

# Are Fruits and Vegetables Really Made of Cells?

## Task Information

**Subject:** Biology

**Content:** MST Framework Reference:  
 Standard 1 - Analysis, Inquiry, & Design: Scientific Inquiry  
 Standard 4 - Science: The Living Environment  
 Regents Biology Syllabus:  
 Unit I, Topic III  
 Variance Biology Program Guide:  
 Energy, Matter, and Organization: Levels of Organization  
 RCT Guide in Science:  
 Middle School Block C - Living Systems

**Format:** manipulative

**Purpose:** To demonstrate that a given fruit or vegetable is cellular, and be able to communicate this fact.

**skills:** **Primary:** Investigation, Collecting Data  
**Secondary:** Data Interpretation, Communication

**Time:** 1-2 class periods (40-45 minutes each), with introduction given before the class period

**Materials:** Compound microscopes, slides and cover slips, stains (iodine, methylene blue), plant dissection equipment, cotton swabs, beakers, paper towels, toothpicks, a variety of fruits and vegetables as described below.

**Preparation:** This assessment would be given to students after they had done the classical onion and check cell lab, and preparing wet mounts.

Having the students design an exercise that the teacher approves before the students begin their work has purposefully been left out. The idea behind this assessment is what can the students do on their own: here is a problem, solve it. Part of this assessment is to see what the students really do in going about the solving of the problem. The teacher must be available for help though, whether solicited or not.

A wide sampling of fruits and vegetables should be available to the students: apple, pear, potato, celery, banana, squash, tomato, turnip, radish, and cucumber are all good choices. These may be supplied by the teacher or students may be asked to bring them from home. The samples should be checked for easily seen cells. Samples such as oranges and grapefruits are generally not good to use unless some tissue is taken from the rind. Samples such as kidney beans, peas, peaches, strawberries, and blueberries should be avoided. Students should not be asked to bring in just any fruit or vegetable from home without checking with the teacher first.

**Safety:** Be certain MSDS information is available for each chemical substance used in this activity.

**Extensions/Modifications:** None

# Student Response

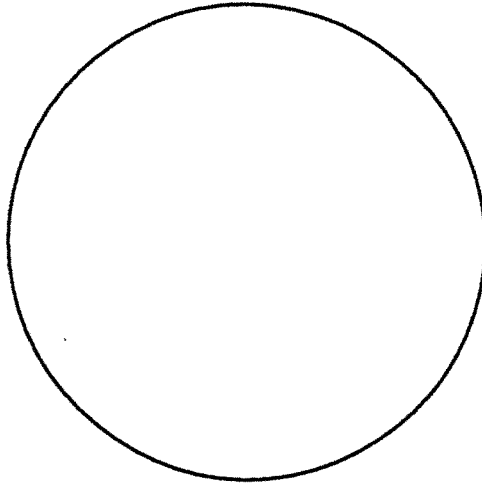
April 29, 1996

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Name \_\_\_\_\_

Materials:

Observation:





# Are Fruits and Vegetables Really Made of Cells?

## Scoring Rubric

**Maximum Score - 17 points**

What is looked for in this assessment is the ability of the student to: realize that cells are small, therefore a microscope is to be used; realize that a thin section of tissue is needed so that light can pass through; be able to prepare a wet mount slide; realize the need for a stain to observe the cells better; and be able to communicate the shape of the cells and their relationship to other cells by drawing.

### 1. Ability to work independently 5 points total

- Allow 5 points if the student works independently with little or minor input from teacher.
- Allow 4 points if the student's work was somewhat independent with minor input from teacher.
- Allow 3 points if student's work was somewhat independent with medium input from teacher.
- Allow 2 points if student's work was dependent on major input from someone else.
- Allow 1 point if student's work was dependent on someone else.
- No credit if the work was not done.

### 2. Technique and procedure 5 points total

- Allow 5 points if proper techniques and procedures were clearly demonstrated.
- Allow 4 points if techniques and procedures were correct, but showed minor faults (e.g.: sample was sliced a little too thick OR not enough stain was placed on the sample OR slide did not have enough water on it OR correct power of the microscope was not used to demonstrate slide)
- Allow 3 points if techniques and procedures were marginal, and showed major faults (ex: sample was sliced too thick OR no stain was added to the sample OR sample was placed directly on dry slide), difficulty in locating and focusing on cells.
- Allow 2 points if techniques and procedures were poor (ex: compound faults such as a combination of those listed in the 3 point section).
- Allow 1 point if student was able to produce a usable slide, but only with the help of someone else.

### 3. Slide 3 points total

- Allow 3 points if the slide shows excellent examples of stained cells.
- Allow 2 points if the slide showed cells, but individual cells were hard to see clearly.
- Allow 1 point if the slide showed tissue, but individual cells were obscure or could only be seen with difficulty. Student needed help in locating cells.
- No credit if no cells could be seen.

### 4. Diagram evidence 4 points total

- Allow 4 points if the diagram is accurately drawn with properly labeled visible structures, and shows proper relation to other cells.
- Allow 3 points if the diagram is accurately drawn, but does not have all visible structures labeled clearly.
- Allow 2 points if the diagram is not accurately drawn, (i.e.: basic shape evident, but not accurate, cellular structures not clearly drawn), proper relation to other cells not accurate, visible structures are not labeled or nonvisible structures are drawn and labeled.
- Allow 1 point if the diagram is sloppy and shows little relation to actual cell, visible structures not drawn in or are hastily done, no labels or mislabeling.
- No credit if the diagram is not drawn.

**Highest possible score - 17 points**

**Are Fruits and Vegetables Really Made of Cells ?**

**Student ID** \_\_\_\_\_

**Scoring Form**

Circle the student's score for each part of the exercise. Add the points for each part and write the total score at the bottom of the scoring form.

- |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| 1. Student's work was independently done        | 0 | 1 | 2 | 3 | 4 | 5 |
| 2. Proper techniques and procedures             | 0 | 1 | 2 | 3 | 4 | 5 |
| 3. Slide demonstrated examples of stained cells | 0 | 1 | 2 | 3 |   |   |
| 4. Diagram accurately drawn and labeled         | 0 | 1 | 2 | 3 | 4 |   |

**Total Score** \_\_\_\_\_

Total Possible score - 17 points

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**Are Fruits and Vegetables Really Made of Cells ?**

**Student ID** \_\_\_\_\_

**Scoring Form**

Circle the student's score for each part of the exercise. Add the points for each part and write the total score at the bottom of the scoring form.

- |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| 1. Student's work was independently done        | 0 | 1 | 2 | 3 | 4 | 5 |
| 2. Proper techniques and procedures             | 0 | 1 | 2 | 3 | 4 | 5 |
| 3. Slide demonstrated examples of stained cells | 0 | 1 | 2 | 3 |   |   |
| 4. Diagram accurately drawn and labeled         | 0 | 1 | 2 | 3 | 4 |   |

**Total Score** \_\_\_\_\_

Total Possible score - 17 points

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**Are Fruits and Vegetables Really Made of Cells ?**

**Student ID** \_\_\_\_\_

**Scoring Form**

Circle the student's score for each part of the exercise. Add the points for each part and write the total score at the bottom of the scoring form.

- |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| 1. Student's work was independently done        | 0 | 1 | 2 | 3 | 4 | 5 |
| 2. Proper techniques and procedures             | 0 | 1 | 2 | 3 | 4 | 5 |
| 3. Slide demonstrated examples of stained cells | 0 | 1 | 2 | 3 |   |   |
| 4. Diagram accurately drawn and labeled         | 0 | 1 | 2 | 3 | 4 |   |

**Total Score** \_\_\_\_\_

Total Possible score - 17 points

Student ID Bio FV-1 **Are Fruits and Vegetables Really Made of Cells ?**  
**Scoring Form**

Circle the student's score for each part of the exercise. Add the points for each part and write the total score at the bottom of the scoring form.

- |   |   |   |   |     |     |     |
|---|---|---|---|-----|-----|-----|
| 1. Student's work was independently done        | 0 | 1 | 2 | 3   | 4   | (5) |
| 2. Proper techniques and procedures             | 0 | 1 | 2 | 3   | 4   | (5) |
| 3. Slide demonstrated examples of stained cells | 0 | 1 | 2 | (3) |     |     |
| 4. Diagram accurately drawn and labeled         | 0 | 1 | 2 | 3   | (4) |     |

Total Score 17 pts  
 Total Possible score - 17 points

Student ID Bio FV-2 **Are Fruits and Vegetables Really Made of Cells ?**  
**Scoring Form**

Circle the student's score for each part of the exercise. Add the points for each part and write the total score at the bottom of the scoring form.

- |   |   |   |   |     |     |   |
|---|---|---|---|-----|-----|---|
| 1. Student's work was independently done        | 0 | 1 | 2 | 3   | (4) | 5 |
| 2. Proper techniques and procedures             | 0 | 1 | 2 | 3   | (4) | 5 |
| 3. Slide demonstrated examples of stained cells | 0 | 1 | 2 | (3) |     |   |
| 4. Diagram accurately drawn and labeled         | 0 | 1 | 2 | (3) | 4   |   |

Total Score 14 pts  
 Total Possible score - 17 points

Student ID Bio FV-1 **Are Fruits and Vegetables Really Made of Cells ?**  
**Scoring Form**

Circle the student's score for each part of the exercise. Add the points for each part and write the total score at the bottom of the scoring form.

- |   |   |   |     |     |   |   |
|---|---|---|-----|-----|---|---|
| 1. Student's work was independently done        | 0 | 1 | (2) | 3   | 4 | 5 |
| 2. Proper techniques and procedures             | 0 | 1 | 2   | (3) | 4 | 5 |
| 3. Slide demonstrated examples of stained cells | 0 | 1 | (2) | 3   |   |   |
| 4. Diagram accurately drawn and labeled         | 0 | 1 | (2) | 3   | 4 |   |

Total Score 9 pts  
 Total Possible score - 17 points

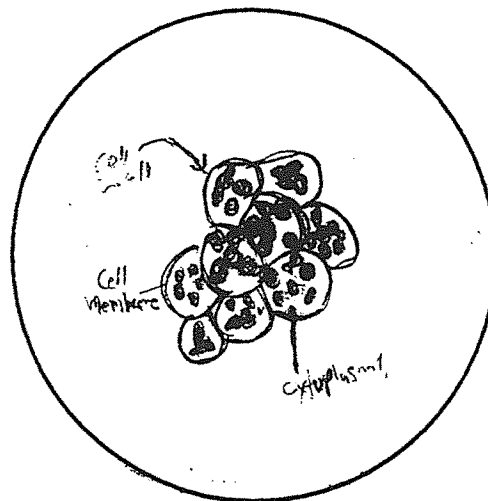
## Student Response

Name Bio - FV - 1

## Materials:

cover slip, stain, sweet potato, water, slide  
 ↑  
 Iodine Razor blade

## Observation:



After it was stained it brought out the features pretty. The biggest thing that caught my attention was the black blotches, but when I looked really hard I saw thin, almost clear, separating lines, I increased the power and they became more apparent. This gives me reason to believe that a sweet potato is cellular.

Total Score 17/1

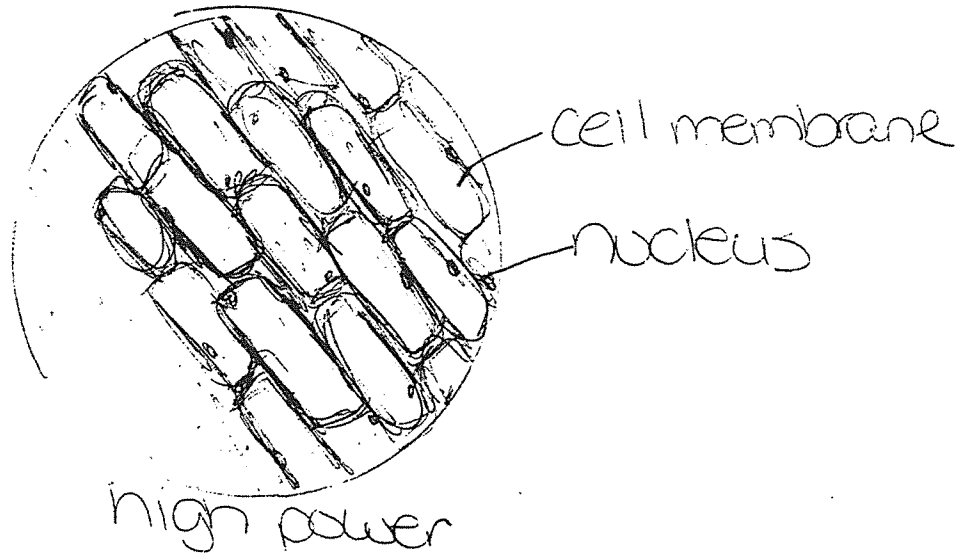
# Student Response

Name Bio - FV - 2

**Materials:**

razor blade                      slide  
eyedropper                      coverslip  
  
water                              celery  
microscope

**Observation:**



Total Score

Student Response

May 4, 1996

2

Name Bio FV-3

Materials:

Apple, razor, wet mount slide,  
microscope, methylene blue

Observation:



Total Score 9/19