1.7 A fair test is a controlled experiment

Student worksheet answers (pages 16–17)

Controls

1 The following scenario describes a scientific investigation. Read the information and answer the questions.

Sue Doh liked to train for netball during the summer and wanted to know what coloured shirt would keep her the coolest. She decided to conduct a series of experiments to find out the answer. Sue assumed that white coloured clothes would be best because her mum’s white car was cooler inside compared with her dad’s dark coloured car. She found five different coloured squares of cotton cloth (white, purple, red, black, yellow and green). During the next really hot, sunny day she put squares of cloth on the trampoline in the backyard and put a thermometer underneath each cloth. She recorded the initial temperature of the five thermometers and the temperature on a thermometer lying on the trampoline but not under any cloth. She waited 5 minutes and wrote down the temperatures on all the thermometers. Sue decided to repeat her experiment three more times and recorded this information in a table of results for further analysis.

a What was Sue’s hypothesis?

Sue’s hypothesis was ‘If the fabric is a lighter colour, then I will not get as hot’.

b What was the independent variable in Sue’s experiment?

The independent variable is the colour of the cloth.

c What was the dependent variable in Sue’s experiment?

The dependent variable is the temperature measured under each of the different cloths.

d What variables were controlled in Sue’s investigation?

The variables that were controlled were the positions of the cloths and thermometers, and the length of time.

e How did Sue attempt to improve the reliability of her investigation?

Sue repeated the experiment three times to improve the reliability of the results.

f Was Sue’s experiment a fair test? Why or why not?

Student responses may vary.

g How could Sue’s experiment be improved so her results are more reliable?

Student responses may vary, but could include different positioning of the cloths, reducing the effect of any breeze and performing the experiment more times.

2 The following scenario describes a scientific investigation that a student, Con Trollé, conducted at home. Read the information and answer the questions.

Con wants to discover whether eating chocolate biscuits after school will affect the amount of food someone eats at dinnertime. To find out, Con chose four people to be test subjects. For 3 days, he will give them three chocolate biscuits after school. He will serve the same food for dinner for those 3 days and the test subjects will eat dinner at the same time every day. After 3 days of eating biscuits after school, he will then have the people have dinner for 3 days without eating biscuits after school. The test subjects will still have the same food for dinner and also eat at the same time. Con will measure and compare how much food they eat in the 3 days after eating biscuits and in the 3 days on which they didn’t have any biscuits.

a What is the independent variable in Con’s investigation?

The independent variable is the different test subjects.

b What is the dependent variable in Con’s investigation?

The dependent variable is the amount of food the test subjects ate for dinner.

c What are the controls in Con’s investigation?

The controls are the number of biscuits, the type of food eaten and the time the food was eaten.

EXTEND YOUR UNDERSTANDING

3 Phrenology is regarded as a branch of pseudoscience (meaning it has no real scientific foundation and isn’t based on evidence). Find out:

a what Phrenology was

Phrenology was the study of the size and shape of (i.e. the bumps on) people’s skulls. These measurements were used in an attempt to determine and predict people’s intelligence and certain personality traits.

b when it originated

Phrenology originated in the late 1700s (possibly 1796).

c what practitioners of Phrenology did

Practitioners of Phrenology would feel the size and shape of their patients’ skulls – in particular the bumps on the skull – to ‘diagnose’ health problems and personality traits. They would sometimes even predict their patients’ futures based on this.

d whether there was any scientific merit to this pseudoscience.

Phrenology was very popular around the world up until the 20th century. Despite the fact that many ‘scientific’ studies were conducted on patients during the 17th and 18th centuries, all of these have now been discredited. There is no scientific merit to Phrenology.