

Virtual Microscope Worksheet

Plant and animal cells: leaf cells (Elodea) and cheek cells

Name: _____ Class: _____ Date: _____

Instructions

- Open the virtual microscope (<https://edtechsim.com/virtual-microscope/>) and use the slide named in each part. Use a sharp pencil for drawings.
- Answer in the spaces provided. The marks for each question are shown in square brackets.
- The scale in the virtual microscope is an estimate, so your measurements may differ slightly from other students'.



Part A: Using the microscope

9 marks

The eyepiece lens of the virtual microscope is $\times 10$.

total magnification = eyepiece magnification $\times$ objective magnification

A1. Complete the table.

(a) Total magnification of each objective lens.

[2]

Objective lens	Eyepiece lens	Total magnification
10 $\times$	10 $\times$	
40 $\times$	10 $\times$	

(b) A microscope has a $\times 10$ eyepiece. Which objective lens gives a total magnification of $\times 1000$?

[1]

Objective lens: _____ $\times$

A2. The steps for focusing on a slide are in the wrong order. Write the numbers 1 to 5 in the boxes to show the correct order.

[2]

	Switch to the 40 $\times$ objective lens.
	Use only the fine focus to make the image sharp again.
	Check that the 10 $\times$ objective lens is in position.
	Turn the fine focus until the image is sharp.
	Turn the coarse focus until the cells are roughly clear.

A3. Answer the questions about using the microscope.

(a) Give one reason why you should always start on the lowest power. [1]

(b) Explain why only the fine focus should be used at high power (40×). [1]

(c) Circle the correct word in each pair. When the diaphragm is closed, the image becomes **brighter** / **darker** and the contrast becomes **higher** / **lower**. [2]

Part B: Leaf cells (Elodea)

17 marks

Select the Leaf cells slide. Start at 10× (100× total) and focus sharply.

B1. Look at the leaf at 100× total magnification.

(a) Describe the shape and arrangement of the cells. [2]

(b) A dark band runs across the leaf. What is it called? [1]

B2. Switch to 40× (400× total) and refocus using the fine focus only. Name each structure. [3]

Description	Structure
The rigid layer around each cell that gives it a fixed rectangular shape.	
The small green discs that absorb light for photosynthesis.	
The large fluid-filled space in the middle of the cell.	

- B3.** Draw two or three neighbouring cells as you see them at 400×. Label the cell wall, a chloroplast and the vacuole. **[5]**

Drawing checklist: title and magnification written in the box; sharp pencil lines, no shading; label lines drawn with a ruler and not crossing.

Title: _____Magnification: × _____

- B4.** Turn on Measure and measure the length of one chloroplast at 400×. **[1]**

Length of chloroplast = _____ μm

- B5.** A drawing of this chloroplast is 30 mm long. Use your answer to B4 to calculate the magnification of the drawing. Show your working. **[2]**

magnification = image size ÷ actual size (use the same units for both)

.....

.....

.....

- B6.** Answer the questions about leaf cells.

- (a) Why do the cells look green? **[1]**

- (b) What fills most of the clear space inside each cell? **[1]**

- (c) Explain why you cannot see the chloroplasts clearly at 100×. **[1]**

.....

.....

Part C: Cheek cells

12 marks

Select the Cheek cells slide. Start at 10× (100× total) and focus sharply.

C1. Observe the cells.

- (a) At 100×, describe the shape of the cheek cells and how they are arranged. [2]

- (b) At 400×, describe the nucleus. [2]

C2. Explain why the cheek cells were stained blue. [2]

C3. Draw one cheek cell as you see it at 400×. Label the nucleus, the cytoplasm and the cell membrane. [5]

Drawing checklist: title and magnification written in the box; sharp pencil lines, no shading; label lines drawn with a ruler and not crossing.

Title: _____ Magnification: × _____
--

C4. Measure the width of the nucleus at 400×. [1]

Width of nucleus = _____ μm

Part D: Comparing plant and animal cells

9 marks

D1. Put a tick (✓) if the structure is present or a cross (X) if it is absent.

[5]

Structure	Leaf cell	Cheek cell
Cell wall		
Chloroplasts		
Large central vacuole		
Nucleus		
Cell membrane		

D2. Explain why a cheek cell has an irregular outline but a leaf cell is rectangular.

[2]

.....

.....

D3. State one function of each structure.

(a) Chloroplast

[1]

.....

(b) Cell wall

[1]

.....

E1. A student looks at an Elodea leaf using a $\times 10$ eyepiece and a $\times 40$ objective lens.

(a) Calculate the total magnification.

[1]

(b) A chloroplast has an actual length of $8\text{ }\mu\text{m}$. In the student's drawing it is 3.2 mm long. Calculate the magnification of the drawing. Show your working.

[3]

E2. A student draws a cheek cell. The drawing is 90 mm wide and the magnification of the drawing is $\times 1500$. Calculate the actual width of the cell in μm . Show your working.

[3]

E3. Explain why cheek cells must be stained before they are viewed but Elodea leaf cells do not need to be.

[2]

E4. The image is too dark. Describe two ways to make it brighter.

[2]

End of worksheet. Total: ____ / 58