Get into Focus!

Contributors

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Intended Audience

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>K-4</td>
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<tr>
<td>5-8</td>
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<tr>
<td>9-12</td>
<td>X</td>
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</table>

Activity Characteristics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Classroom Setting</td>
<td></td>
</tr>
<tr>
<td>Requires special equipment</td>
<td>X</td>
</tr>
<tr>
<td>Uses hands-on manipulatives</td>
<td>X</td>
</tr>
<tr>
<td>Requires mathematical skills</td>
<td></td>
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<tr>
<td>Can be performed individually</td>
<td>X</td>
</tr>
<tr>
<td>Requires group work</td>
<td></td>
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<tr>
<td>Requires more than one (45 min class) period</td>
<td></td>
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<tr>
<td>Appropriate for special needs student</td>
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Introduction

Description

In this lab activity, students will practice and demonstrate proper microscope techniques. Students will be provided with an introduction to microscopes and demonstration on dry and wet mounts.

Abstract

Microscopes are important tools in forensic science investigations and throughout activities in this module. In this activity, students will investigate basic microscope techniques and learn how to make a wet mount

Core Themes Addressed

<table>
<thead>
<tr>
<th>Microbial Cell Biology</th>
<th></th>
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<tbody>
<tr>
<td>Microbial Genetics</td>
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<tr>
<td>Microorganisms and Humans</td>
<td></td>
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<tr>
<td>Microorganisms and the Environment</td>
<td>X</td>
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<tr>
<td>Microbial Evolution and Diversity</td>
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<tr>
<td>Other</td>
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</tr>
</tbody>
</table>

Keywords

Microscopes, Wet Mount

Learning Objectives

At completion of this activity, learner will

1. Calculate total magnification
2. Demonstrate the correct way to make a wet mount

National Science Education Standards Addressed

Standard A: Science as Inquiry

- Abilities necessary to do scientific inquiry
Teacher Handout

Get into Focus!

Student Prior Knowledge

Students should have the following knowledge prior to completing this activity:

1. Be able to recognize major parts of a microscope.

Teacher Background Information

A microscope is an instrument used to see objects that are too small for the naked eye. The science of investigating small objects using such an instrument is called microscopy. There are many types of microscopes, the most common and first to be invented is the optical microscope which uses light to image the sample. Other major types of microscopes are the electron microscope and various types of scanning probe microscopes.

How to focus on specimens:

1. Start with the lowest objective (4 DIN) clicked into place and the stage in the lowest position.
2. Place slide on the stage and fasten with stage clips.
3. While looking through the ocular turn the coarse adjustment knob.
4. Looking through the ocular turn the fine adjustment knob to sharpen focus.
5. Once in focus, turn to the next higher objective.
6. Only use the fine adjustment.

Class Time

This activity will require a minimum of one 50 minute class period.

1. Introduction PowerPoint – 15 minutes
2. Lab Activity – 30 minutes
3. Wrap up questions/Review – 5 minutes
Teacher Preparation Time

This lesson will require approximately 30 minutes preparation time to print and cut out the letter “e” for each group.

Materials and Equipment (2 per group)

1. Microscope
2. Glass slide
3. Cover slip
4. Forceps
5. Paper letter “e”
6. Cotton ball
7. Small beaker of water
8. Disposable pipette
9. Pond water sample (Students were awarded extra credit for bringing in pond water samples from around the community)

Methods

1. Provide an overview of microscope parts and demonstration of how to use a microscope (PowerPoint).
2. Generate groups with two students per group.
3. Give each group a one set of activity materials: microscope, glass slide, cover slip, forceps, paper letter “e”, cotton ball, small beaker of water, disposable pipette, pond water sample.
4. In this activity, students will:
   a. Calculate total magnification.
   b. Complete the letter “e” activity under different magnifications.
   c. Prepare a wet mount of a cotton fiber and observe under different magnifications.
   d. Prepare a mount of pond water and draw something they find interesting.
5. As a wrap up, facilitate student discussion on how and why microscopes are used during forensic investigations.

Tips/Suggestions

1. Frequently check on groups to help them trouble shoot any issues.
2. To increase student involvement save a few interesting slides of pond water that are found throughout the day and show to students.
Answers to Student Handouts

1. What is the total magnification power of your microscope under the following operating conditions:
   a. 40X
   b. 100X
   c. 400X

   a. The letter “e” moved to the right.
   b. The letter “e” moved to the left.
   c. The letter “e” moved down.
   d. The letter “e” moved up.
Get into Focus!

Introduction

A microscope is an instrument used to see objects that are too small for the naked eye.

How to focus on specimens:

1. Start with the lowest objective (4 DIN) clicked into place and the stage in the lowest position.
2. Place slide on the stage and fasten with stage clips.
3. While looking through the ocular turn the coarse adjustment knob.
4. Looking through the ocular turn the fine adjustment knob to sharpen focus.
5. Once in focus, turn to the next higher objective.
6. Only use the fine adjustment.

Student Background Knowledge

Students should have the following knowledge prior to completing this activity:

1. Be able to recognize major parts of a microscope.

Vocabulary

**Ocular:** The lens at the top of the microscope that you look into. They are usually 10X.

**Stage:** The flat plate where the slides are placed for observation.

**Focus:** A means of moving the specimen closer or further away from the objective lens to render a sharp image.

Materials Checklist

<table>
<thead>
<tr>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microscope</td>
</tr>
<tr>
<td>Glass slide</td>
</tr>
<tr>
<td>Forceps</td>
</tr>
<tr>
<td>Paper letter “e”</td>
</tr>
<tr>
<td>Cotton ball</td>
</tr>
<tr>
<td>Disposable pipette</td>
</tr>
<tr>
<td>Pond water sample</td>
</tr>
<tr>
<td>Cover slip</td>
</tr>
</tbody>
</table>
Procedure

1. Calculate total magnification.
2. Complete the letter “e” activity under different magnifications.
3. Prepare a wet mount of a cotton fiber and observe under different magnifications.
4. Prepare a mount of pond water and draw something interesting.
Student Handout

Get into Focus!

Objectives: Students will be able to calculate total magnification and demonstrate the ability to make a wet mount.


Safety Precautions: Lab goggles

Instructions: Complete all of the procedures and answer all questions. Drawings should be done in pencil. The circles represent the field of view. Always remember to record the total magnification each drawing was made in as well as the specimen that was observed.

Procedure: Magnification

1. What is the total magnification power of your microscope under the following operating conditions?

<table>
<thead>
<tr>
<th>Objective</th>
<th>Ocular</th>
<th>Total Magnification (X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN 4</td>
<td>10X</td>
<td>______________________</td>
</tr>
<tr>
<td>DIN 10</td>
<td>10X</td>
<td>______________________</td>
</tr>
<tr>
<td>DIN 40</td>
<td>10X</td>
<td>______________________</td>
</tr>
</tbody>
</table>

Procedure: The Letter “e”

1. The teacher will provide each group with a cutout of a letter “e”.
2. Place the letter “e” on the slide face up and add a drop of water to the slide
3. Place the plastic cover slip on top of the “e”. Draw what is on the slide in Figure 1.
4. Place the slide on the stage and view in low power (4x). Center the “e” in your field of view. Draw what you see in Figure 2.

5. Move the slide to the left, what happens? Move the slide to the right, what happens? Up? Down? Record your answer below

What happened when you moved your slide to the left?

____________________________________________________________________________________

_____________________________________________________________________________________
What happened when you moved your slide to the right?
_____________________________________________________________________________________
_____________________________________________________________________________________

What happened when you moved your slide up?
_____________________________________________________________________________________
_____________________________________________________________________________________

What happened when you moved your slide down?
_____________________________________________________________________________________
_____________________________________________________________________________________

6. View the specimen in high power (10x). Use the fine adjustment only to focus. Draw what you see in Figure 3.

Figure 3

Stop here and wait for you teacher to demonstrate the next steps.

Procedure: Wet Mount

1. Gather a few strands of cotton from a cotton ball using forceps and place it on the middle of your slide. If your specimen is too thick, then the coverslip will wobble on top of the sample and you will not be able to view it clearly.
2. Place one drop of water on the cotton fibers already on the slide.
3. Add the coverslip as demonstrated by your teacher. Performed correctly, the coverslip will perfectly fall over the specimen
4. Draw the specimen as it appears in your viewing field under each magnification (4x, 10x and 40x) in Figures 4, 5 and 6.

Figure 4

Total Magnification

Specimen

Figure 5

Total Magnification

Specimen

Figure 6

Total Magnification

Specimen
Procedure: Pond Water

1. Clean the slide and cover slip that you used for the cotton fiber with a paper towel and dispose of the cotton fibers; you will be reusing this slide.
2. Place one drop of pond water on the middle of your slide.
3. Place the cover slip on the pond water at a 45-degree angle to avoid air bubbles.
4. Using the 4X and 10X objectives find something interesting in your pond water sample and draw them in Figures 7 and 8.

Figure 7

Total Magnification

________

Specimen

_____________________

Figure 8

Total Magnification

________

Specimen

_____________________