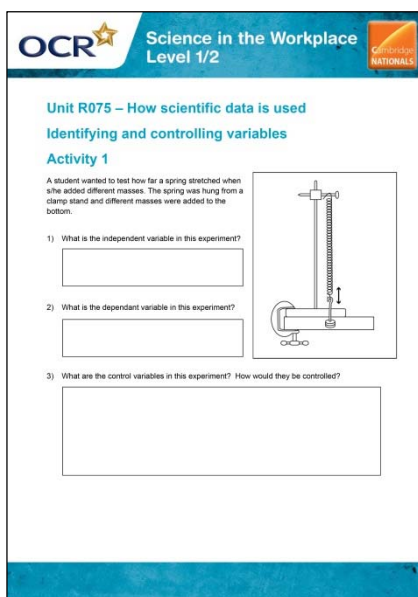


Unit R075 – How scientific data is used

Identifying and controlling variables

Instructions and answers for teachers

The activity below covers LO1: Identification and control of variables



Associated files:

Identifying and controlling variables (activity)

Activity 1 – approx. 10 minutes

Activity 2 – approx. 10 minutes

Activity 3 – approx. 10 minutes

Activity 4 – approx. 10 minutes



This activity offers an opportunity for English skills development.

This lesson element gives a range of case studies describing some simple and more detailed investigations.

Learners are asked to identify the control, independent and dependent variables.

Activity 1

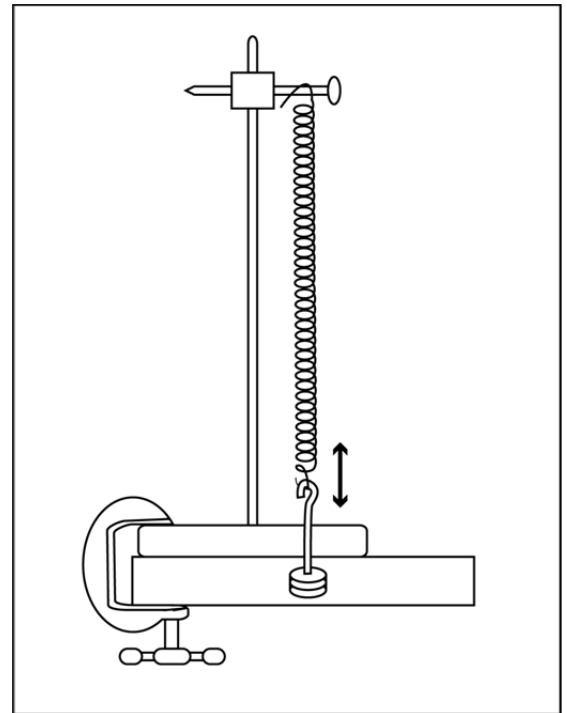
A student wanted to test how far a spring stretched when s/he added different masses. The spring was hung from a clamp stand and different masses were added to the bottom.

- 1) What is the independent variable in this experiment?

The different masses

- 2) What is the dependant variable in this experiment?

The length of the stretch of spring



- 3) What are the control variables in this experiment? How would they be controlled?

Using the same equipment etc
The same operator
Doing it at the same time (of day) etc
Doing it in the same place (environmental influences etc)

Activity 2

A student wanted to know if the temperature of water affected how fast salt would dissolve. The student heated water to different temperatures and then added salt, they then timed how long it took for the salt to completely dissolve.

- 1) What is the independent variable in this experiment?

Temperature of the water

- 2) What is the dependant variable in this experiment?

The time taken for the salt to dissolve

- 3) What are the control variables in this experiment? How would they be controlled?

Using the same equipment etc
The same operator
Doing it at the same time (of day) etc
Doing it in the same place (environmental influences etc)
Using the same amount of salt
Stirring /not stirring each time
Starting and stopping the stop clack at the correct time each time

- 4) Suggest how you think the student could make sure they get reliable results.

See answer 3

Also: repeat the test 3 times and take the average

Identify any anomalous results and repeat them

Activity 3

A group of students wanted to find out which material was the best at insulating a beaker of hot water. They placed a piece of material around a beaker, filled it with hot water and measured its temperature over time. They repeated this with a number of different materials.

- 1) What is the independent variable in this experiment?

The different materials

- 2) How many different times do you think this should be changed to get a good variety of results?

Carry out tests on at least 5 different materials.

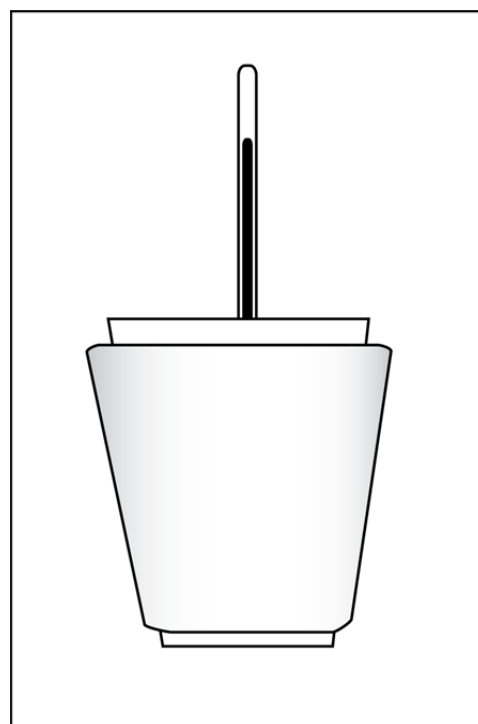
Each material should be tested 3 times

- 3) What is the dependant variable in this experiment?

The temperature

- 4) What equipment do you think the students should use to complete this experiment?

Beakers (to hold the water), different insulating materials (to test), elastic bands (to hold the material in place), lid (to prevent heat loss from the top of the beaker), thermometer (to measure the temperature change), stop clock (to measure the time), measuring cylinder (to measure the same amount of water for each test), kettle (or Bunsen burner, heat proof mat and tripod) (to get hot water).



- 5) What are the control variables in this experiment? How would they be controlled?

The same time interval in between each measurement,
The same surface area of insulating material,
The same volume of water for each beaker,
Use the same equipment,
The same operator,
The same environment,
The same time of day etc.

- 6) Suggest how you think the students could make sure they get reliable results

Make sure they do what is listed in question 5.
Repeat each material three times and take the average.
Identify any anomalous results and repeat them.

Activity 4

Some students wanted to know if the surface a ball moved across would affect how far it rolled. They rolled a ball over a carpeted floor and measured how far it went; they repeated this with different surfaces.

- 1) What is the independent variable in this experiment?

The different surfaces.

- 2) What is the dependant variable in this experiment?

The distance the ball rolled.

- 3) What equipment do you think the students should use to complete this experiment?

Different surfaces (to test), a ball (to roll), a meter stick (to measure the distance the ball rolled).

- 4) What are the control variables in this experiment? How would they be controlled?

Roll the ball with the same force,
Use the same equipment,
The same operator,
The same environment,
The same time of day etc.

- 5) Suggest how you think the students could make sure they get reliable results

Make sure they do what is listed in question 4.
Repeat each surface three times and take the average.
Identify any anomalous results and repeat them.

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OCR Resources: *the small print*

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