

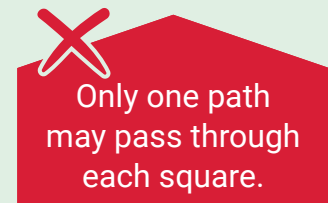
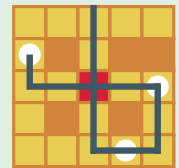
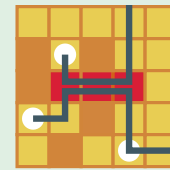
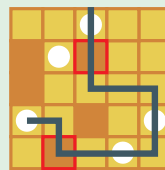
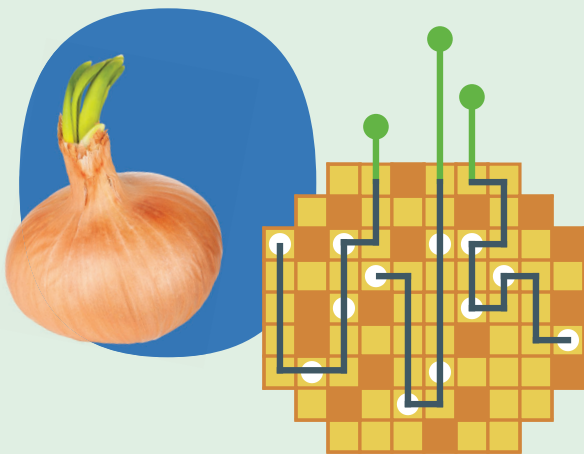
GO WITH THE PHLOEM PUZZLES

Plants have two kinds of vessels for moving fluids inside their bodies. **Xylem** (zye-lum) transports water from the roots to all parts of a plant. **Phloem** (flow-um) transports sugars made by a plant's leaves to the parts that need energy. Many plants have special roots that can store sugars for later.

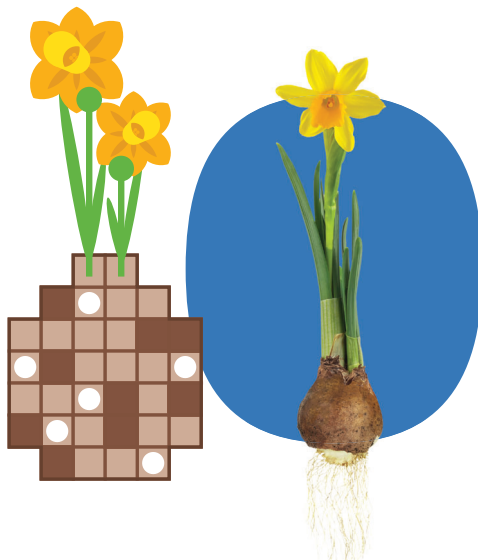
PRACTICE:

For each of the puzzles below, draw phloem paths for sugar to travel. Paths must connect sugars (O) to a part of the plant that needs it.

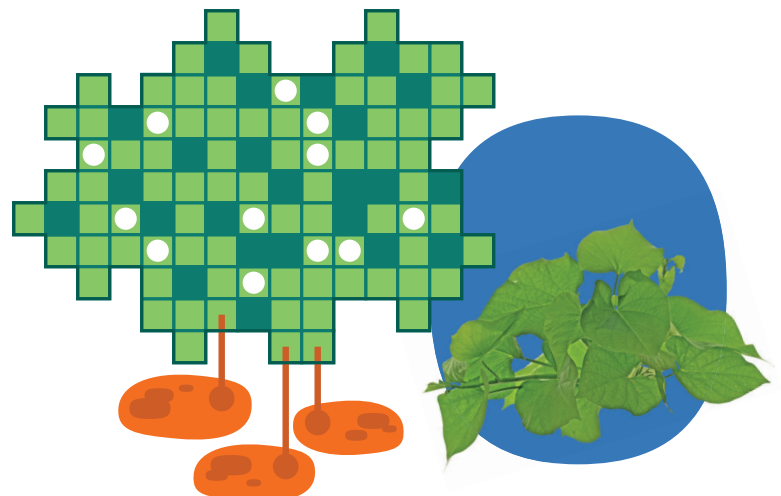
Ex. Transport 4 sugars from the onion root to each sprout.



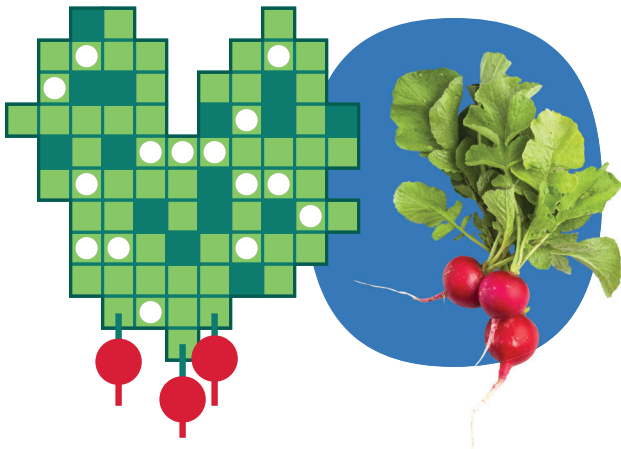
9 Transport 3 sugars from the daffodil root to each flower.



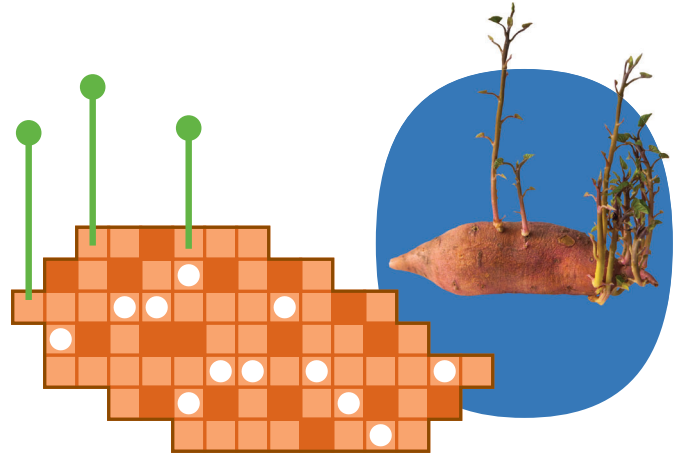
10 Transport 4 sugars from the leaves to each sweet potato root.



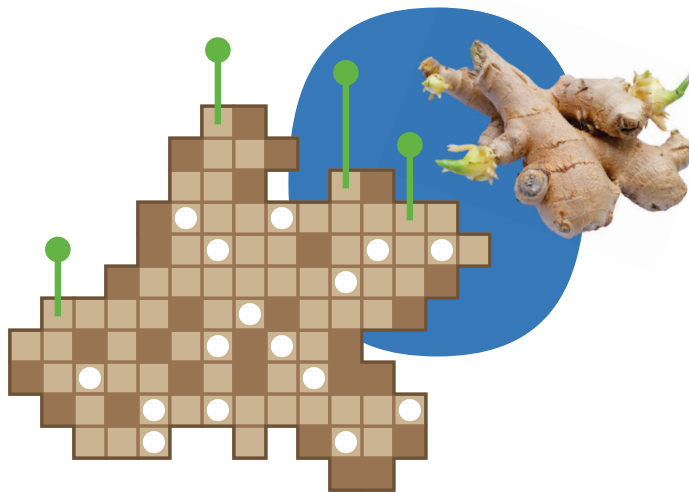
- 11 Transport 5 sugars from the leaves to each radish root.



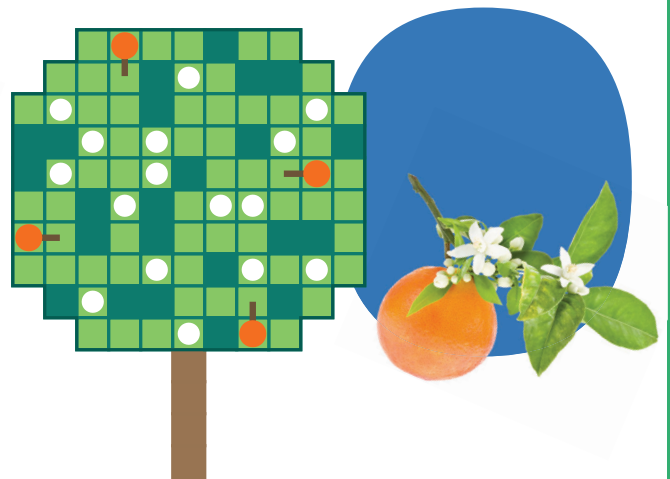
- 12 Transport 4 sugars from the sweet potato root to each sprout.



- 13 Transport 4 sugars from the ginger root to each sprout.



- 14 Transport 4 sugars from the leaves to each orange.



- 15 Which of the trees below is most likely transporting sugar to its roots for storage? Check one or more.



A tree that lost its leaves is growing new ones



A tree that is making offspring (fruits)



A tree getting plenty of sunshine and water

HEARTLESS HYDRATION

Build a model to explore how plants can transport water upwards without a pump.

MATERIALS

You will need:

- White fresh-cut flowers
- Disposable straw
- Paper towel or tissue
- Scissors
- Two clear containers
- Liquid food coloring
- Water



The vessels in a plant's body that move water from the roots upward to the tips of the leaves are called **xylem**. Let's take a closer look at how the vessels in a plant work.



REAL PLANT

- ① Mix 10 drops of food coloring into 1 cup of water. Gel dyes won't work.
- ② Place a white flower into the glass. Carnations, daisies, and roses work well.

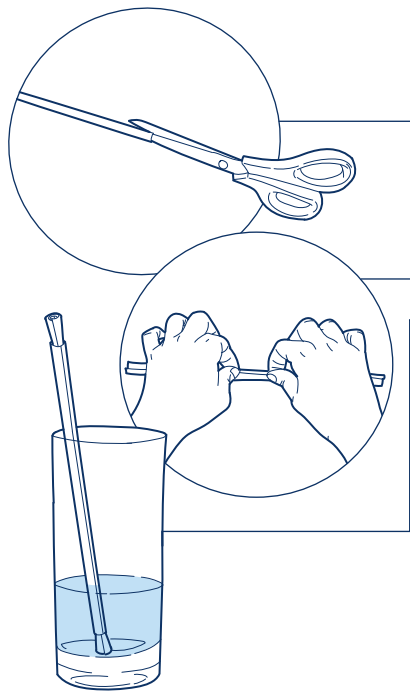
JOURNAL:

- 16 Describe what changes you can see in the plant after 1 minute, 5 minutes, 1 hour, and 1 day in your journal. Try to include drawings or photos with your descriptions.

CHALLENGE:

- 17 Can you make a carnation with multiple colors? Try it. Draw a diagram in your journal to explain how you did it.





MODEL PLANT

- 1 Carefully cut a slit down the entire length of a drinking straw.
- 2 Tightly roll a piece of paper towel or tissue so that it will fit into the straw. Part of the paper towel or tissue should poke out of each end.
- 3 Place the straw into a glass so that it stands upright. Pour a small amount of water and food coloring into the glass.

JOURNAL:

- 18 Describe what changes you can see in your model plant after 1 minute, 5 minutes, and 1 hour in your journal. Include drawings or photos with your descriptions.

- 19 Do you think a plant needs to use energy to move water upwards? Explain how this model provides evidence.

- 20 People add fertilizers to the soil to help plants grow. Fertilizers contain minerals like potassium and nitrogen. Do you think minerals from the soil can be transported through the xylem too? Explain how this model provides evidence.

Which is taller?

The tallest animals to have ever lived can't match the heights of the tallest trees. The larger an animal grows, the further its blood must

travel, and the harder its heart must work. Since animals use muscles to move and pump blood, their bodies generate heat even at rest. The larger an animal grows, the harder it is to avoid overheating.

