Name: _____   Date: _____

Student Exploration: Growing Plants

Vocabulary: compost, fertilizer, mass, seed, soil, variable

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. What do you think plants need to grow and stay healthy?

    _____

    _____

2. **Soil** is a combination of tiny rock fragments and decayed plant materials. How do you think soil helps a plant?

    _____

    _____

Gizmo Warm-up: Grow the Biggest Plant!

1. In the Gizmo set up the three pots however you like:

    - Choose a **seed** to drag into each pot.

    - Click on the light bulbs to turn them on or off.

    - Drag the **Water** slider up or down to set the amount of water each plant will get.

    - If you like, drag **fertilizer** or **compost** into a pot.

    - When the pots are ready, click **Play** (▶) and wait for the simulation to end.

Turnip
Soil
Fertilizer

Height: 8.8 cm
Mass: 2.4 g

Daily water   50 mL   **A**

2. How tall was your tallest plant? _____

    What is the average height of your plants? _____

    What is the range in height of your plants? _____

3. Click **Reset** (↩) and **Clear pots**. Run a few more trials to grow the tallest plants you can. What conditions led to the tallest plant?
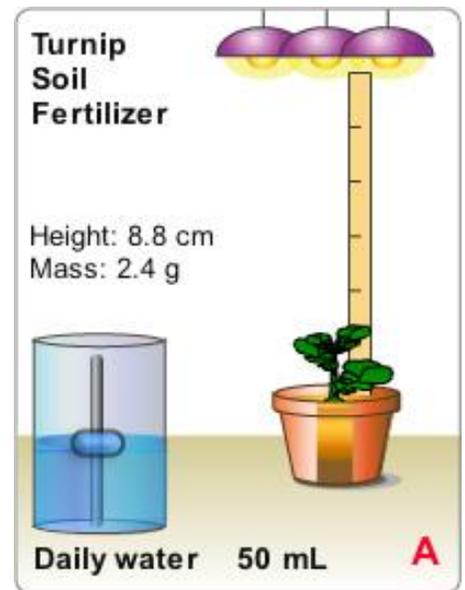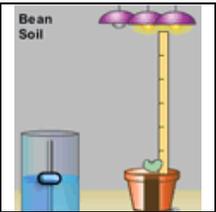
    _____

    _____

    Explain why you think these conditions lead to the tallest plant:

    _____

    _____

Activity A: Wet and dry	Get the Gizmo ready: • Click **Reset**. • Click **Clear pots**.	

Question: Do seeds need water to grow?

1. <u>Form hypothesis</u>: Do you think seeds need water to start growing? Explain why or why not.

_____

_____

2. <u>Set up Gizmo</u>: In the Gizmo, set up the three pots like this:

   • Pot A: Bean seed, two lights on, 0 mL water per day
   • Pot B: Bean seed, two lights on, 50 mL water per day
   • Pot C: Bean seed, two lights on, 100 mL water per day

   What is the independent variable in this experiment? _____

   What is the dependent variable in this experiment? _____

   What are three controlled variables in this experiment? _____

3. <u>Experiment</u>: Click **Play** to start. When the simulation is done, observe the plants.

4. <u>Collect data</u>: Fill in the data table below with the height and mass of each plant on day 50. (The **mass** of a plant is the amount of matter in the plant. It is related to how heavy it is.) In the last column describe what each plant looks like.

Pot	Water/day (mL)	Height (cm)	Mass (g)	Appearance
A				
B				
C				

5. <u>Draw conclusions</u>: Do seeds need water to grow? (Was your hypothesis correct?)

_____

6. <u>Revise and repeat</u>: Is more water always better? Create your own experiments to find the ideal amount of water for each kind of plant. Explain your findings below.
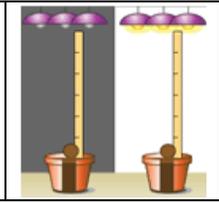
_____

_____

_____

Activity B: **Light and dark**	Get the Gizmo ready: • Click **Reset**. • Click **Clear pots**.	

Question: How does the amount of light affect how plants grow?

1. Form hypothesis: A **variable** is something that can be changed in an experiment, such as the amount of light. How do you think the amount of light affects how plants grow?

_____

_____

2. Experiment:

   • Set up the three pots with 50 mL of water per day, plain soil, and turnip seeds.
   • Turn on three lights over pot A, one light over pot B, and zero lights over pot C.
   • Click **Play**.
   • After 30 simulated days, click **Pause** (⏸).

   What is the independent variable in this experiment? _____

   What is the dependent variable in this experiment? _____

   What are three controlled variables in this experiment? _____

3. Collect data: In the table below, describe each plant after 30 days.

Pot	Number of lights	Height (cm) on day 30	Mass (g) on day 30	Appearance on day 30
A				
B				
C				

4. Draw conclusions: Select the **Data** tab. Look at the graphs for **Plant Height** and **Plant Mass**. How did the amount of light affect the growth of plants?
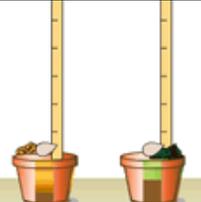
_____

_____

5. Think and discuss: Click **Play** and let the simulation continue to 50 days. Based on what you have seen so far, what do seeds need to grow into healthy plants?

_____

_____

Activity C: **Design an experiment**	Get the Gizmo ready: • Click **Reset**. • Click **Clear pots**.	

Question: You come up with the question! (See below.)

1. Create question: Fill in the blanks below with the variable and the type of plant you would like to study in this activity. (Do not repeat an experiment you have already done.)

   How does _____ affect a _____ plant?

2. Form hypothesis: What is your hypothesis for the question above?

   _____

   What is the independent variable in this experiment? _____

   What is the dependent variable in this experiment? _____

   What are three controlled variables in this experiment? _____

3. Set up Gizmo: Set up the pots to test the variable you are investigating. Describe how you set up each pot in the table below.

Pot	Type of seed	Water/day	Number of lights	Type of soil
A				
B				
C				

4. Experiment: Click **Play** to start. When the simulation is done, observe the plants.

5. Collect data: Examine your plant data on the **Data** tab. Record your results here.

Pot	Height (cm)	Mass (g)	Appearance
A			
B			
C			

6. Draw conclusions: What did you discover? Why do you think it happened that way?

   _____

   _____