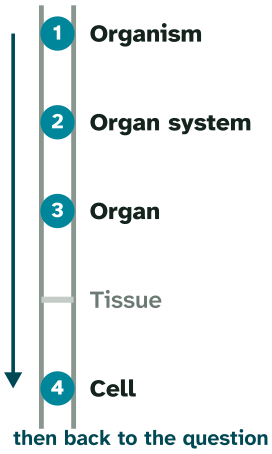
Transport systems: yo-yo chains and a celery practical

Name: Class: Date:

Page 1 has two yo-yo chains. Answer one question at each level, moving down or up the levels as the ladder shows, then come back to the starting question. Page 2 is a practical that follows coloured water up celery stalks.

YO-YO CHAIN 1 Why does your heart beat faster when you run?

Work down the levels, then come back up.



1 **ORGANISM** What changes for the whole person when they run?

2 **ORGAN SYSTEM** What does the circulatory system have to do?

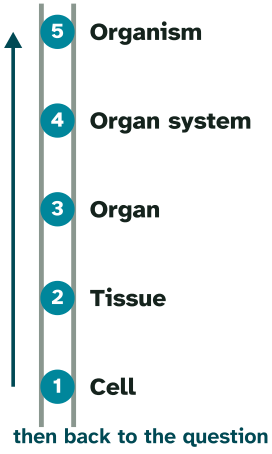
3 **ORGAN** What does the heart do?

4 **CELL** What happens in the leg muscle cells?

↩ Back to the question: why does the runner's heart beat faster?

YO-YO CHAIN 2 On a hot, dry afternoon, a plant's guard cells close its stomata. Why?

Work up the levels, then come back to the starting question.



1 **CELL** What do the guard cells do?

2 **TISSUE** What happens in the leaf's epidermis, the layer the stomata are in?

3 **ORGAN** What happens to the leaf?

4 **ORGAN SYSTEM** What happens in the shoot and root systems?

5 **ORGANISM** What does this mean for the whole plant?

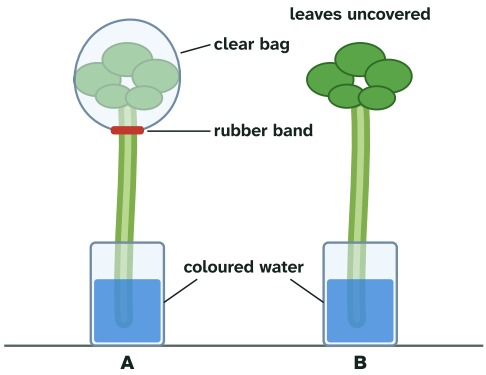
↩ Back to the question: why do plants close their stomata on hot, dry afternoons?

PRACTICAL Coloured water in celery

Aim: To see how water moves up a plant stalk, and to find out whether covering the leaves changes how far it rises.

Each group needs: two fresh celery stalks with their leaves, two tall glasses or jars, water, food colouring (blue or red), a clear plastic bag and a rubber band, a sharp knife and a cutting board, a ruler, a hand lens and paper towel.

> **Safety.** Cut on the board, away from your hand. Food colouring stains skin and clothes. Don't eat or drink anything used in the practical.



1. Pour the same amount of water into both glasses, about half full, and add 10 drops of food colouring to each.
2. Cut 1 cm off the bottom of each stalk and stand one stalk in each glass straight away.
3. Label the glasses A and B. Put the plastic bag over the leaves of stalk A and close it round the stalk with the rubber band. Leave the leaves of stalk B uncovered.
4. Stand both glasses side by side in a bright, warm place, such as a classroom windowsill, for 24 hours.
5. Take each stalk out and rinse it. Starting at the bottom, cut it across every 2 cm until a cut shows no colour. Record the height of the highest cut that still shows colour.
6. Look at a coloured cut end with the hand lens and draw what you see in the box.

Stalk	Leaves	Height the colour reached (cm)	What the cut end looks like
A	covered with a bag		
B	uncovered		

Draw a coloured cut end here.

1. Where does the colour show in the cut end of the stalk? What is the tissue that carried the coloured water up?

2. In which stalk did the coloured water rise further? Use the word transpiration in your explanation.

3. What was the one thing you changed between the two stalks, and what did you keep the same?

4. Explain with the levels: how does water leaving the leaves (an organ) pull water up the stalk's xylem (a tissue)?