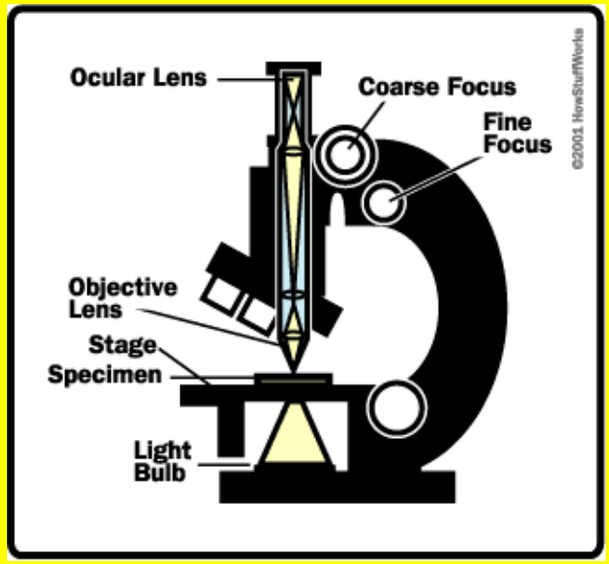
Measuring With The Microscope



You should know already…

- All parts of the microscope.
- How to calculate **total magnification**.
- How to make a wet mount.
- What an **"d"** looks like in the microscope.
- Use ONLY the *fine* adjustment with the…

- It's darker under high power, so you need to adjust the…

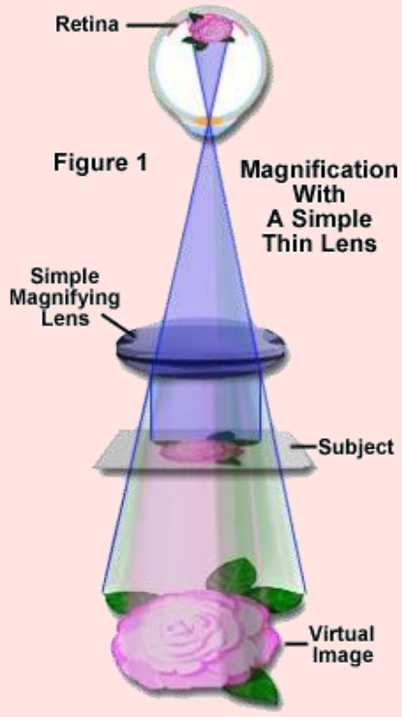
- The field of view is smaller under…

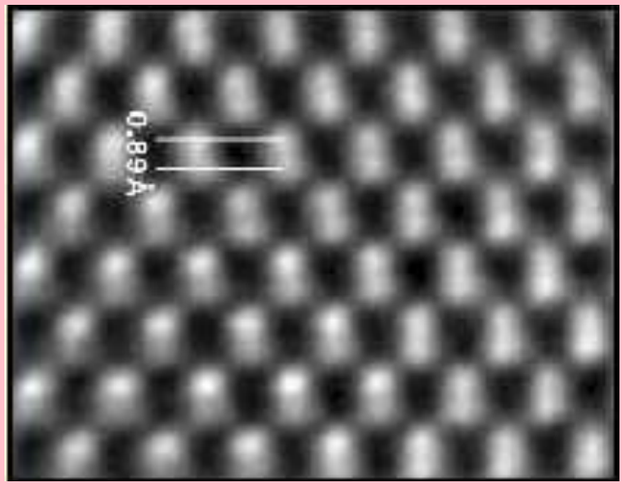
Image : **What we see when we use a microscope to examine a specimen.**

Magnification

the ratio of image size to object size
(the amount of times the image is enlarged when compared to the real size of the object)

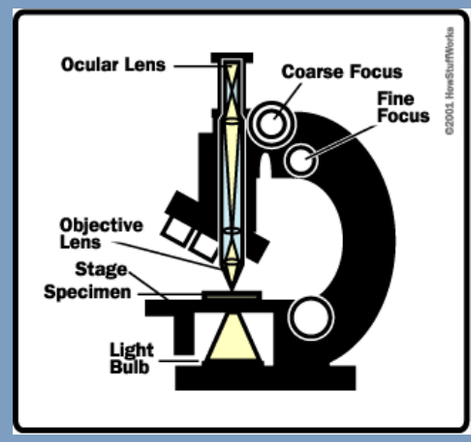
Example - 50X





: the capacity (ability) of a microscope to show two points that are very close together as being separate from each other.

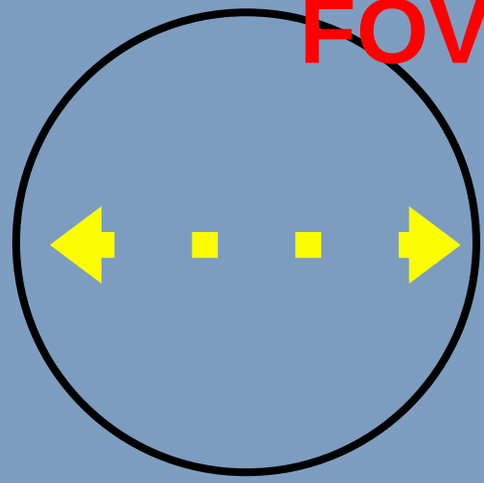
How can we measure the size of objects under the microscope?



"Field of view"

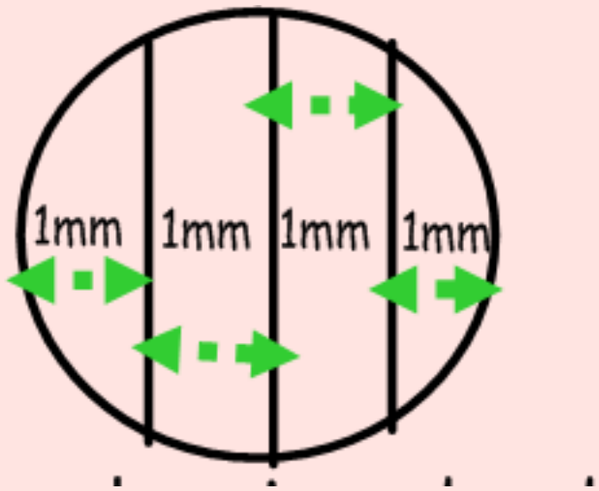
or "Field of Vision"

FOV

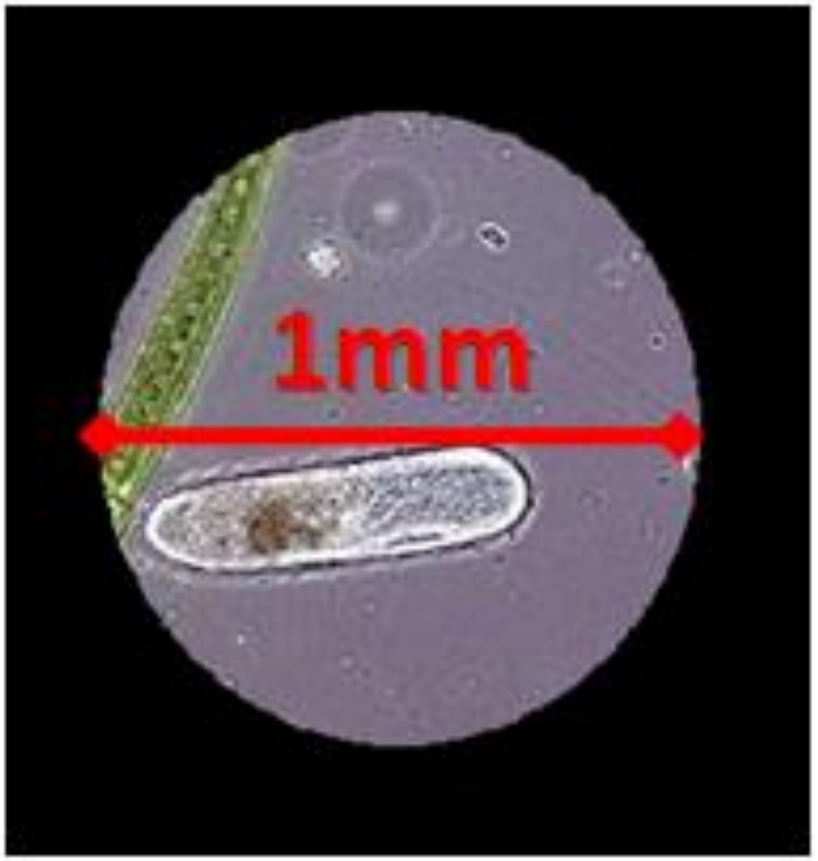


The area of the slide that you see when you look through a microscope's eyepiece.

The diameter of the low power field of view is determined by using a clear metric ruler.



How wide is the field of view in millimeters?



field of view is 1mm...

Micrometers

Kids **H**ave **D**irty **M**ouths **D**rinking **C**hocolate **M**ilk

Lips

Gums

K H D b d c m * * u

micro

1 meter = 100 cm

2 cm = 20 mm

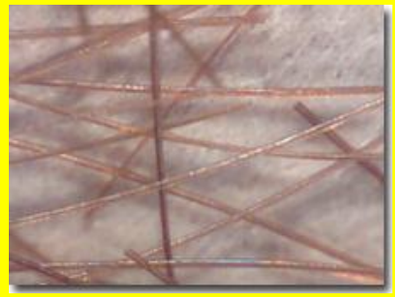
1 mm = [redacted] um

When we use a **MICROscope** we use **MICROmeters.**

1000 micrometer (um) = 1 millimeter (mm)

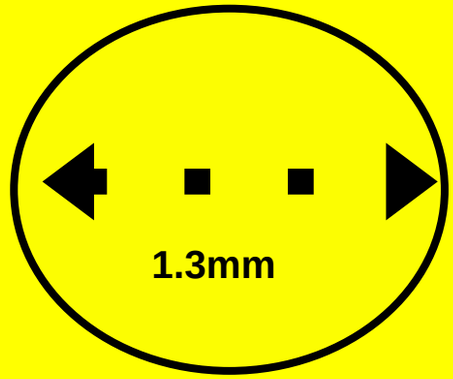
..

One strand of hair = 100 um wide



To convert from millimeters to micrometers, move the decimal 3 places to the right.

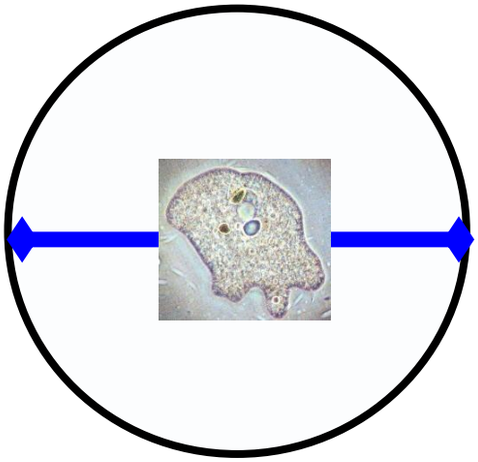
EX: "Field of view"= 1.3mm
How wide is the field in um?



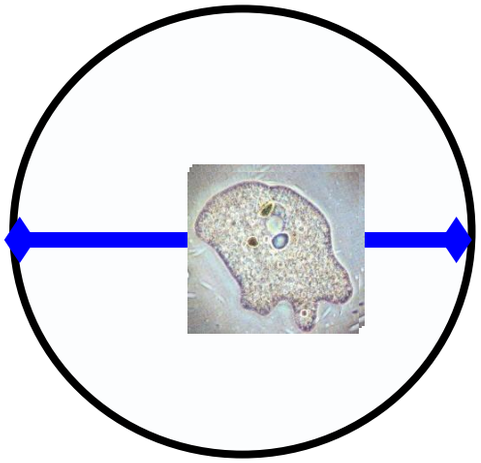
How can we measure the size of objects under the microscope?

How big is the cell

Field of view in LP= 1000 micro meters



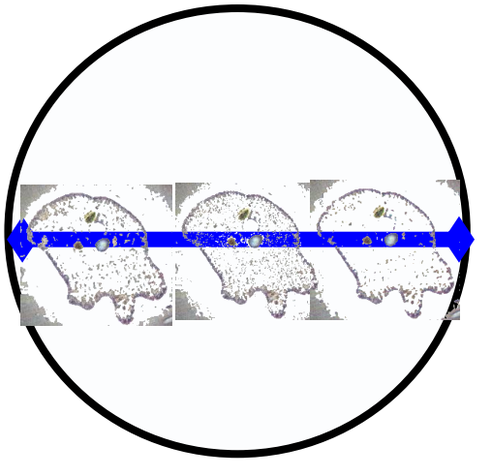
How many "objects" fit in the field of view?



What is the size of ONE of the "objects?"

3 cells = 1000 microns

1 cell = _____ microns



$$\frac{\text{diameter of the field of view}}{\text{number of cells that fit}}$$

Lets try some conversions:

1) 5.0mm= um

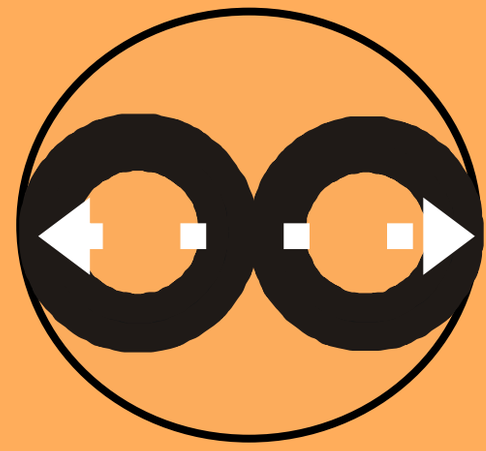
2) 1.8mm= um

3) 1.65mm= um

4)1300um= mm

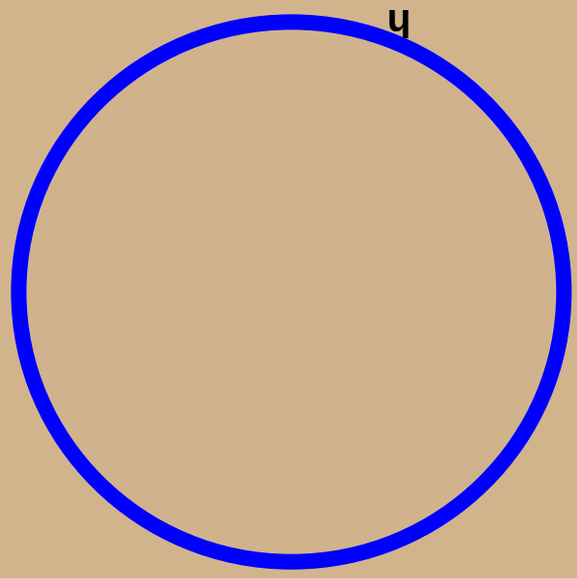
5)1500um= mm

6) **How big is each object in um if the field of view = 1500um?**

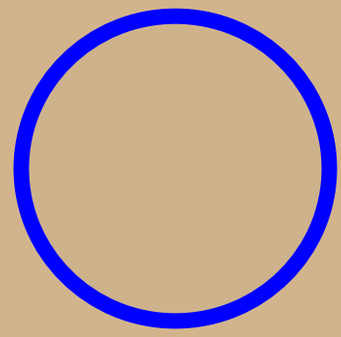


1500um

When we switch from low power to high power
you see a smaller area of the slide under High power.
This is why centering what you want to see, prior to switching to high power is so important.



Low Power



High Power

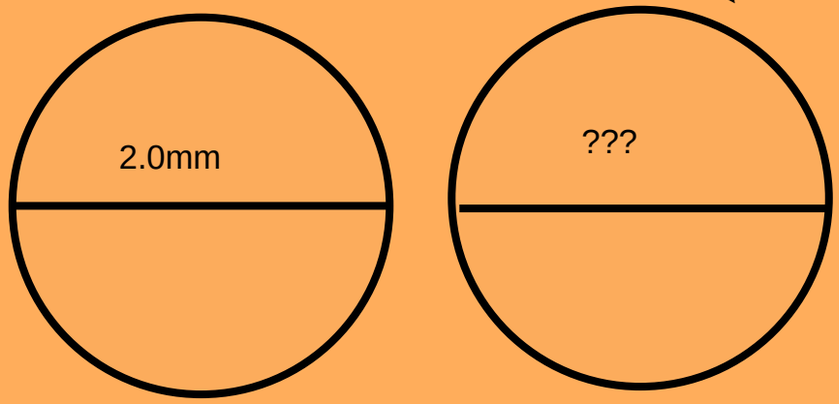
How do we find the diameter of a high power field of view?

We use the formula below

$$\frac{L}{H} = \frac{H}{L}$$ } diameter

Low power magnification / High power magnification = High Power field diameter / Low power field diameter

What is the high power field diameter?



Low Power
10X

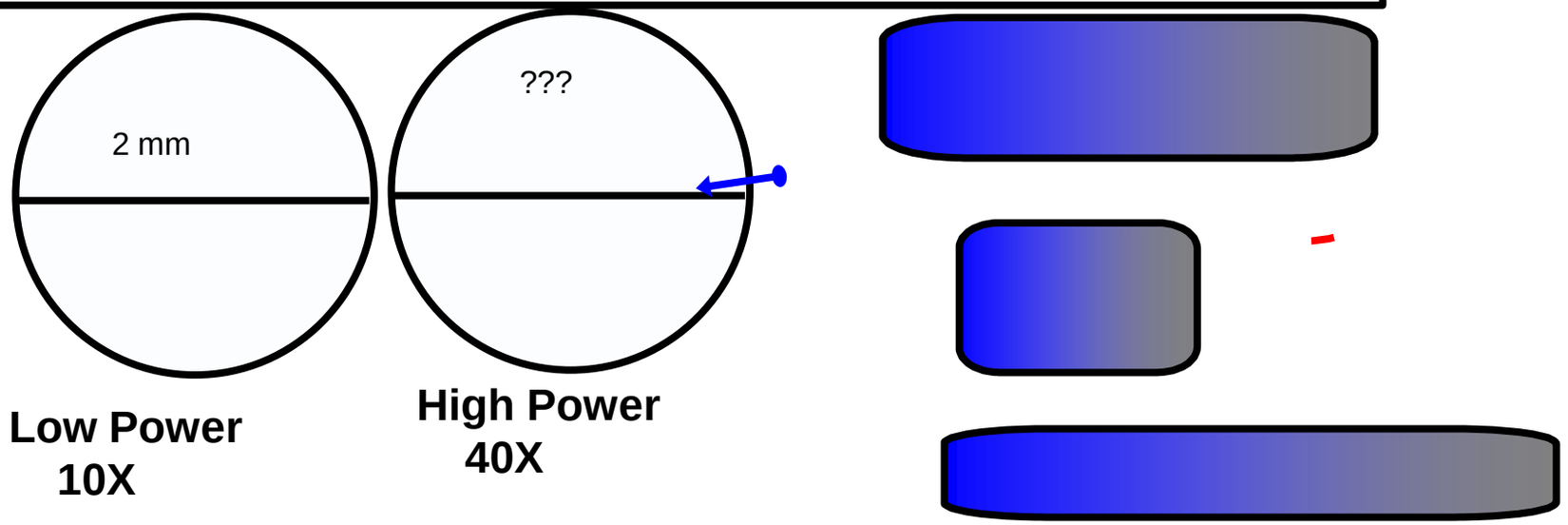
High Power
40X

$$\frac{10x}{40x} = \frac{x}{2.0mm}$$

$$20 = 40x$$

$$x = \frac{20}{40} = 0.5mm$$

$$\frac{\text{Low power magnification}}{\text{High power magnification}} = \frac{\text{High Power field diameter}}{\text{Low power field diameter}}$$



What is the high power field diameter?

$40X = 20\ mm$

$X = \frac{20}{40}$ **.5 mm = 500 microns**

1) Which is bigger a mm or a um?

2)H[redacted]

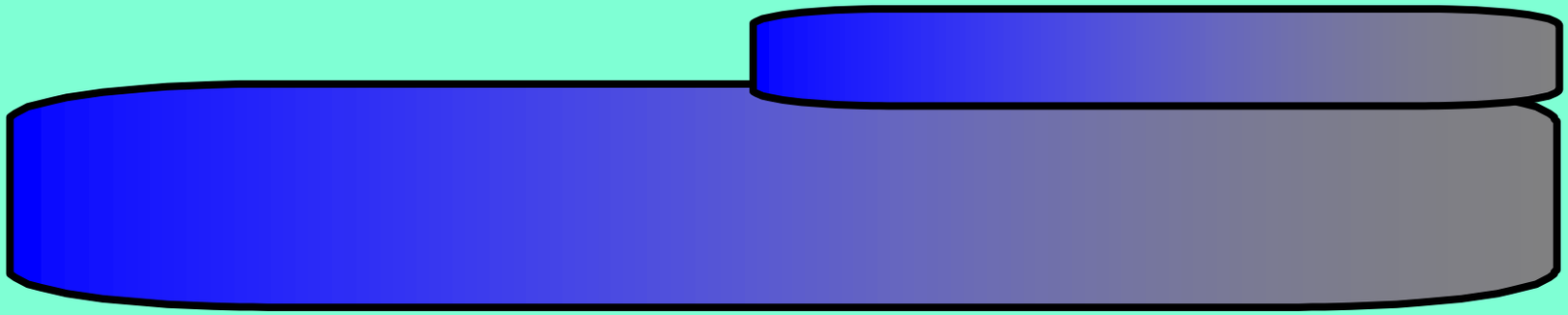
3)Which objective - low or high power would give you the largest field of view?

4) Which objective provides the most detail ? High or low?

5) If the field diameter is 5000um [redacted] th of one cell?

in um?

in mm? _____



Example #1:

ocular power = 10x
low power objective = 10x
high power objective = 50x

a) What is the highest magnification you could get using this microscope ?

b) If the diameter of the low power field is 2 mm,
what is the diameter ofthe high power field of view
in mm? in micrometers ?

IOx X 50 x =5OOx

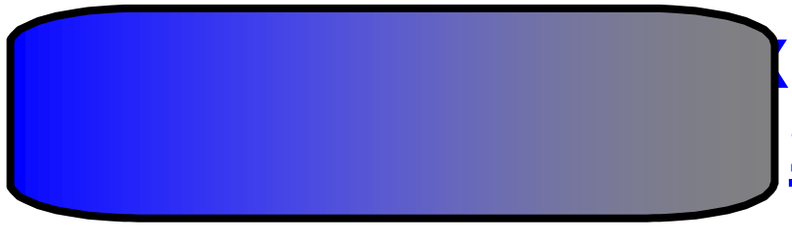
c) If 10 cells can fit end to end in the low power field of view, how big is each cell in mm ? um?

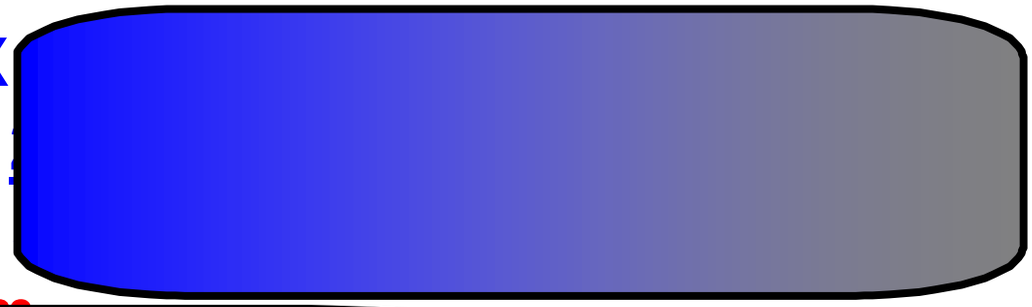
b) If the diameter of the low power field is 2 mm, what is the diameter ofthe high power field of view in mm? in micrometers ?

c) If 10 cells can fit end to end in the low power field of view, how big is each cell in mm ? um?

b)

$$\frac{\text{Low power magnification}}{\text{High power magnification}} = \frac{\text{High Power field diameter}}{\text{Low power field diameter}}$$





4 mm X 1000 = 400 um

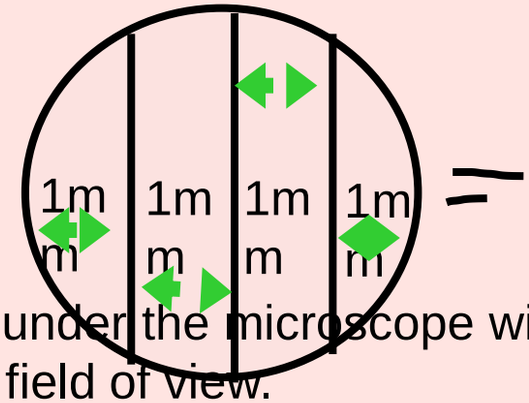
c) $\frac{\text{diameter}}{\text{\# of cells}} \frac{\text{2mm}}{\text{10 cells}}$ **1 cell =**

Example #2:

ocular power = 10x

low power objective = 10x

high power objective = 40x



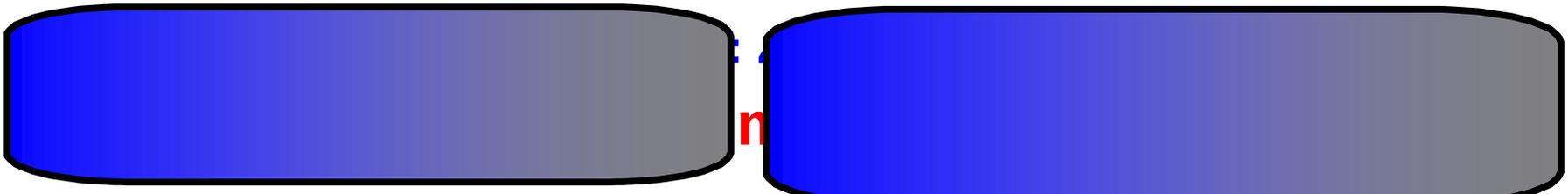
The diagram shows the edge of a millimeter ruler viewed under the microscope with the lenses listed above. The field shown is the low power field of view.

a) What is the approximate width of the field of view in micrometers ?

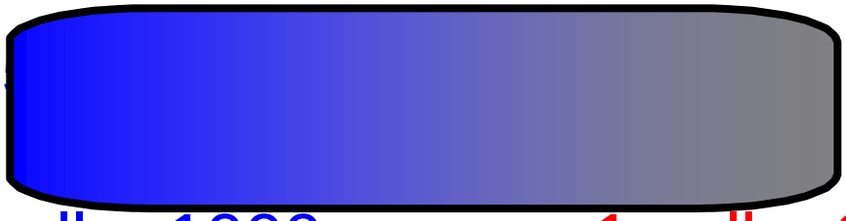
b) What would be the width of the field of view under high power ?

c) If 5 cells fit across the high power field of view, what is the approximate size of each cell ?

b)



c)



1 cell = 1000um 1 cell = 200 um = 2 mm