What's The Size of What You See?

Determining the Field Diameter of A Compound Microscope

Materials:
compound microscope
clear plastic metric ruler, showing mm divisions

To Do and Notice:

Finding the Magnification of the Microscope:
Find the eyepiece and read the power on it. Its power is a number followed by an X.

Eyepiece Power: _____X

Find the three barrel-shaped objective lenses near the microscope stage. They each have a different power.

Lowest Power Objective Power: _____X

Medium Power Objective Power: _____X

Highest Power Objective Power: _____X

You find Magnification by MULTIPLYING the power of the eyepiece by the power of the objective. Find the magnification of your microscope at:

Lowest Magnification: Eyepiece X Lowest power objective = _____X

Medium Magnification: Eyepiece X Medium power objective = _____X

Highest Magnification: Eyepiece X Highest power objective = _____X

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Finding the Field Diameter:
Put microscope on lowest magnification. Slide the plastic metric ruler onto the stage, focusing on the millimeter divisions. Adjust the ruler and the focus so that you can determine the diameter of your field of view (field diameter) on lowest power. Record the field diameter in mm.
Repeat this process for medium power.

	Eyepiece Power (same for all)	Objective Power	Magnification	Field Diameter
Lowest Power				
Medium Power				
Highest Power				

What happens when you try this at the highest magnification? At the highest magnification, the field diameter is smaller than one mm, so it cannot be measured directly. To find the field diameter at highest magnification, we need to use the following proportional relationship:

$$\frac{\text{magnification highest power}}{\text{magnification lowest power}} = \frac{\text{field diameter lowest power}}{\text{field diameter highest power}}$$

It seems counter-intuitive to have the numerators and the denominators not "match". As the magnification goes up, the field diameter gets smaller, and vice versa. The proportion described above shows this inverse relationship.

The unknown value is the "field diameter highest power". The following values are used as examples only.

$$\frac{400x}{40x} = \frac{4\text{ mm}}{?\text{ mm}}$$

Solving this by cross-multiplying or by finding an equivalent fraction, the unknown value is .4 mm or 400 microns. Once the field diameter of each magnification is known, reasonable estimates may be made about the size of what you see.

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