**Extension Station: The Microscope (Part 2)**

**(Microscopy Calculations)**

**Directions:** Complete the following procedure to learn how to make calculations of specimens seen under a microscope. Add your answers to the questions found on the answer sheet.

**Materials:** microscope, prepared slides (see Mrs. Côtè), white paper, petri dish, ruler, pencil

**Procedure:**

**How to measure the field of view:**

1. With the low power objective in place, put a transparent ruler onto the stage.
2. Position the millimeter marks on the ruler immediately below the objective lens.
3. Using the coarse adjustment knob, focus on the marks of the ruler.
4. Move the ruler so that one of the millimeter markings is just at the edge of the left side of your lfield of view. Find the diameter by counting how many millimeters take up the field of view. Record this on the handout page.

**Example: Assuming each line represents 1 mm, the field of view (FOV) would be 3 mm**

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\*Note: assume this is what you would see looking through the

microscope.

 **\*Complete question #1 on the extension handout.**

1. A field of view is often measured in micrometers (µm), there are 1000µm in every millimeter.

For the example above, there would be 3000 µm.

FOV x 1000

 3 x 1000

= 3000 µm

 **\*Complete question #2 on the extension handout.**

1. Most high-power lenses provide a field of view less than one millimeter making it hard to calculate with the eye so the field of view beyond low power (medium and high) can be calculated using the ratio of the other lenses to the low power magnification.

The equation below allows you to calculate the field of view for a power greater than low (so medium or high).

**FOV (high) = Low power FOV x 4**

 **High power magnification**

**FOV (medium) = Low power FOV x 4**

 **Medium power magnification**

Using the example from above, the field FOV for medium would be 1200 µm and the FOV for high would be 300 µm. Here is how that is calculated:

FOV (high) = 3 x 4 = 0.3 mm = 300 µm

 40

 FOV (Medium) = 3 x 4 = 1.2 mm = 1200 µm

 10

 **\*Complete question #3 on the extension handout.**

**How to estimate the Size of a Specimen**

1. Remove the ruler and replace it with one of the prepared slides provided.

**\*Complete question #4 on the extension handout.**

1. Estimate the number of times the specimen you are looking at could fit across the field of view (center of view).

**\*Complete question #5 on the extension handout.**

1. Calculate the width of the specimen. Show your calculations.

**Width of specimen = \_\_\_\_\_\_field of view**\_\_\_\_\_\_\_\_

**Number of specimens that fit across the field**

Example: Calculate the actual size of the object below in micrometers/cell using the microscope measurements from above.

 # Specimen estimated across FOV = 4.5 faces

 Width of faces under low = 3 mm = 0.67 mm = 670 µm/cell

 4.5 faces (face)

**\*Complete question #6 on the extension handout.**