

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Block: \_\_\_\_\_

**UNIT CONVERSIONS TUTORIAL (LIFE SCIENCES 11)****1. Determine a conversion factor between your units.**

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

\_\_\_\_  $\mu\text{m}$  = \_\_\_\_ nm

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

Multiplication Factor	Prefix	Symbol
$1,000,000,000 = 10^9$	giga	G
$1,000,000 = 10^6$	mega	M
$1,000 = 10^3$	kilo	k
$100 = 10^2$	hecto	h
$1 = 1$		
$0.01 = 10^{-2}$	centi	c
$0.001 = 10^{-3}$	milli	m
$0.000001 = 10^{-6}$	micro	$\mu$
$0.000000001 = 10^{-9}$	nano	n

**2. Write your conversion factor as a fraction, with the desired unit on top and old unit on bottom.****3. 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  $\mu\text{m}$ .**Practice:**

a) 22 cm to mm

b) 1580 cm to m

c) 58,960,000 nm to mm

d) 0.0065  $\mu\text{m}$  to nme) 28  $\mu\text{m}$  to mm

f) 0.00003 m to nm

g) 600 nm to  $\mu\text{m}$ h) 22,451 mm to  $\mu\text{m}$ 

i) 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.

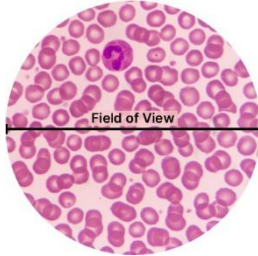
## EYEPIECE

Every eyepiece has two values:

**Magnification** (of eyepiece lens only)

**Field number:**

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



## FIELD OF VIEW CALCULATIONS

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

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

Example 1: Calculate the field of view on high power objective.



Example 2: Calculate the field of view on low power objective.

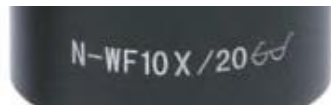


Example 3: Calculate the field of view using an oil immersion lens (100x magnification). Convert your answer to micrometers.



### 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.