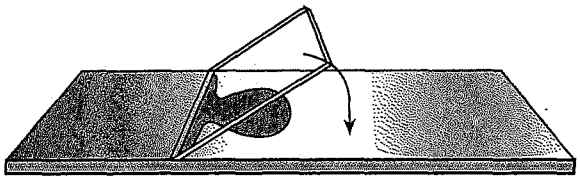
Name_____

Metric Measurement & Microscope Review
LE

1. While viewing a specimen under high power of a compound light microscope, a student noticed that the specimen was out of focus. Which part of the microscope should the student turn to obtain a clearer image under high power?
   1) eyepiece
   2) coarse adjustment
   3) fine adjustment
   4) nosepiece

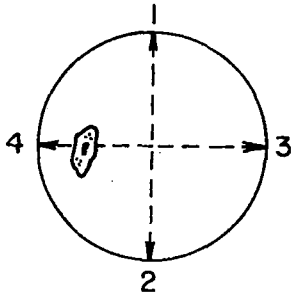
2. The diagram below shows how a coverslip should be lowered onto some single-celled organisms during the preparation of a wet mount.



   Why is this a preferred procedure?
   1) The coverslip will prevent the slide from breaking.
   2) The organisms will be more evenly distributed.
   3) The possibility of breaking the coverslip is reduced.
   4) The possibility of trapping air bubbles is reduced.

3. Onion epidermis is a suitable tissue to use for observing cellular structures with a compound light microscope because this tissue is thin enough to
   1) fit on top of a coverslip
   2) be placed very close to the ocular
   3) allow water to diffuse through the cell membrane
   4) allow light to pass through it

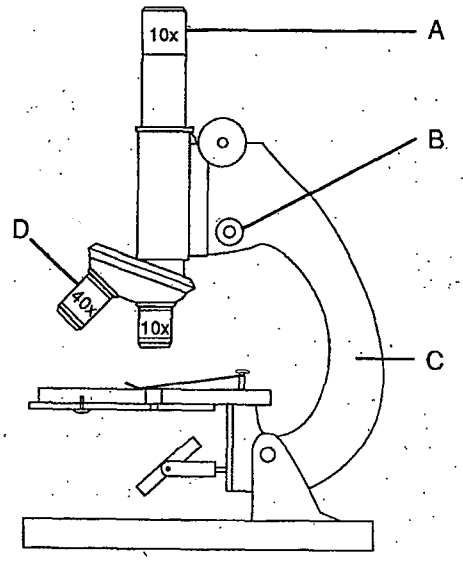
4. The diagram below shows a cell as seen in the low-power field of a compound microscope.



   In which direction should the slide be moved to center the cell in the field of view?
   1) toward 1
   2) toward 2
   3) toward 3
   4) toward 4

5. Which part of a compound light microscope should a student adjust to allow more light to pass through a specimen?
   1) fine adjustment
   2) ocular
   3) diaphragm
   4) stage

6. Base your answer to the following question on the diagram below of a microscope and on your knowledge of biology.



   While viewing a specimen under high power, a student noticed that the specimen was out of focus. Which part of the microscope should the student use to obtain a clearer image?
   1) *A*
   2) *B*
   3) *C*
   4) *D*

7. A student is examining stages of mitotic cell division with a compound microscope. Some of the steps she takes are listed below.

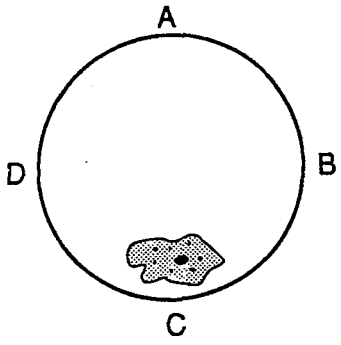
   A Focus under high power using the fine adjustment.
   B Position the specimen under low power.
   C Scan the field of view under low power.
   D Focus under low power using the coarse adjustment.
   E Adjust the diaphragm opening.

   What sequence of steps should the student follow?
   1) *A-C-B-E-D*
   2) *D-A-B-C-E*
   3) *B-E-D-C-A*
   4) *C-E-B-A-D*

8. A specimen was viewed under the high-power objective of a compound light microscope. Its length was estimated to be 0.75 millimeter. What is the approximate length of the specimen in micrometers?
   1) 0.00075
   2) 0.75
   3) 75
   4) 750

9. Which part of a microscope should be used with the low-power objective, but *not* with the high-power objective?
   1) coarse adjustment
   2) fine adjustment
   3) diaphragm
   4) ocular

10. The diagram below represents a cell in the field of view of a compound light microscope.



In which direction should the slide be moved on the microscope stage to center the cell in the field of view?

1) toward *A*
2) toward *B*
3) toward *C*
4) toward *D*

11. A student using a compound microscope measured the diameter of several red blood cells and found that the average cell length was 0.008 millimeter. What is the average length of a single red blood cell in micrometers?

1) 0.8
2) 8
3) 80
4) 800

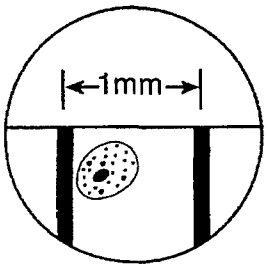
12. A student used a light microscope to observe a cell under low power. After the student switched to high power and attempted to focus, the cell was no longer visible. What was most likely the cause of the disappearance of the cell?

1) The diaphragm was open while the student observed the cell under low power.
2) The distance between the specimen and the objective lens decreased after the student switched to high power.
3) The student focused the eyepiece before observing the cell under high power.
4) The cell was not in the center of the field of view when the student observed it under low power.

13. To locate a specimen on a prepared slide with a compound microscope, a student should begin with the low-power objective rather than the high-power objective because the

1) field of vision is smaller under low power than under high power
2) field of vision is larger under low power than under high power
3) specimen does not need to be stained for observation under low power but must be stained for observation under high power
4) portion of the specimen that can be observed under low power is less than the portion that can be observed under high power

14. What is the approximate diameter of the cell shown in the low-power field of a compound light microscope represented below?

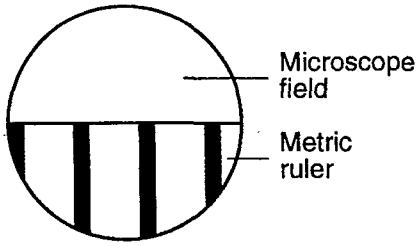


1) 100 μm
2) 500 μm
3) 800 μm
4) 1,000 μm

15. A student determined the diameter of the low-power field of a compound microscope to be 1.20 millimeters. What portion of the field diameter would be occupied by an organism that is 600 micrometers long?

1) $\frac{1}{2}$
2) $\frac{2}{3}$
3) $\frac{1}{3}$
4) $\frac{1}{4}$

16. Each division of the metric ruler shown in the diagram below equals 1 millimeter.



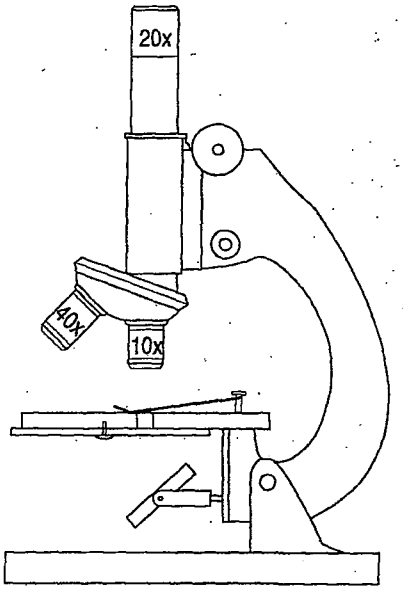
The diameter of the field of vision is approximately

1) 2,800 μm
2) 3,700 μm
3) 4,400 μm
4) 4,700 μm

17. Which group of measurement units is correctly arranged in order of increasing size?

1) micrometer, millimeter, centimeter, meter
2) millimeter, micrometer, centimeter, meter
3) meter, micrometer, centimeter, millimeter
4) micrometer, centimeter, millimeter, meter

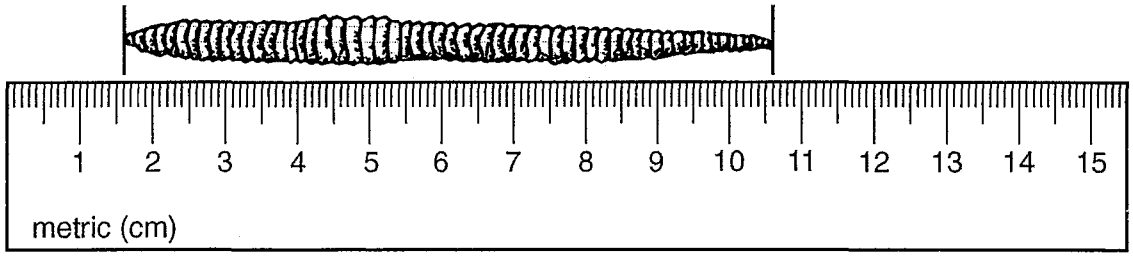
18. What is the *lowest* possible magnification that can be obtained using the microscope shown below?



1) 20×
2) 200×
3) 40×
4) 800×

19. Which environmental factor could have a temperature of 39°C?
    1) water temperature at the North Pole in March
    2) water temperature in a lake in New York State in January
    3) air temperature in a desert in the southwestern United States during a day in July
    4) air temperature in the Adirondack Mountains of New York State in December

20. What is the approximate length of the earthworm shown in the diagram below?



1) 9 mm
2) 90 mm
3) 10.6 cm
4) 106 cm

21. A certain plant has white flower petals and it usually grows in soil that is slightly basic. Sometimes the plant produces flowers with red petals. A company that sells the plant wants to know if soil pH affects the color of the petals in this plant. Design a controlled experiment to determine if soil pH affects petal color. In your experimental design be sure to:

- state the hypothesis to be tested in the experiment
- state *one* way the control group will be treated differently from the experimental group
- identify *two* factors that must be kept the same in both the control group and the experimental group
- identify the dependent variable in the experiment
- state *one* result of the experiment that would support the hypothesis

22. Base your answer to the following question on the passage below and on your knowledge of biology. The letters indicate paragraphs.

Yellow Fever

Paragraph *A*

A team of doctors was sent to Havana, Cuba, to study a yellow fever epidemic. The doctors wanted to find out how the pathogenic microbe that causes yellow fever is transferred from those who are sick to those who are well. Some people thought that the disease was spread by having contact with a person who had the disease or even through contact with clothing or bedding that they had used.

Paragraph *B*

It was known that yellow fever occurred more frequently in swampy environments than in environments that were dry. Consequently, some people thought that the disease was due to contact with the atmosphere of the swamps. A respected doctor in Havana was convinced that a particular species of mosquito, *Aedes calopus*, spread the disease.

Paragraph *C*

The team of doctors carried out several experiments and collected data. They built poorly ventilated houses in which American soldiers volunteered to sleep on bedding used by individuals who had recently died of yellow fever in local hospitals. The soldiers also wore the night-shirts of those who had died. The houses were fumigated to kill all mosquitoes and the doors and windows of the houses were screened. None of the soldiers living in these houses contracted the disease, though the experiment was tried repeatedly.

Paragraph *D*

In another experiment, the team built houses that were tightly sealed. The doors and windows were screened. The insides of the houses were divided into two parts by mosquito netting. One part of the house contained a species of mosquito, *Aedes calopus,* that had been allowed to bite yellow fever patients in the hospital. There were no mosquitoes in the other part of the house. A group of volunteers lived in each part of the house. A number of those who lived in the part of the house with the mosquitoes became infected; none of those in the other part of the house did.

Paragraph *E*

Putting these facts together with other evidence, the team concluded that *Aedes calopus* spread the disease. The validity of this conclusion then had to be tested. All newly reported cases of yellow fever were promptly taken to well-screened hospitals and their houses were fumigated to kill any mosquitoes. The breeding places of the mosquitoes in and around Havana were drained or covered with a film of oil to kill mosquito larvae. Native fish species known to feed on mosquito larvae were introduced into streams and ponds. The number of yellow fever cases steadily declined until Havana was essentially free of the epidemic.

- What is a possible hypothesis being tested?
- Explain how the control & experimental groups differ.
- What kind of data should be/was collected?

Name _____ Class _____ Date _____

21.

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21. Write your answers
22. in the spaces provided on the top right of this sheet

22.