

## Peat Pots

### Task Information

**Subject:** Earth Science

**Content:**

- NYS Earth Science syllabus - Moisture and Energy Budget (1970 ed.)  
- Topic VIII-A-1.4 - Earth's water
- Earth Science Syllabus Pro. Mod. - Unit 7 - The Water Cycle and Climates Section A
- Framework - Standard 4 - Science - The Physical Setting - Key Concept: Many of the phenomena that we observe on Earth involve interaction among air, water, and land components.
- Middle Level Science - Block D-II-A1 - Changes in Earth's Surface/Weathering

**Format:** Manipulative

**Purpose:** To observe and calculate the rate of capillarity in a model of a soil.

**Skills:**

**Primary:** Measuring, interpreting data  
**Secondary:** Applying math, observing, recording data

**Time:** 20 minutes

**Materials:**

**Teacher:**

- 1 large waste basket
- extra supply of dry peat pots

**Per Student:**

- small peat pot (2-3 inch diameter)
- small dish with diameter larger than pot
- funnel
- metric ruler
- graduated cylinder
- stopwatch or watch with second hand
- water
- paper towels

**Preparation:**

Peat pots size and capillarity will vary.  
 Recommend- that the teacher determine capillarity rate prior to test.  
 Small disposable pie plates can be used for water dishes.  
 If peat pots are unavailable, clay pots may be used (time will vary).  
 Peat pots may be dried and reused.

**Safety:** N/A

**Extensions/Modifications:**

1. Use of different materials, i.e. paper column (to compare materials and their capillarity) i.e. sand column
2. Vary the length of time of activity.

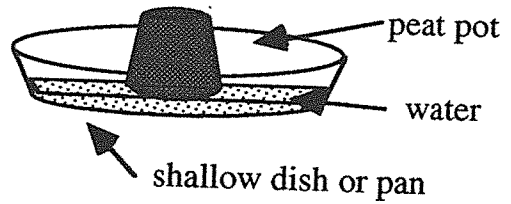
**Credit/Source:** 1. Earth - The Water Plant - NSTA (1989)

# Peat Pot

**Task:** At this station, you will measure the rate of capillary action in a peat pot.

**Materials:**

- small peat pot
- small dish
- funnel
- metric ruler
- graduated cylinder
- stop watch
- water
- paper towels



**Background:**

Peat is a surface deposit consisting of decayed plant materials. It forms a very spongy soil, displaying obvious capillary action. Commercially produced garden pots formed of pressed peat provide a model for observing capillary action in soil.

**Directions:**

1. Measure 50 mL of water and pour it in the small dish.
2. You will be placing the peat pot in the water, as shown in the diagram, and will measure, over time, how high the water rises along the sides of the pot.
3. Now place the peat pot in the dish, large end down. Start the timer and measure the height of the water line above the bottom of the pot every minute for seven minutes. Record your observations to the nearest tenth of a cm. in the data table.

Time (in minutes)	Height of water (in centimeters)
0	0.0 cm
1.0	
2.0	
3.0	
4.0	
5.0	
6.0	
7.0	

4. After 7 minutes, remove the pot and find the volume of the water that is left in the dish. Calculate the amount of water absorbed by the pot.

Amount of water in the dish at time 0.0 \_\_\_\_\_

Amount of water in the dish at time 7.0 \_\_\_\_\_

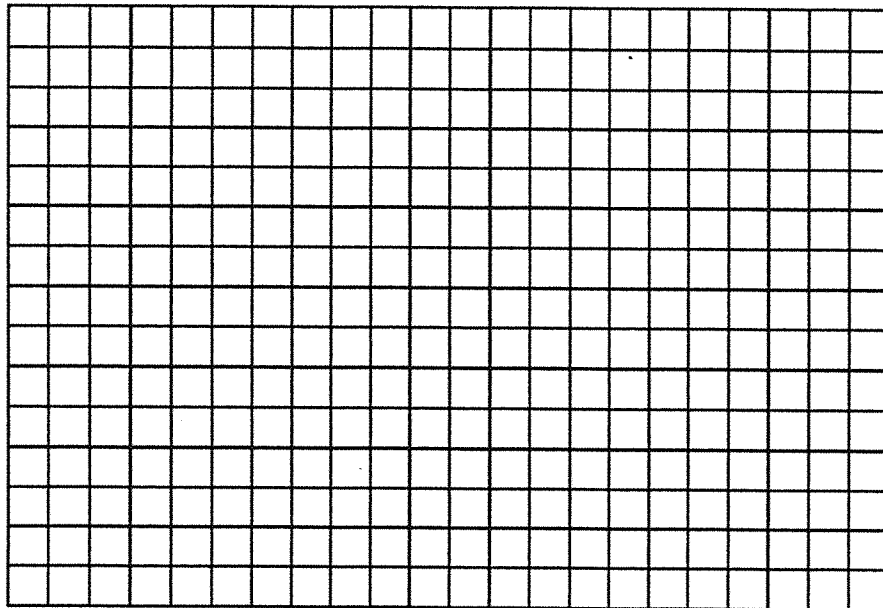
Amount of water absorbed by the peat pot \_\_\_\_\_

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5. How many milliliters of water did the pot retain in its pore spaces? \_\_\_\_\_
6. Calculate the average rate (cm/min) of capillary action for seven (7) minutes. Show your work in the space below.

Rate =  $\frac{\text{distance}}{\text{time}}$                       Answer \_\_\_\_\_

7. Draw a line graph of the data using time and height of water as your variables. Label both axes.



8. Using complete sentences, describe the results plotted on your graph. Include both variables in your description.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

9. Write a conclusion based on your experiment.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**Peat Pot - Scoring Rubric****Maximum score 17 points****Tasks 1 & 2 Directions**

No credit

**Task 3. Data Table****2 points total**Standard: The student will accurately record measurements on a data table.Criteria:

- 1 point if the data table is complete with reasonable values.
- 1 point for all data recorded to the nearest tenth of a centimeter

**Task 4. Volume Calculation****1 point total**Standard: The student will apply mathematics to solve for an unknown.Criteria:

- 1 point for recording data and calculating the amount of water absorbed.

**Task 5. Application****1 point total**Standard: The student will apply the knowledge of pore space to infer the amount of water retained in the model.Criteria:

- 1 point if line 3 of Task 4 and the answer given here are the same.

**Task 6. Capillary Action Calculation****4 points total**Standard: The student will apply mathematics to calculate the average rate of capillarity.Criteria:**A. Substitution**

- 1 point for the correct substitution into the equation. (Units not required)

**B. Correct Units**

- point for units recorded as  $\text{cm}/\text{min}$ .

**C. Rounding**

- 1 point for answers recorded to the nearest tenth of a  $\text{cm}/\text{min}$ .

**D. Correct Calculation**

- 1 point for an answer within  $\pm 0.2 \text{ cm}/\text{min}$ .

**Note 1:** Base student responses on student data

**Task 7. Graph****6 points total**

Standard: The student will correctly set up graph axes, plot data points, and draw a line graph.

Criteria:

- A. **Axes Labeled**
  - 1 point for **both** of the axes correctly labeled (naming variable).
- B. **Correct Units**
  - 1 point for units recorded on **both** axes.
- C. **Appropriate Scale**
  - 1 point for use of appropriate scale for the data.
- D. **Data correctly plotted**
  - 2 points for plotting 7 or more points correctly.
  - 1 point for plotting 4-6 points correctly.
  - No credit is given for fewer than 3 points plotted correctly.
- E. **Line Correctly Drawn**
  - 1 point for either a "best fit curve" or "dot to dot."

**Task 8. Analysis****2 points total**

Standard: The student will analyze and describe the plotted results.

Criteria:

- 2 points for an accurate, logical description using complete sentences.
- 1 point if the answer is correct but not in a complete sentence.
- No credit is given for an incorrect answer even if it is written in a sentence.

**Task 9. Conclusion****1 point total**

Standard: The student will write a concluding statement based on his/her observations.

Criteria:

- 1 point if the conclusion is consistent with the data.
- No credit is given for a conclusion inconsistent with the data

**Highest possible score -17 points**

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

## Peat Pot - Scoring Form

Male or Female (circle one)

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

<b>1 &amp; 2. Directions</b>	No credit		
<b>3. Data table</b>			
A. completed data table	0	1	
B. recorded accurate data to the nearest tenth	0	1	
<b>4. Volume Calculation</b>	0	1	
<b>5. Application</b>	0	1	
<b>6. Capillary Action Calculation (4 points)</b>			
A. data substituted properly	0	1	
B. correct units	0	1	
C. answer to the nearest tenth	0	1	
D. correct calculation	0	1	
<b>7. Graph (6 points)</b>			
A. axes (variables) labeled	0	1	
B. correct units	0	1	
C. appropriate scale	0	1	
D. data correctly plotted	0	1	2
E. line graph correctly drawn according to data table	0	1	
<b>8. Analysis</b>	0	1	2
<b>9. Conclusion</b>	0	1	

**TOTAL SCORE** \_\_\_\_\_

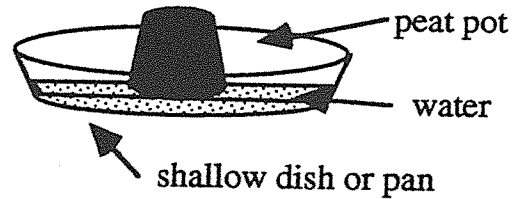
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Time (in minutes)	Height of Water (in centimeters)
0	0.0 cm
1.0	.5 cm
2.0	.7 cm
3.0	1.0 cm
4.0	1.2 cm
5.0	1.4 cm
6.0	1.6 cm
7.0	1.7 cm

4. After 7 minutes, remove the pot and find the volume of the water that is left in the dish. Calculate the amount of water absorbed by the pot.

Amount of water in the dish at time 0.0 0.0

Amount of water in the dish at time 7.0 1.7

Amount of water absorbed by the peat pot 1.7

5. How many milliliters of water did the pot retain in its pore spaces? 44 mL

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