Instructions

This lab contains FLASH components which currently do NOT work on iPod's, iPad's, iPhones and iPod touches. PDF links are provided where Flash would normally have been viewed.

There are currently problems with opening this lab in Adobe Reader XI, compatibility problems between this reader and its previous version are currently being experienced by all users. Please open this lab in Adobe Reader X in order to experience the full interactivity.
While moussing over this lab you will notice a hand with a downward facing arrow on it, this is the default pointer. When the pointer changes to a pointing hand this means you are directly above an interactive component of this lab.

Click on web addresses throughout the lab to open the address in a separate page of your web browser.

Click on the arrow buttons in the bottom corners of the lab to navigate to the next or previous page.

Screenshots are not accepted for components of this lab that require hand drawn pictures.

If you have any problems please contact your
Student Support Officer
07 3307 4779

Activity One

The Microscope Lab

If the Audio does not play click here

Click to begin

Activity One

The Microscope Lab

Objective

To learn how to use the microscope and its parts correctly.

Materials

Microscope Link
Coloured Pencils
Paper
Lab Sheet

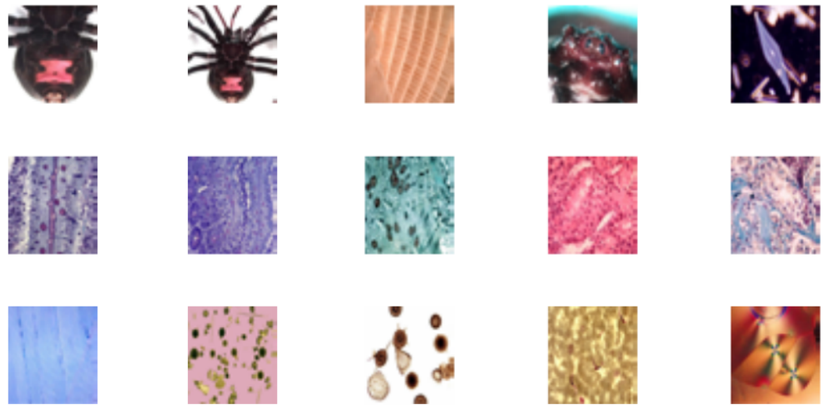
*additional links provided as needed

Because biological objects can be very small, a microscope is often used to view them. There are several types of light microscopes; the compound microscope will be the one used during this virtual lab.

Light microscopes use light rays that are magnified and focused by means of lenses. The binocular dissecting microscope is designed to study entire objects in three dimensions at low magnification.

The compound light microscope is used for examining small or thinly sliced sections of objects under magnification that is higher than that of the dissecting light microscope. Illumination is from below, and the light passes through clear sections but does not pass through opaque sections. To improve contrast, the microscopist uses stains or dyes that bind to cellular structures and absorb light.

Below you can view some images from a light microscope provided by the University of Aberdeen.



Hover over the thumbnails to enlarge them

you can also open the image in a PDF by clicking here
(screen reader friendly)

Photos by:

Kevin Mackenzie
04/10/2000
www.abdn.ac.uk

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hover your mouse over the different names below to view the part, you will need to identify these later in the lab.

Ocular Lense
Ocular Tube
Diopter Adjustment
Head
Body
Nosepiece or Turret
Objective Lenses
Arm
Course Focus Knob
Fine Focus Knob
Base
Mechanical Stage
Stage Clips
Stage Control Knobs
Condenser System
Diaphragm Lever
Condensor Focus
Feild Iris Diaphragm
Brightness/Power
Power Cord

The Microscope Lab

Microscopes have a variety of parts that must be used correctly before an image will become visible. Using a light microscope takes lots of practice that we can simulate using a virtual microscope.

Microscope

-noun-

Instruments that produce enlarged images of small objects, allowing them to be viewed at a scale convenient for examination and analysis. Formed by various means, the image is received by direct imaging, electronic processing, or a combination of these methods.

The most familiar type of microscope is the optical, or light, microscope, in which lenses are used to form the image. Other types of microscopes use the wave nature of various physical processes, the most important being the electron microscope, which uses a beam of electrons in its image formation.

Crude microscopes date to the mid-15th century, but it was not until 1674 where the powerful microscopes of *A. van Leeuwenhoek* was able to detect phenomena as small as protozoa.

The picture of the compound microscope shows where these features are typically found. Please be aware that not all microscopes will look exactly the same so some of the features may be found around the general area, but may vary in placement.

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Reference

Merriam-Webster Online
Home Page, Search, Microscope
Concise Dictionary

http://www.merriam-webster.com/dictionary/microscope

Activity One

Total Microscope Magnification

Total magnification is calculated by multiplying the magnification of the ocular lens (eyepiece) by the magnification of the objective lens.

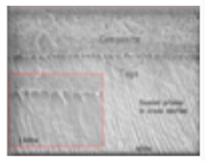
For instance if your ocular is 10x and low power is 4x the total magnification for that lens is 40x.

Some microscopes allow you to use oil with the 100x magnification. The oil helps focus the light providing in depth detail on small specimens (i.e. bacteria).

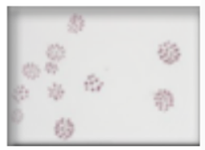
The Microscope Lab

Using your knowledge of microscope magnification answer the questions 1-3 to the right.

you can also open the image in a PDF by clicking here (screen reader friendly)



You have been asked to identify which objective the slides to the right have been viewed under. (Hover over the pictures to the right to view a larger version of the image)



You are given the magnification of the oculars and the magnification of the objectives along with the total magnification of the slide. You need to fill in the ocular and the objective used that will equal the magnification sighted.

See Ocular and Objective Magnification options in the far right column

1. A microscope has an eyepiece lens with a power of 5X. The objective lens being used has a power of 10X.
Total Magnification

2. A microscope has an eyepiece lens with a power of 15X. The objective lens being used has a power of 40X.
Total Magnification

3. A microscope has an eyepiece lens with a power of 10X. The objective lens being used has a power of 10X.
Total Magnification

4. The following slide is viewed under 1,500X and 400x. What is the magnification of the ocular and the objective used for 1,500x and 400x?

1,500x Ocular _____ Objective _____
400x Ocular _____ Objective _____

5. The following slide is viewed under 600X. What is the magnification of the ocular and the objective used 600x?

600x Ocular _____ Objective _____

6. The following slide is viewed under 500X. What is the magnification of the ocular and the objective used 500x?

500x Ocular _____ Objective _____

7. The following slide is viewed under 200X. What is the magnification of the ocular and the objective used 200x?

200x Ocular _____ Objective _____

8. The following slide is viewed under 10,000X. What is the magnification of the ocular and the objective used 10,000x?

10,000x Ocular _____ Objective _____

To open the information in a PDF click here (screen reader friendly)

Hover over the different options to view

Ocular Magnification

Option 1
Option 2
Option 3

Objective Magnification

Option 1
Option 2
Option 3
Option 4

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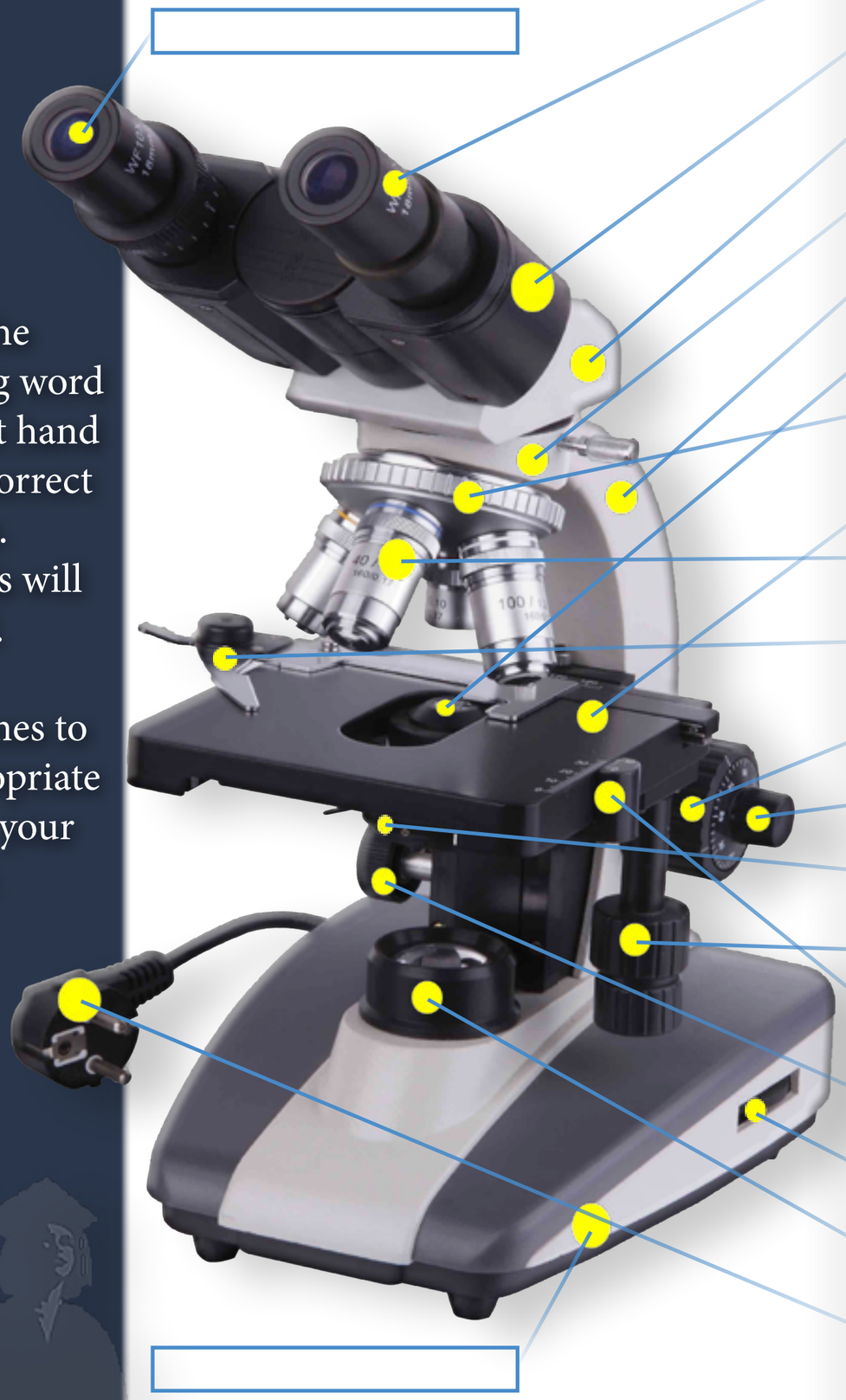
Activity One

The Microscope Lab

Type in the corresponding word from the right hand list into the correct text box.
Not all words will be used.

Follow the lines to find the appropriate text box for your answer.



Procedures

Illuminator
Brightness/ON-OFF
Field Iris Diaphragm
Condenser Focus Knob
Arm
Mechanical Stage
Fine Focus Knob
X Stage Control Knob
Y Stage Control Knob
Condensor System
Objectives
Ocular Tube
Revolving Nosepiece
Coarse Focus Knob
Diaphragm Lever
Diopter Adjustment
Body
Power Cord
Ocular Lenses
Stage Control Knob

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THE MICROSCOPE LAB

Answer the following questions.

1. What moves the stage up and down?

2. How can you tell low, medium and high power objectives apart? (there are three ways, please explain two)

3. Where do you set the slide?

- (•) **Base**
- ( ) **Arm**
- ( ) **Stage**

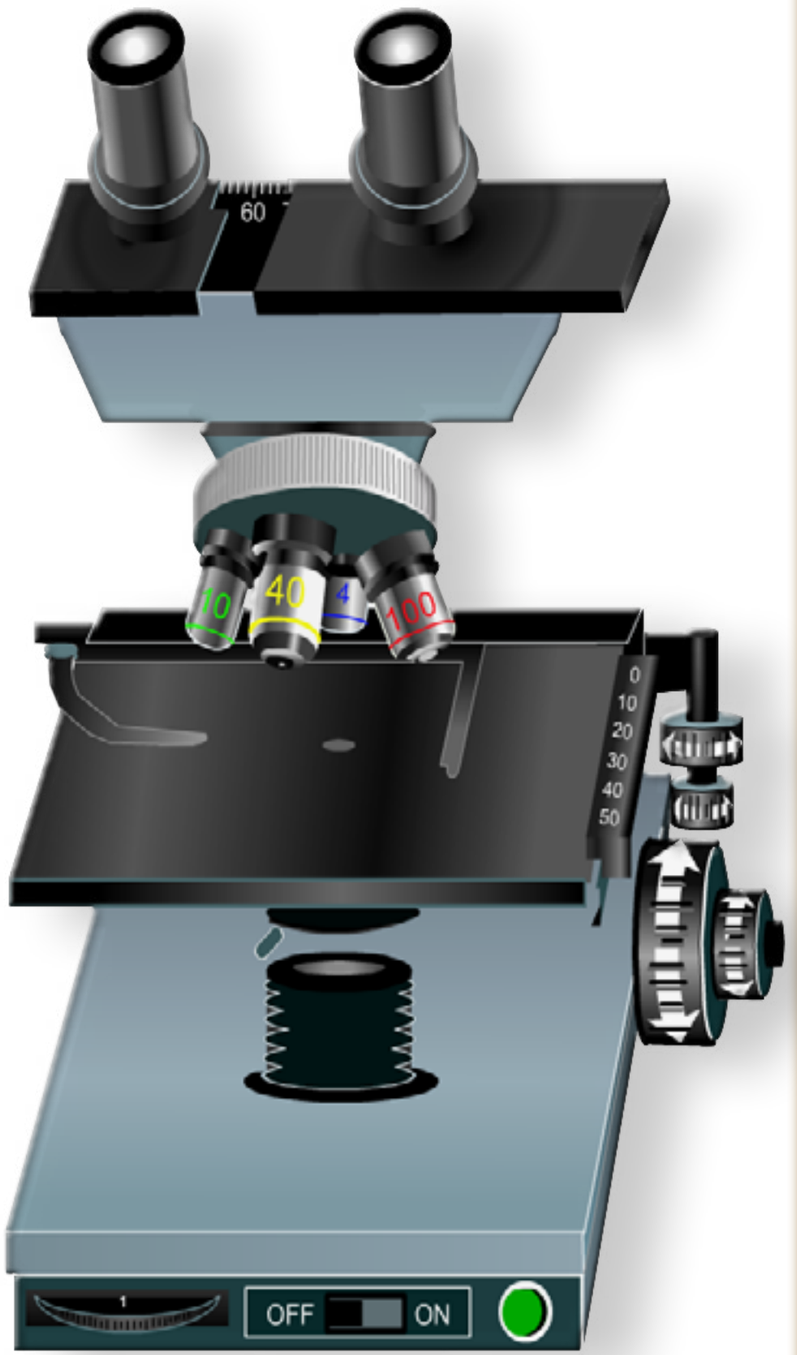
4. Describe the fine adjustment?

5. Describe the coarse adjustment?

6. If you were not sure as to which is the coarse and which is the fine adjustment how would you determine this?

7. Which magnification would you use if you were using oil with the microscope?

8. How do you control the amount of light that enters a microscope?



Procedures

Refer to this image of the online microscope for the questions.

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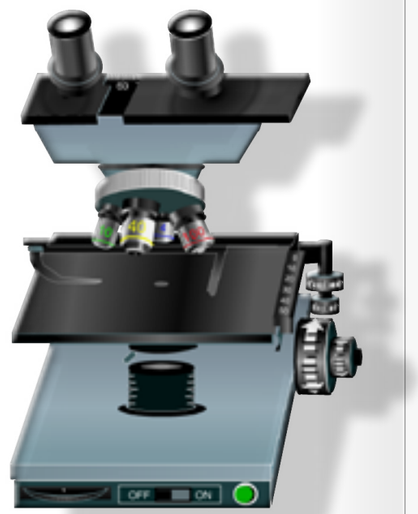
Activity One

The Microscope Lab

1. click the image below to view a tutorial on how to locate the letter 'e' and a brief tutorial on using the Online Virtual Microscope

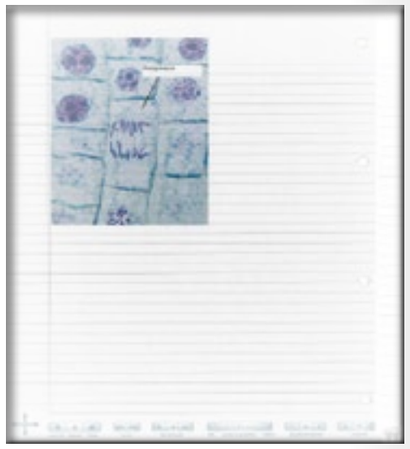
Once you have completed the tour in question 1 please follow the instructions below:

The image to the right will take you to the Online Virtual Microscope Lab. If you feel you need a more in-depth tour of how to use this microscope then please complete the optional tour.



2. Draw the letter 'e' under all powers on a separate sheet of paper by using the Online Virtual Microscope. Don't forget to label your pictures for the magnification level of each image.

Click the Pencast image to the right to view an example of how to draw and label the images you view under the Online Virtual Microscope



Procedures

3. Look at two other slides in the Online Virtual Microscope Lab.
(your choice)

4. Draw the slides under two different powers. Draw the pictures as viewed under each magnification in colour.

(Remember to label the pictures with the magnification in colour and the magnification level used.)

Save all of your drawings to your desktop and name them according to the question they pertain to (i.e. Q1 letter e under 10x, etc.)

You will attach these images to an email at the end of this lab.

Save all of your drawings to your desktop and name them according to the question they pertain to

(i.e. Q1 letter e under 10x, etc...)

You will attach these images to an email at the end of this lab.

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The Microscope Lab

Answer the following questions once you have completed the virtual lab activity.

1. When do you use coarse adjustment to focus?

2. When do you use fine adjustment to focus?

3. Why don't you use coarse adjustment on the highest magnification?

4. What power can you see the most detail?

5. What power were the images the clearest under?

6. Does low power or high power have a larger field of view and allow you to see more of the object?

7. What is the magnification of each objective lens?

Low	
Medium 1	
Medium 2	
High	

8. Were all images clearest under the same power? Why or why not?

9. Why is locating an objective more difficult if you start with the higher power objectives than with the scanning (low power) objective?

10. What is inversion? How does it apply to the microscope?

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Submit to Tutor

Before you click Submit !!!

Make sure that after you click the 'Submit' button to send this lab to your tutor via email you remember to add all of your drawings to the email as attachments!

Otherwise the your tutor may grade the lab as if you did not complete the drawings.

If you have any problems please contact your Student Support Officer
07 3307 4779