MICROSCOPE CALCULATIONS ANSWERS

TOP MARKS SCIENCE

1) Use the information below to calculate the magnification of a microscope

a) x5

b) x5

c) x25

d) x30

e) x715

f) x14

g) x200

h) x90000

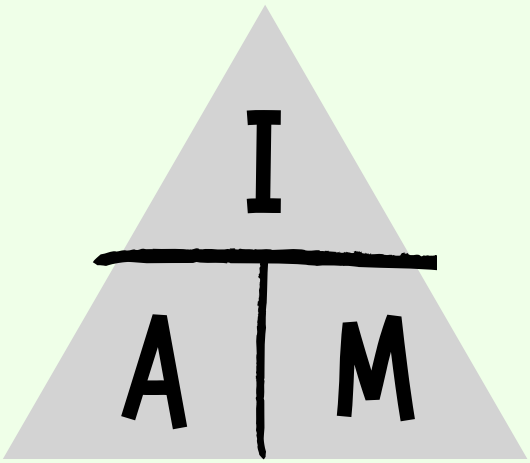
2) Rearrange the equation triangle to calculate the following:

a) 3 / 40 = 0.075mm

b)2 / 10 = 0.2mm

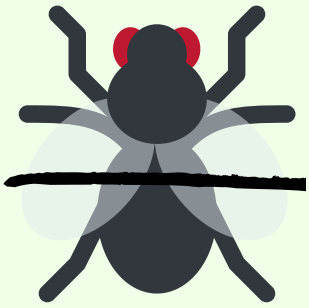
c) 2 x 20 = 40mm

d) 5 x 30 = 150mm

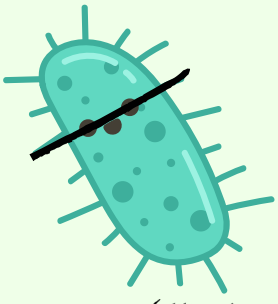


3) Use a ruler to measure the size of each image and use this to calculate the magnification

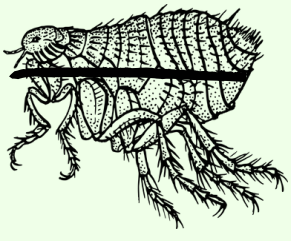
a) Image = 40mm, Actual = 2mm,
40 / 2 = 20x



b) Image = 25mm, Actual = 2.5mm
25 / 2.5 = x10



c) Image =30mm, Actual = 0.5mm
30 / 0.5 = x60



5) Now use your conversion chart to convert the following units:

1m= 100cm
1m= 1000mm
1m= 1000000 (1 x 10^6)um
1m= 1000000000 (1x10^9)nm
1m= 1000mm
1um= 1000nm
1nm= 0.001um
1um=0.001mm

12mm= 12000um
15um= 15000nm
5nm= 0.005um
5um= 0.005mm

6) Use the equations above to calculate:

Image in um

Actual= 3um, Magnification= x40, Image = 120um

Actual in um

Image= 8mm, Magnification= x40, Actual = 200um (8000um)

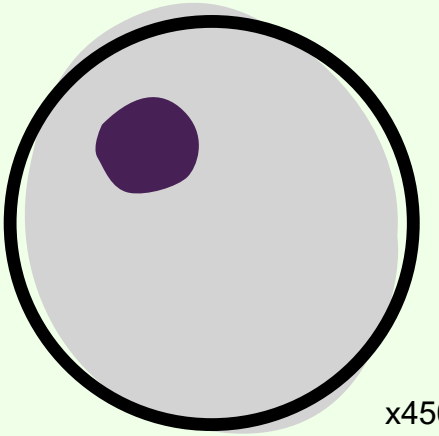
Magnification

Image= 10mm, Actual= 50um, Magnification = x200 (10000um)

Challenge:
Try and make up your own calculation questions for a partner who has also finished the above. You will need to test your own questions and make sure you can answer them yourself!

Exam style questions

1. A student observes a cell under a microscope.



They see the image which is shown on the right

Calculate the actual diameter of the cell.

Image diameter = approx 5.5cm (1) = 55mm (1)
55mm / 450 (1)

0.122 mm (1) (4)

2. The image of a cell has a diameter of 4.5 millimetres.

The magnification of the image is ×300.

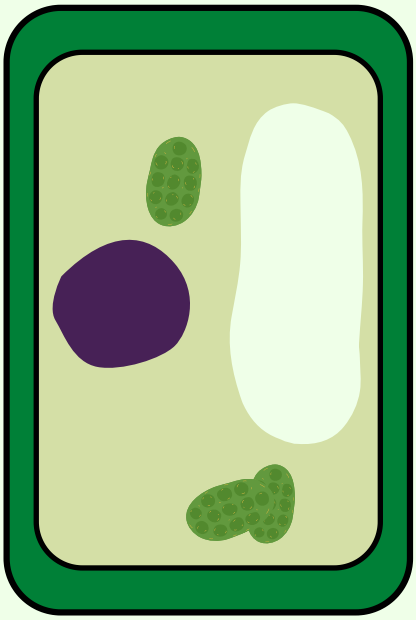
Calculate the diameter of the real cell.

Give your answer in micrometres. (3)
4.5 x 1000 = 4500 (1)
4500 / 300 = 15

15um (1)

3. A student observes a cell under a microscope.

Their findings are shown in the image on the right.



The eyepiece was set at a magnification of x10.

The objective was set at x40

ai. Calculate the actual length of the cell.

Give your answer in micrometres. (5)
Total mag: 10 x 40 = x400 (1)
Image length = 8cm = 80mm (1)
80 x 1000 = 80000um (1)
80000/400 (1)
200um (1)

ii. Convert your answer from (i) into nanometers (2)
200 x 1000 (1) = 200000nm (1)
iii. Write your answer from (ii) in standard form. 2 x 10^5 (1)