****Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Block: \_\_\_\_\_\_

**Unit Conversions Tutorial (LSc11)**

1. **Determine a conversion factor between your units.**

Examples: \_\_\_\_ mm = \_\_\_\_ cm

 \_\_\_\_µm = \_\_\_\_\_\_ nm

 \_\_\_\_ km = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cm

1. **Write your conversion factor as a fraction, with the desired unit on top and old unit on bottom.**
2. **Multiply by the top part of the fraction and divide by the bottom part of the fraction. Express your answer with the new unit.**

|  |  |
| --- | --- |
| Example 1: Convert 79 mm to cm.  | Example 2: Convert 540 nm to µm.  |

**Practice:**

1. 22 cm to mm
2. 1580 cm to m
3. 58,960,000 nm to mm
4. 0.0065 µm to nm
5. 28 µm to mm
6. 0.00003 m to nm
7. 600 nm to µm
8. 22,451 mm to µm
9. 890 mm to m

**Total Magnification**

* Default magnifications (memorize!):
	+ Eyepiece = 10x
	+ Low objective = 4x
	+ Medium objective = 10x
	+ High objective = 40x
	+ Oil immersion = 100x
* Compound microscopes have two lenses working together.
* To calculate the **total magnification** of a compound microscope, you must ***multiply*** the eyepiece magnification with the objective magnification.

Example 1: Calculate the total magnification of a compound microscope with a 15x eyepiece and a 40x objective.

Example 2: Calculate the total magnification of a compound microscope on medium power.

Example 3: Calculate the total magnification of a compound microscope on high power.

**Eyepiece**

This eyepiece has a magnification of 10x and a field number of 20 mm.

Every eyepiece has two values:

**Magnification** (of eyepiece lens only)

**Field number**:

* + The *actual* diameter of the circle being viewed
	+ In millimeters (mm)

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**Field of View Calculations**

**Field of View:** diameter of observable area when looking through a compound microscope

$$field of view=\frac{field number}{objective magnification}$$

|  |  |  |
| --- | --- | --- |
| Example 1: *Calculate the field of view on high power objective.*Microscope World Blog: Microscope Field Size, Field Number &amp; Field of View | Example 2: *Calculate the field of view on low power objective.*Pair 15X Eyepieces field number 16mm for 30mm eyepiece tube - GT Vision  Online | Example 3: *Calculate the field of view using an oil immersion lens (100x magnification). Convert your answer to micrometers.* *Pair 20X Eyepieces field number 12.5mm for 30mm eyepiece tube - GT Vision  Online* |

**Specimen Size: Daphnia**

This is a water flea (*Daphnia magna*) on low power. If the eyepiece field number is 16mm, determine the length of the flea.



**Specimen Size: Euglena**

*Euglena* is a unicellular, eukaryotic, photosynthetic organism. It moves by rotating its whiplike flagellum.

This image was taken using a 10x objective lens and the eyepiece shown. Calculate the length of the labelled individual. Express your answer in micrometers.