

Relationship between variables

ACTIVITY 3.2 5.3

Introduction

'The stronger the wind, the faster I can walk to school: Is that true? In other words, is there a relationship between the variable 'strength of wind' and the variable 'how fast one can walk'? Science is all about exploring relationships between variables and two activities in this programme give pupils an opportunity to do just that.

Aim

The pupils are encouraged to identify and consider the relationships between different events or processes. It is not just a case of *whether* things 'go together' but *how* they go together: as one goes up, does the other go up too, or go down, or isn't it connected at all?

Activity 3.2: Hotter or Colder? requires the pupils to consider changes in temperature over a period of time.

Activity 5.3: Late for School invites pupils to consider the effect of the wind on the speed at which they can walk.

Keeping warm Activity 3.2

Hotter or Colder?

Aim

Pupils will use the charts created in the last activity. They will then decide what happens to the temperatures after a period of 4 hours and discuss the causes of changes in temperatures.

Materials

Supplied

- Resource sheet 19, which is a photocopiable sheet showing pictures of 6 thermometers. None of the thermometers show any temperature.

Not supplied

- # Black pens to mark the temperature on each thermometer.
- # Some glue, coloured pens, paper and graph paper for each group (if desired).

Before you start

Take photocopies of Resource sheet 19 - 2 copies for each group. Cut these to make a total of 12 separate cards per group.

Find the large sheets of paper on which the children glued the thermometer cards next to the relevant scenario cards during

Activity 3.1: How Hot are You?

Activity

Concrete preparation

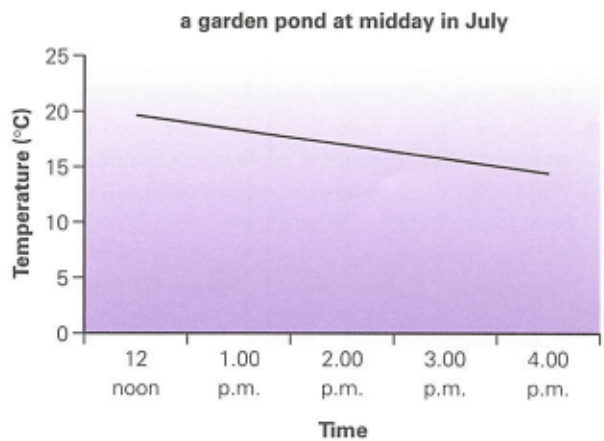
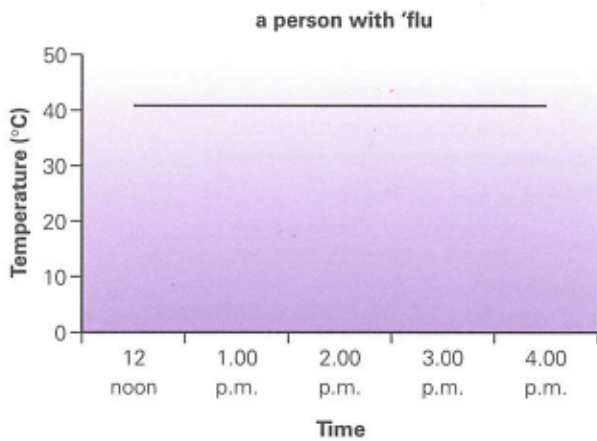
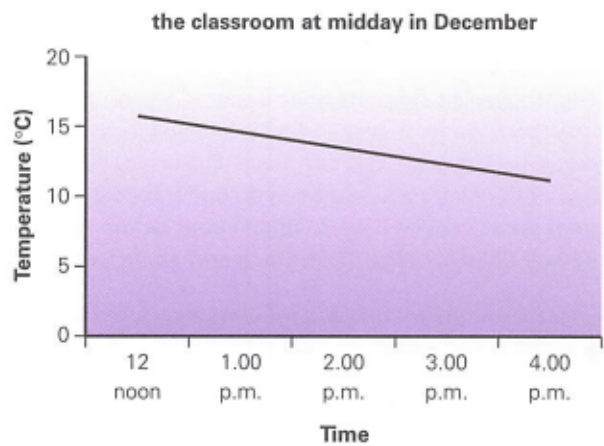
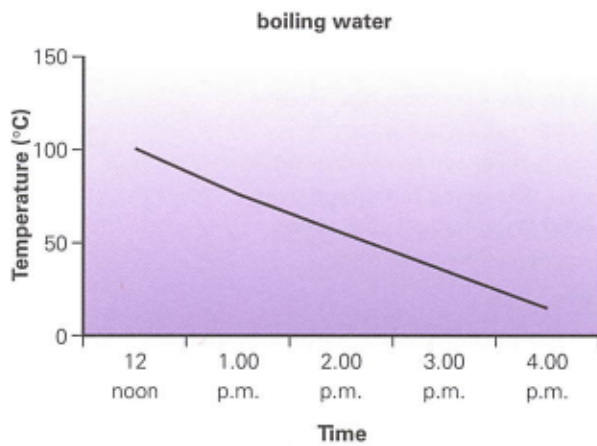
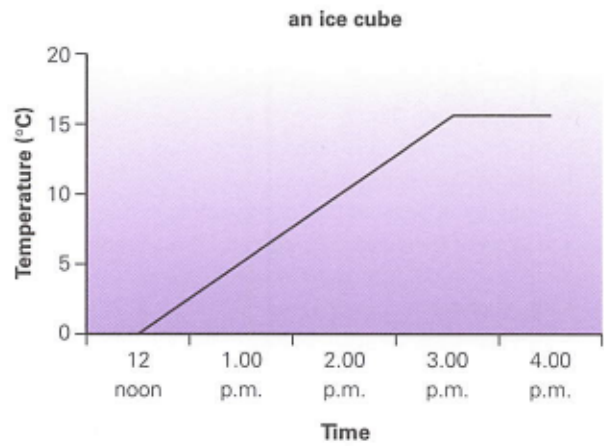
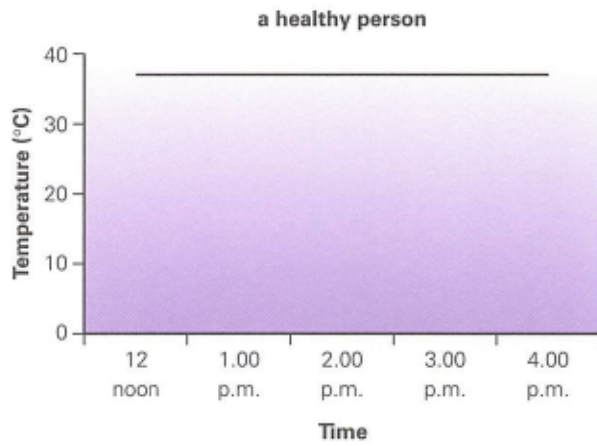
- Refer to the work completed in **Activity 3.1: How Hot are You?** Give each group their sheet put together during this activity. Ask the pupils to look at their sheet in their group. **What do you remember about the activity? What did you learn? How has it helped you with other work related to this topic? Have you changed your minds about anything?**

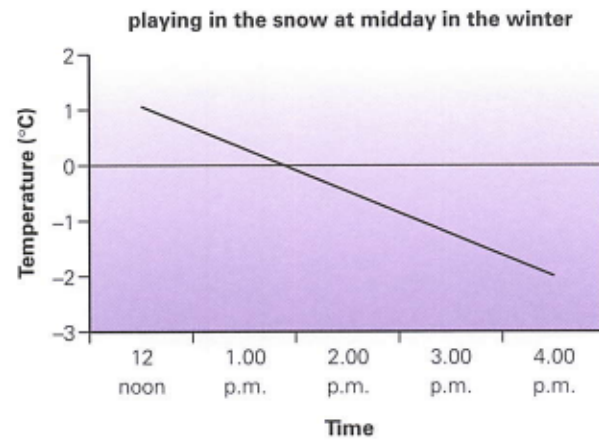
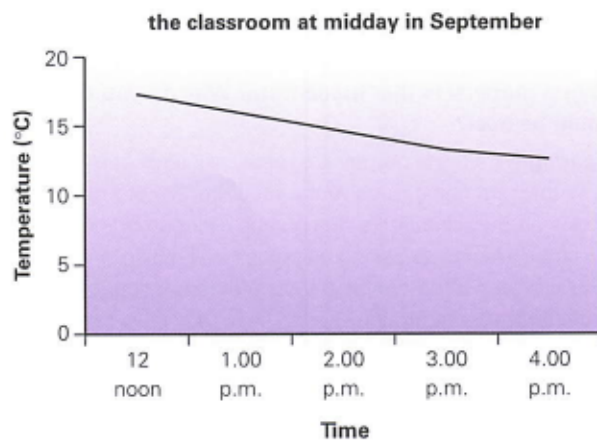
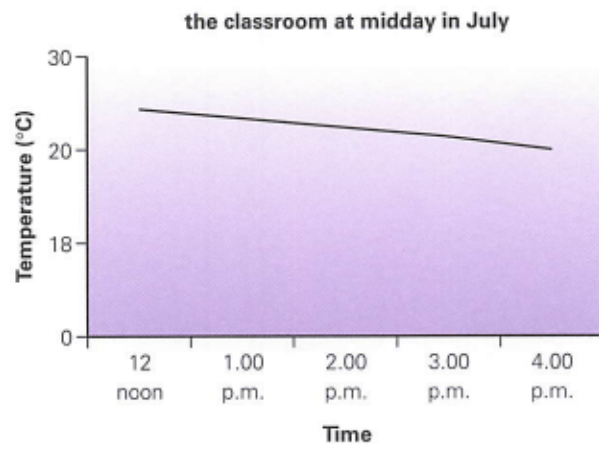
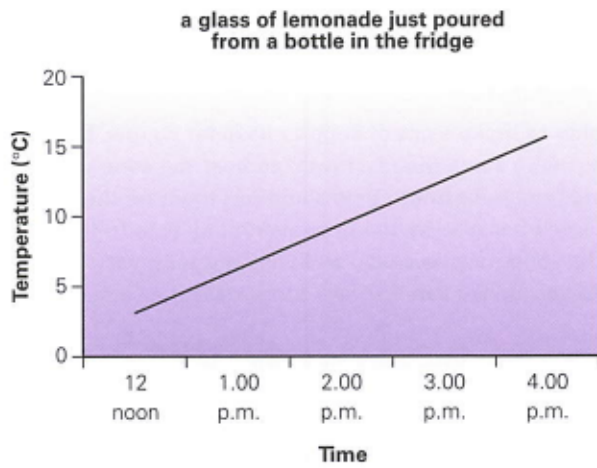
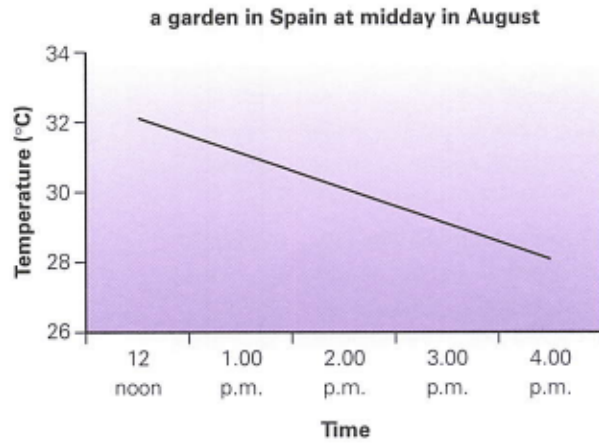
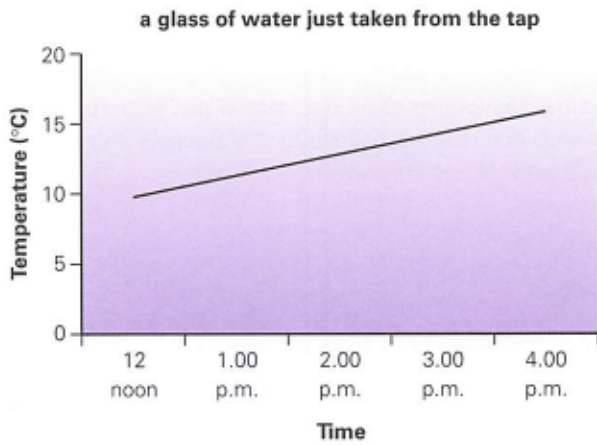
Cognitive conflict and social construction: Part I

- * **If we had the real objects/people in these different scenarios, and if each one stayed in the same position for 4 hours, what differences would be showing on the thermometers? Talk in your groups about your ideas. When you agree, you need to record your idea on the new thermometers. You will show your ideas to the class so we all need to be able to see the record.** Ask the pupils to fill in the temperatures on the blank thermometers, and glue each card onto the original sheets beside the relevant scenario.

idea? What did you have to think about and agree? What caused disagreement? How did you solve that problem? What kind of thinking were you doing? How would this help you in another task? What would you do differently next time if you had to do something like this again? Encourage the other groups to listen to the ideas and to ask the feedback group questions.

Pupils may have drawn graphs such as those shown below as part of this activity.





One possible solution showing the temperatures four hours later is given below:

A

- | | |
|---|------|
| • healthy person | 37°C |
| • boiling water | 17°C |
| • an ice cube | 17°C |
| • the classroom at midday in December | 13°C |
| | |
| • a person with 'flu | 41°C |
| • a glass of water just taken from the tap | 17°C |
| • a garden pond at midday in June | 16°C |
| • a garden in Spain at midday in August | 29°C |
| • a glass of lemonade just poured from a bottle in the fridge | 17°C |
| • the classroom at midday in September | 14°C |
| • the classroom at midday in July | 20°C |
| • playing in the snow at midday in the winter | -2°C |

Class sharing: *When* the pupils have finished, ask them to share their ideas. Discuss how they decided on the differences in temperature. When each group has shared, allow time for them to challenge each other. **Why does that thermometer now show ... ? What has happened to make this one change?** Pupils need to be able to discuss the difference between the temperatures and what causes the difference or what causes the temperature to remain the same.

Metacognition

Help the pupils to become more aware of the issues that they had to consider. Encourage them to think about the ideas they took on board and those they rejected. A discussion about room temperature may usefully take place. Pupils may also consider the effects of central heating. **What kind of thinking have you been doing? How did you decide what was going to happen over time? What did you have to think about before you could decide? What helped you? What made it difficult? What have you learnt about your thinking?** Encourage class discussion.

Cognitive conflict and social construction: Part 2

+ Have on view some coloured pens, pencils, graph paper and squared paper of various sizes.

Now, in your groups, I want you to agree a method of recording each temperature 'before' and 'after', to show what is happening. You need to do this *without just showing the thermometers as they are so that you can show what has happened.*

- **Class sharing:** After 5 minutes, initiate a discussion about different ways of recording. The pupils need to explain what materials they need and what recording method they intend to use. This may help the groups to make a better attempt at the challenge.

As a group, they then take the equipment required and record the initial and the final temperatures for each item. They could show the relationship between the change and the time taken.

- + When the groups have had enough time, each shares its ideas. The class discusses each method proposed. **Which record is easiest to understand? Why? Which is most difficult to understand? What key things do we need to think about when recording our ideas?** Some groups may have used different colours on the thermometers and annotated them, others may have drawn graphs (such as those shown on pages 40 and 41). The pupils need to think about a systematic method that shows at a glance the temperature at the two times of measurement.

Metacognition

Encourage the pupils to consider what they have learnt. They need to become clear as to how their thinking together helped them to develop their individual ideas. **How did you come up with your**