ANSWERS

SNC2DI
Calculating Magnification Worksheet

1. Calculate the missing values in the table below:

Eyepiece Lens	Low Power Objective (4 X)	Medium Power Objective (10 X)	High Power Objective (40 X)
10 X	40 X	100 x	400 X
15 X	60 x	150 X	600 x

2. Convert the following.

1000 x a) 3.3 mm = 3300 µm
1000 x b) 0.78 mm = 780 µm
÷ 1000 c) 390 µm = 0.390 mm
÷ 1000 d) 4600 µm = 4.600 mm

3. Calculate:

a) The medium power field of view for a microscope with:
- eyepiece lens = 10x
- low power lens = 5x
- medium power lens = 20x
- low power field of view = 3.5 mm (=3500 um)

$$\frac{FV_{MP}}{FV_{LP}} = \frac{M_{LP}}{M_{MP}}$$

$$FV_{MP} = \frac{M_{LP} FV_{LP}}{M_{MP}} = \frac{50(3500)}{200}$$

$FV_{MP} = 875\ \mu m$

∴ the field of view under medium power is

b) The high power field of view for a microscope with:
- eyepiece lens = 15x
- low power lens = 10x
- medium power lens = 20x
- high power lens = 50x
- low power field of view = 5 mm (=5000 um)

$$\frac{FV_{HP}}{FV_{LP}} = \frac{M_{LP}}{M_{HP}}$$

$$FV_{HP} = \frac{M_{LP}}{M_{HP}} \times FV_{LP}$$

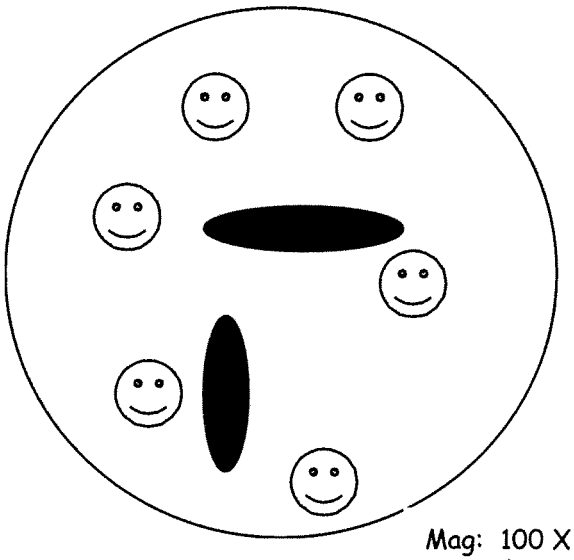
$$FV_{HP} = \frac{(150x)}{(300x)}(5000\ \mu m)$$

$= 2500\ \mu m$

∴ the field of view under high power is 2500 µm.

4. From each diagram below, estimate the size of all objects as specified. Assume the field of view on low power is 4 mm, on medium power is 1.6 mm and on high power is 0.4 mm.

a) Slide of some one celled animals



Mag: 100 X
↳ 10 x 10 = med.

i) The length of the darker objects

$$\text{est. size} = \frac{FV}{\#\text{fit}} = \frac{1.6\text{ mm}}{2.5} = 0.64\text{ mm}$$

∴ the est. size is 0.64 mm or 640 μm

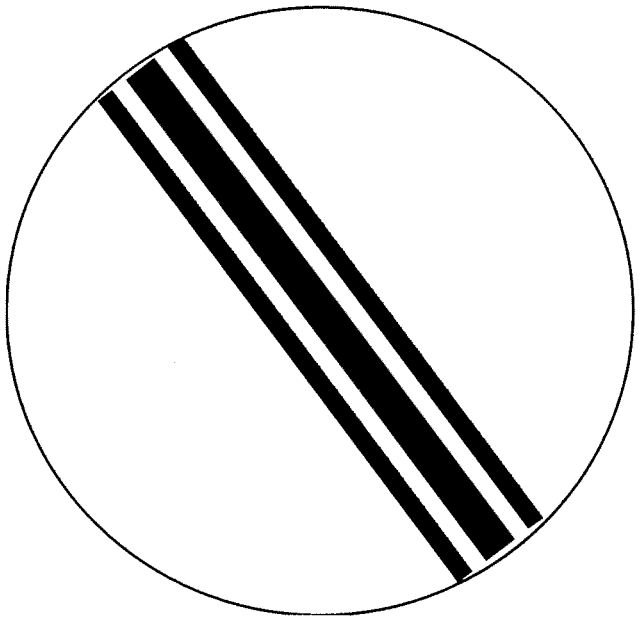
ii) The diameter of the smaller light coloured objects

$$\text{est. size} = \frac{FV}{\#\text{fit}} = \frac{1.6\text{ mm}}{8}$$

est size = 0.2 mm

∴ the est. size is 0.2 mm or 200 μm

b) The width of the human hair shown below.



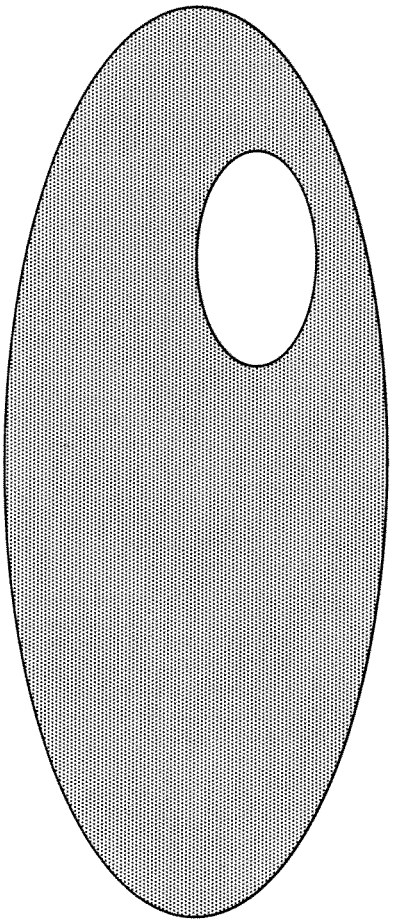
Mag: 40 X
4 x 10 = low

$$\text{est size} = \frac{FV}{\#\text{fit}} = \frac{4\text{mm}}{5} = 0.8\text{ mm}$$

∴ the width of the hair is approximately 0.8 mm or 800 μm

c m μ

c) Below is the drawing you did of the cell you saw under your microscope. Calculate the drawing magnification of this diagram using both length and width. Assume that you estimated the length of your cell to be 0.6 mm (600 um), and the width to be 0.25 mm (250 um).



i) Drawing magnification (length)

$$\text{Drawing mag. length} = \frac{\text{dimension of cell diagram}}{\text{dimension of actual cell}}$$

$$= \frac{120000\ \mu m}{600\ \mu m}$$

$$= 200\times$$

ii) Drawing magnification (width)

$$\text{Drawing mag. width} = \frac{\text{dimension of cell diagram}}{\text{dimension of actual cell}}$$

$$= \frac{50000\ \mu m}{250\ \mu m}$$

$$= 200 \text{ times}$$

* answers will vary with size of sheet *