Name: _____   **Period:** _____   **Date:** _____

Open **peebedu.com** and navigate to **Plant Response Simulator**. Click the **Start Exploring!** button to begin. Read the introduction popup, which describes two plant responses: Phototropism (growth toward light) and Photoperiodism (flowering based on day length).

Part 1 — Model Evaluation (MAPP Framework)

Scientific models are simplified representations of complex biological phenomena. Use the MAPP framework below to evaluate the Plant Response Simulator as a scientific model.

M — Mode

What type of model is the Plant Response Simulator? Describe how this computational simulation represents plant responses to environmental stimuli. In your answer, identify at least three specific simulation elements and explain what each one is designed to show about how plants respond to their environment.

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A — Accuracy

(a) Identify two things this simulation represents **accurately** about plant responses to environmental changes. For each, name the specific simulation feature and explain what aspect of plant behavior it demonstrates.

_____

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_____

(b) Identify two things this simulation **oversimplifies or leaves out** about plant responses. Consider what you cannot observe in the simulation that would be important for a complete understanding of how organisms respond to environmental cues.

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P — Purpose

What is the learning goal of this simulation? Explain how the Plant Response Simulator is designed to help you understand how organisms respond to changes in their environment through behavioral and physiological mechanisms. In your answer, connect at least one specific simulation feature to an ecological example of why that response matters for plant survival.

P — Permanency

Could this model change with new scientific evidence? Describe one way that new discoveries might change or improve a simulation like the Plant Response Simulator. Explain why scientific models, including computational simulations, are revised as new evidence becomes available.

Small-Group Discussion

With your group, discuss the following:

- What are the strengths of this simulation as a model for plant responses?
- What are its limitations?
- If you could add one feature to improve this simulation, what would it be and why?
- How does the simulation help you connect observable plant behaviors to underlying biological mechanisms?

Part 2 — NGSS Questions

1.

Simulation Task: In the Phototropism tab, drag the sun to the far left of the screen and observe the plant's response. Watch where the green auxin dots accumulate on the stem and which direction the stem bends.

Describe the pattern you observe in the movement of auxin when the light source is on one side of the plant. Explain how the buildup of auxin on the shaded side of the stem causes the plant to bend toward the light.

HS-LS1-3

2.

Simulation Task: Drag the sun to the far right and watch the plant change direction. Then move the sun directly above the plant. Compare the plant's shape and the auxin distribution in each position.

Explain how the plant's growth response changes when the light source moves to a different position. Describe what happens to auxin distribution and stem bending when light comes from directly above compared to from the side.

HS-LS1-3

3.

Simulation Task: Switch to the Photoperiodism tab. Set the day length slider to 8 hours and note which of the three plants are flowering. Then increase the slider to 16 hours and observe which plants change their flowering status.

Describe how each of the three plant types (short-day, long-day, and day-neutral) responds to the change from 8 hours to 16 hours of daylight. Explain how detecting day length helps a plant coordinate its flowering with favorable seasonal conditions.

HS-LS1-3

4.

Simulation Task: In the Photoperiodism tab, slowly slide the day length from 8 hours to 16 hours. Identify the approximate day length at which the short-day plant stops flowering and the long-day plant begins flowering.

Based on your observations, explain why short-day and long-day plants flower during different seasons of the year. Describe how this timing of flowering could increase a plant's chances of successful reproduction in its environment.

HS-LS1-3

5.

Simulation Task: Return to the Phototropism tab. Drag the sun to the left and observe the leaf sprites that appear on the illuminated side of the plant. Then move the sun to the right and watch where new leaves sprout.

Explain how the plant's ability to grow new leaves on the side facing the light helps it capture more energy for photosynthesis. Describe why this response would be important for a plant growing in a shaded environment where light is limited.

HS-LS2-8

6.

Simulation Task: In the Phototropism tab, position the sun on the far left. Observe the yellow light photons, the green auxin dots, and the direction of stem bending. Read the informational panel about why plants lean toward the sun.

In the box below, draw a labeled diagram of a plant responding to a light source on its left side. Include and label the following: the light source, the direction of light photons, the location of auxin buildup on the stem, the side of the stem that grows faster, and the direction the stem bends.

Draw your diagram here.

HS-LS2-8

7.

Simulation Task: Explore both the Phototropism and Photoperiodism tabs one more time. Think about how each response helps plants survive and reproduce in changing environments.

Choose either phototropism or photoperiodism. Explain how this plant response is an adaptation that has been shaped over many generations. Describe how a population of plants that lacked this response might be affected if their environment changed, and predict how the loss of this trait could disrupt the stability of the ecosystem they belong to.

HS-LS4-4, HS-LS2-6