Plants: Moving Water

Aim:	**Success Criteria:**	**Resources:**
To investigate the way in which water is transported within plants by observing the transport of food colouring through a flower stem. I can investigate how water is transported in plants.	I can explain the function of the stem. I can understand how water is transported in a plant. I can set up a comparative investigation. I can suggest ways to find answers. I can make a prediction. I can make a conclusion.	**Lesson Pack** Bright white flowers such as carnations, chrysanthemums or gerberas with stems, ends cut at an angle of equal length Food colouring (darker colours work well) Tablespoons Beakers of the same size filled with 100ml water Access to a places with different temperatures (e.g. over a heater, normal classroom temperature, a fridge) Thermometers
Key/New Words: Transport, stem, evaporate, compare, temperature, leaves, flower, observe, prediction, conclusion.	**Preparation:** **Example Conclusions Activity Sheet** - as required **Differentiated Prediction Puzzle Activity Sheet** - 1 per child **Differentiated Observing Changes Activity Sheet** - 1 per child Pre-dye one of the bright white flowers (We recommend that you begin this lesson at the end of the day before, or at least in the morning, so that children can check the flowers regularly throughout the day before making a conclusion in the afternoon.)	

Prior Learning: Children will have learned about the function of the stem in lesson 1.

Learning Sequence

	**Human Modelling:** Children work in groups to create a human model of the function of the stem. Remind children of the function of the stem and address any misconceptions. Use the Lesson Presentation to reveal hints if the children are struggling to think of what to do. Allow each group to show their human models and ask the class to feedback.	
	**Water Transportation:** Use the Lesson Presentation to explain the process of water transportation. Ask children to explain their understanding of how water is transported to a partner, using the diagram for support. Check understanding using the diagram on the Lesson Presentation.	
	**Transportation Investigation:** Explain the investigation using the Lesson Presentation. The children will be carrying out a comparative investigation to find out whether temperature affects the speed that water is transported. Show the children the pre-dyed flower. Discuss how it was dyed. How does this show the process of water transportation? Use the Lesson Presentation to explain how it was set up. As a class, discuss how this idea could be used to investigate the rate of water transportation in different temperatures. Once they have had time to think about this, explain the method suggested on the Lesson Presentation.	
	**Prediction Puzzle.** Children work as a group to sort the predictions on the differentiated Prediction Puzzle Activity Sheet into ones they agree with and ones they disagree with.	
	**Set It Up:** Organise the children into groups to set up the investigation. Assign groups to the different places around school and provide them with their flowers, beakers of water, teaspoons and food colouring. Ensure that each group keeps variables other than temperature the same.	
	**Observing Changes:** Explain that the children should check the flowers at regular intervals throughout the day (depending on the temperature, first results may be seen within 1 to 2 hours). Continue to observe the flowers throughout the day, recording their observations on the differentiated Observing Changes Activity Sheet. Depending on when you began the experiment, it may be necessary to leave the flowers overnight for a clear change or difference to be observed.	

Coming To Conclusions: Use the Lesson Presentation to explain what a conclusion is. Place the Example Conclusions on tables or stick them up around the room. Invite children to look at the conclusions and write their thoughts and ideas around each one.
Once they have had chance to do this, ask them to write their own conclusion for the investigation on the differentiated Observing Changes Activity Sheet. Can you use your observations to come to a clear conclusion?

Children use the suggested words, phrases and pictures for support.

Children explain why they came to their conclusion.

Task*it*

***Test*it:** Try splitting a flower stem in half lengthways and putting each half in a different colour of water. What do you think will happen to the flower?

***Compare*it:** Why not compare the speed of water transportation in different places? You could think about comparing a windy place with a calm place, or a very bright place with a darker place.

***Create*it:** Can you demonstrate your understanding of how water is transported by the stem by creating a 3D picture? Use a straw for the stem, and collage materials for the rest of the plant.