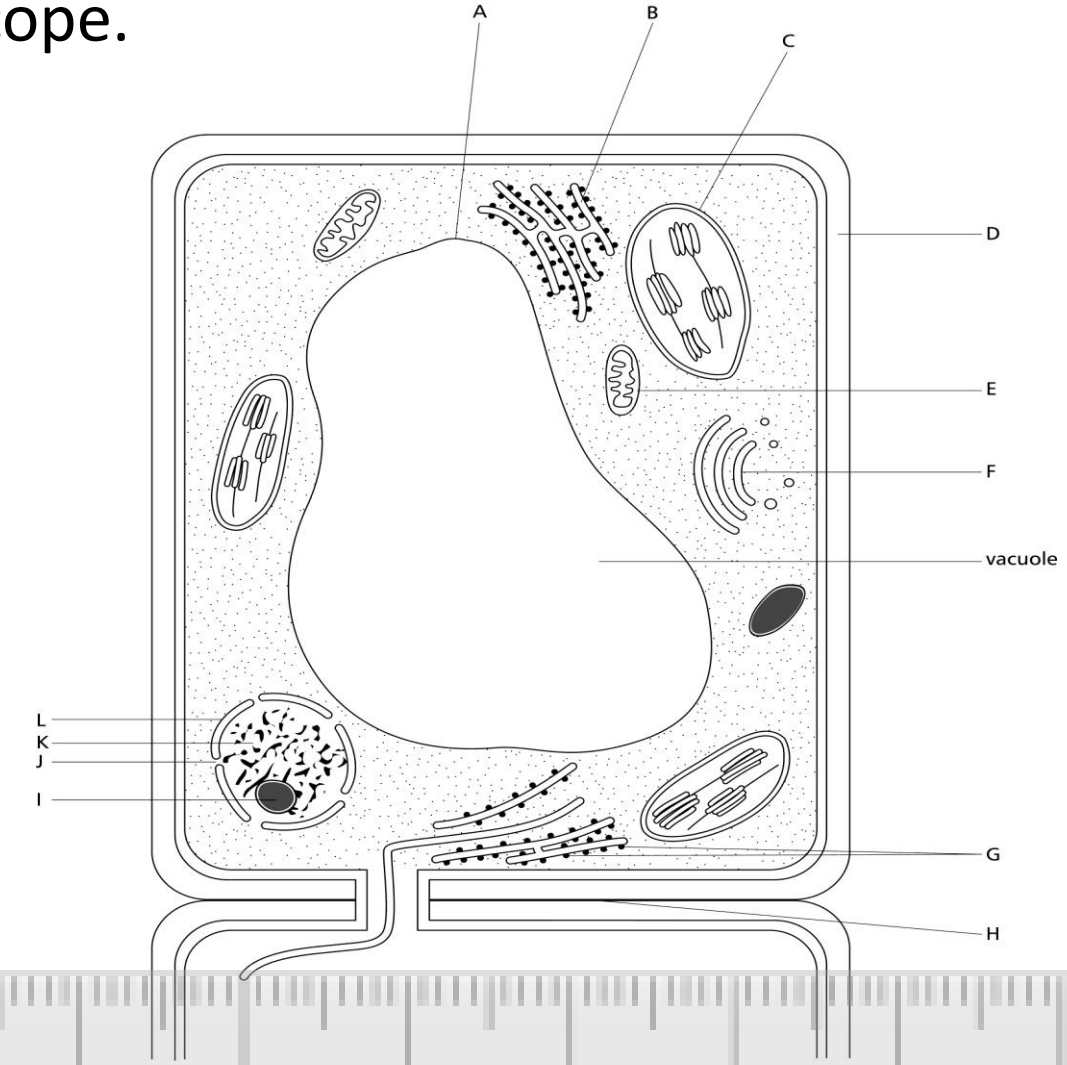


$$\text{Magnification} = \frac{\text{Image size}}{\text{Actual size}}$$

$$= \frac{23\text{mm}}{40\mu\text{m}}$$

$$= \frac{23000\mu\text{m}}{40\mu\text{m}}$$

$$= \frac{\text{x } 575}{40\mu\text{m}}$$



1) Calculate the magnification factor of the diagram