Part 1: Finding Total Magnification

When you look through a microscope, you are actually looking through two lenses at once. These lenses are (**1) the lens in the eyepiece and (2) the objective lens you have chosen (low-, medium-, or high-power).** Each of the lenses (the eyepiece lens and the objective lens) adds to the total magnification. The eyepiece usually has a magnification of **10×.**

Total magnification = (eyepiece magnification) × (objective lens magnification)

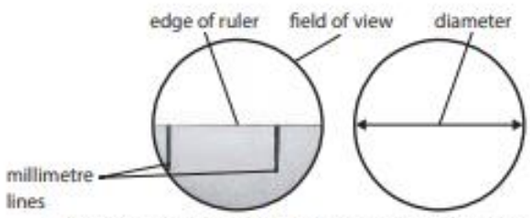
Table 1 Magnification and Total Magnification of Each Objective Lens

Objective Lens	Magnification	Total Magnification
Low- Power	4x	
Medium Power	10x	
High Power	40x	

Part 2: Finding the Diameter of the Field of View

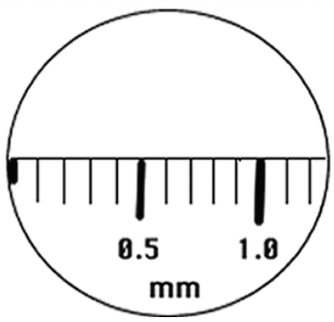
The field of view is the circular area you can see when you look through the microscope. The diameter of the field of view is different depending on which lens you are using.

1. Place a clear plastic ruler on the microscope stage.
2. Use the coarse-adjustment knob to focus on the ruler. Position the ruler so that one of the millimetre markings is at **the left edge** of the field of view, as shown below.



The diameter of the field of view under low power illustrated here is about 1.5 mm.

3. Measure and record the diameter of the field of view in millimetres (mm) for the **low-power objective lens.**



The field of view of the picture to the left is _____ mm

4. Use the following formula to calculate the field of view for the medium-power objective:

$$\text{Medium-power field of view} = \frac{\text{low-power field of view} \times \text{magnification of low-power objective}}{\text{magnification of medium-power objective}}$$

5. Use the following formula to calculate the field of view for the high-power objective:

$$\text{High-power field of view} = \frac{\text{low-power field of view} \times \text{magnification of low-power objective}}{\text{magnification of high-power objective}}$$

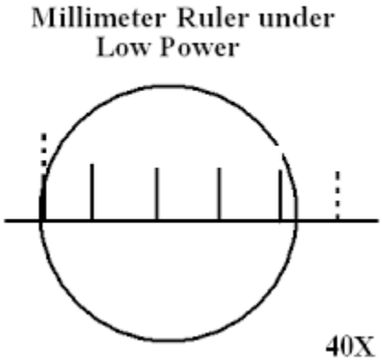
Convert your measurements to micrometers (µm). 1mm = 1000µm

Low power field of view = _____ mm x 1000 µm/mm = _____ µm

Medium power field of view = _____ mm x 1000 µm/mm = _____ µm

High power field of view = _____ mm x 1000 µm/mm = _____ µm

Practice: What is the field of view for the following images?



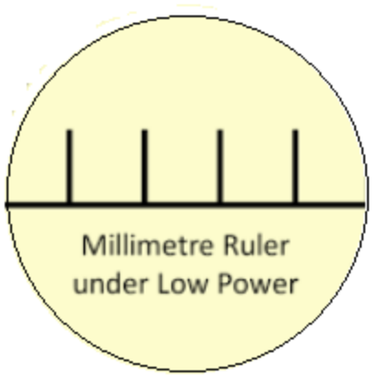
Low Power FOV = _____ mm

Medium Power FOV Calculations	High Power FOV Calculations

Low power field of view = _____ mm x 1000 µm/mm = _____ µm

Medium power field of view = _____ mm x 1000 µm/mm = _____ µm

High power field of view = _____ mm x 1000 µm/mm = _____ µm



Low Power FOV = _____ mm

Medium Power FOV Calculations	High Power FOV Calculations

Low power field of view = _____ mm x 1000 µm/mm = _____ µm

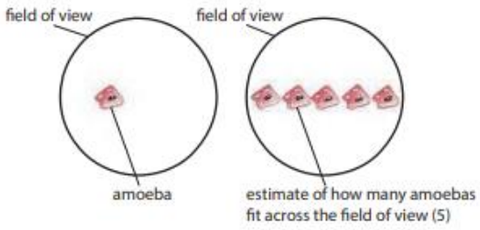
Medium power field of view = _____ mm x 1000 µm/mm = _____ µm

High power field of view = _____ mm x 1000 µm/mm = _____ µm

Part 3: Steps in Calculating the Size of an Object Under the Microscope

This example shows you how to calculate the size of an amoeba that you are viewing under a microscope on **low power**.

1. Estimate how many amoebas could fit end to end across the field of view. (See the diagram below.)



2. Calculate the size of one amoeba using the following formula:

Size of object = (field of view diameter) ÷ (number of specimens)

Size of amoeba = 1500 µm ÷ 5 = 300 µm

Therefore, one amoeba measures about 300 µm across.

Practice Questions: What is the size of each organism? Show ALL calculations and give answers in µm.

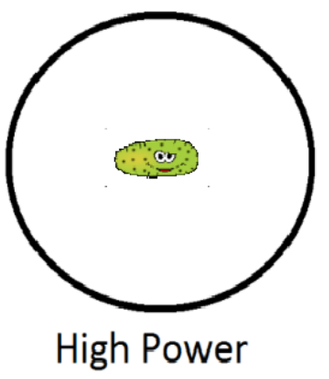
All of the specimens below were viewed using the same microscope. The FOV on low power was 1.6 mm

Low power field of view = _____ µm

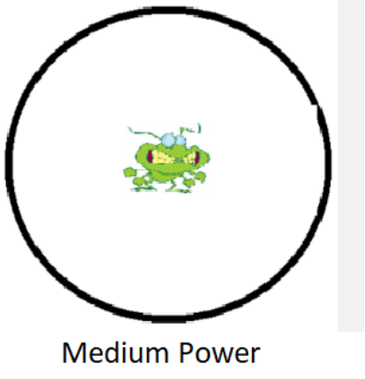
Medium power field of view = _____ µm

High power field of view = _____ µm

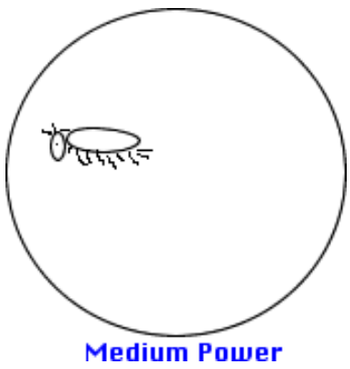
Medium Power FOV Calculations	High Power FOV Calculations



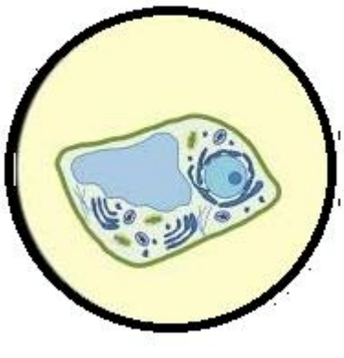
High Power



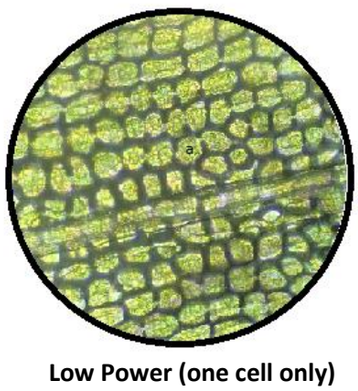
Medium Power



Medium Power



High Power



Low Power (one cell only)

Low Power