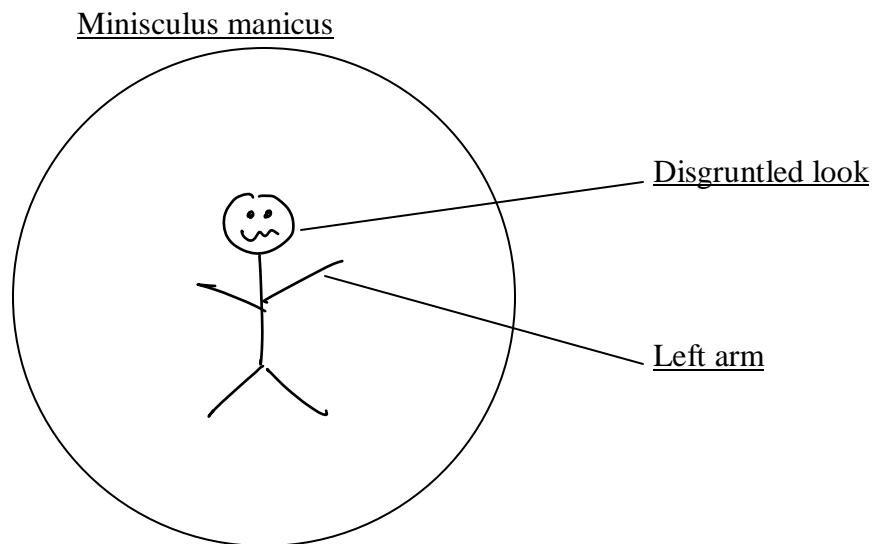


### Biological Diagrams:

- Use unlined paper
- Draw a circle to represent field of view
- Do one drawing per side
- Label the top of the circle with the name of the organism
- Draw the organism, to scale, within the circle. Show as much detail as possible.
- Use pencil only
- If labels are used, use ruled lines to point out the structure(s), and write the labels outside the circle, on the right side.
- Underneath the circle, list the following:
  - Viewed at \_\_\_\_\_x
  - Actual size \_\_\_\_\_mm or
  - Drawing magnification \_\_\_\_\_x



Viewed at 400x

Actual size **225  $\mu\text{m}$**

Drawing magnification **133 X**

## Calculating Magnification

### 1) General Formula

$$\text{Magnification} = \frac{\text{Drawing Size}}{\text{Actual Size}} \quad \text{or} \quad \frac{\text{D.S.}}{\text{A.S.}}$$

### 2) To calculate actual size

-estimate how many cells would fit across the field of view of you microscope (the circle you see!).

-Divide that number into the field of view size.

$$40x \quad \text{Low power} = 4350\mu\text{m}$$

$$100x \quad \text{Medium power} = 1750\mu\text{m}$$

$$400x \quad \text{High power} = 450\mu\text{m}$$

### 3) To calculate drawing size

-with a ruler, measure the size of your drawing of a cell and convert it to microns

$$1000\mu\text{m} = 1\text{mm}$$

### 4) Plug the numbers calculated in steps 2 and 3 into the formula from step 1.

Example:

#### Step 1:

$$\text{actual size} = \frac{\text{field of view}}{\# \text{ of times organisms fits}} = \frac{450\mu\text{m}}{2} = 225\mu\text{m}$$

#### Step 2:

$$\text{drawing size} = 30 \text{ mm} \times 1000 \mu\text{m} = 30000 \mu\text{m}$$

#### Step 3:

$$\text{Magnification} = \frac{\text{drawing size}}{\text{actual size}} = \frac{30000\mu\text{m}}{225\mu\text{m}} = 133 X$$

Magnification practice questions:

- 1) The high power field of view measures 450 $\mu$ m. Calculate the magnification if 45 cells span the field of view and the drawing of one cell measures 1.5cm?

**Step 1:**

$$\text{actual size} = \frac{\text{field of view}}{\# \text{ of times organsm fits}} = \frac{450\mu\text{m}}{45} = 10 \mu\text{m}$$

**Step 2:**

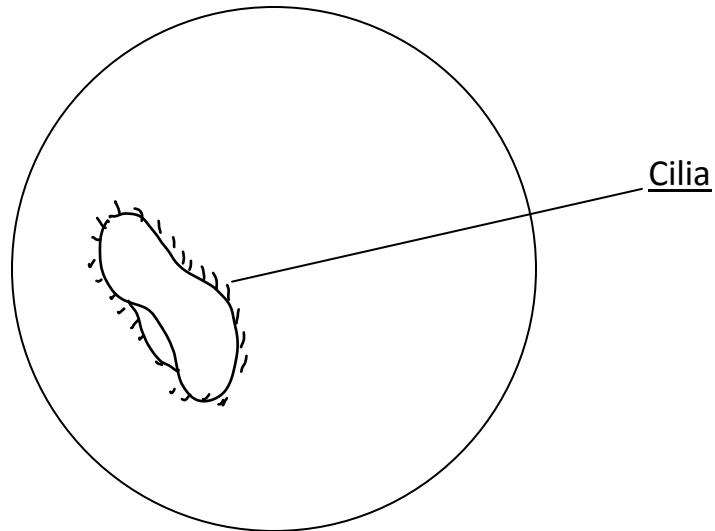
$$\text{drawing size} = 1.5 \text{ mm} \times 1000 \mu\text{m} = 1500 \mu\text{m}$$

**Step 3:**

$$\text{Magnification} = \frac{\text{drawing size}}{\text{actual size}} = \frac{1500\mu\text{m}}{10\mu\text{m}} = 150 X$$

2) Calculate the magnification of the paramecium shown below.

Paramecium caudatum



Viewed at Medium power

Actual Size: **875  $\mu\text{m}$**

Drawing Magnification: **32 X**

**Step 1:**

$$\text{actual size} = \frac{\text{field of view}}{\# \text{ of times organism fits}} = \frac{1750\mu\text{m}}{2} = 875 \mu\text{m}$$

**Step 2:**

$$\text{drawing size} = 28 \text{ mm} \times 1000 \mu\text{m} = 28000 \mu\text{m}$$

**Step 3:**

$$\text{Magnification} = \frac{\text{drawing size}}{\text{actual size}} = \frac{28000\mu\text{m}}{875\mu\text{m}} = 32 X$$