



Prescribed Focus Area: 4.2

uses examples to illustrate how models, theories and laws contribute to an understanding of phenomena

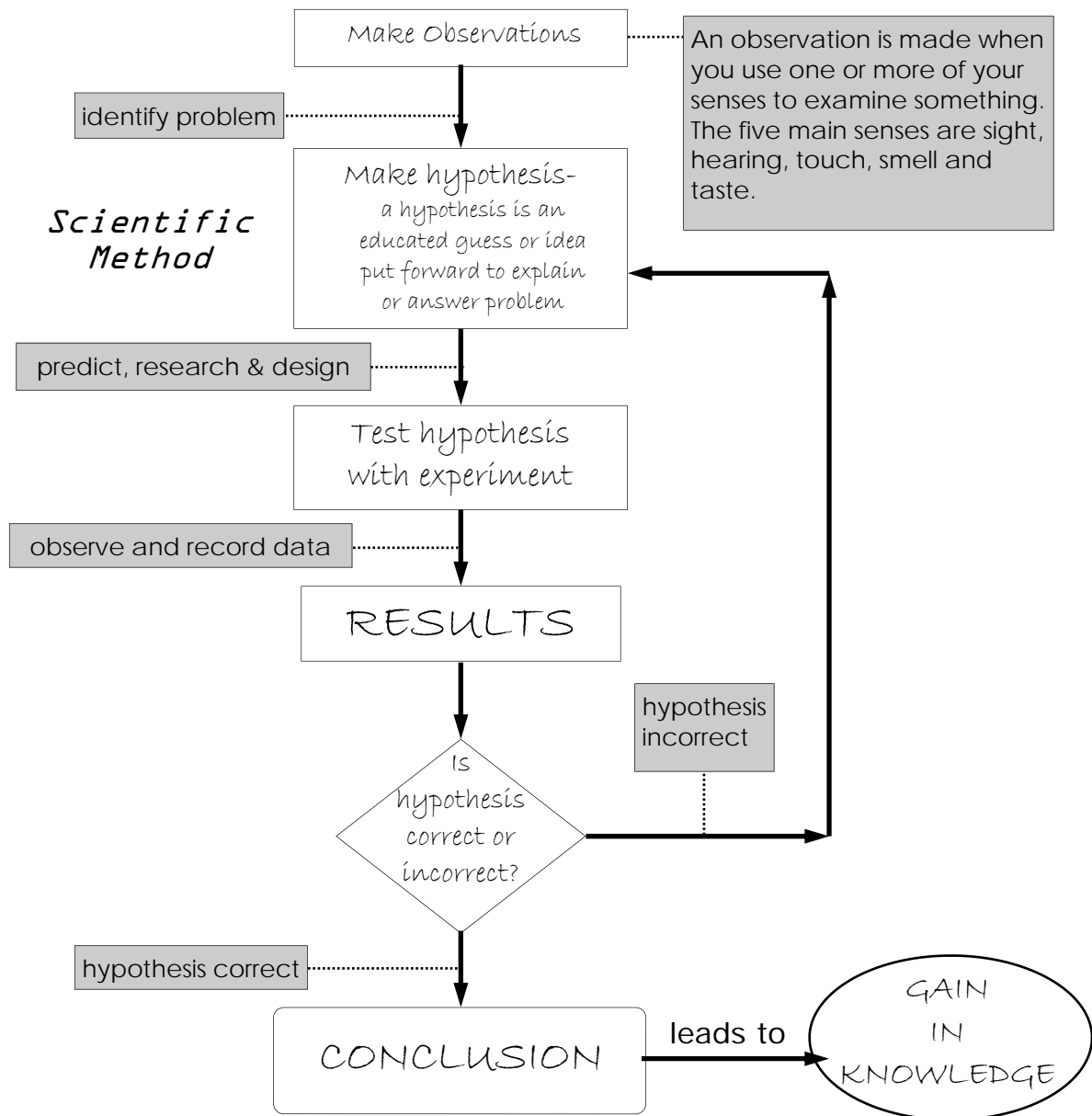
What is Science?

Science is often described as “knowledge gained by study and practice”. The study of science is different from all other forms of study because of the way in which scientific knowledge is **gathered, tested** and **used to predict** future events.

Science can be considered as a subject which “*collects and organises information about natural events with the aim of generating new information*”.

Scientific Method

The method by which scientists investigate a problem is called **scientific method**. The process of scientific method is summarised below:





Terms Related to Scientific Method

Term	Meaning
observation	An observation is made when we use one or more of our senses (seeing, hearing, smelling, tasting and touching).
inference	An inference is a statement which explains an observation or observations ~ it might or might not be correct. Inferences are used in conjunction with previous knowledge, to put forward a hypothesis from the observations made.
prediction	Predictions are used to design an experiment from the hypothesis. A prediction should be simple, specific and able to be tested.
variable	Any factor which can change in an experiment.
independent variable	The independent variable is the one that is changed by the scientist. In an experiment there is only one independent variable. As the scientist changes the independent variable, he or she observes what happens.
dependent variable	The dependent variable changes in response to the change the scientist makes to the independent variable. The new value of the dependent variable is <i>caused by</i> and <i>depends</i> on the value of the independent variable.
hypothesis	An hypothesis is an educated guess, based on observations, put forward to explain something. An hypothesis is tested in science using a controlled experiment. The hypothesis is worded so that it can be tested in your experiment. Do this by expressing the hypothesis using your independent variable (the variable you change during your experiment) and your dependent variable (the variable that changes in response and <i>depends</i> on changes in the independent variable). Not only must you incorporate all these variables in your hypothesis, but you also must express them in a way that you can readily measure.
controlled variable	Controlled variables are variables which must be kept constant. If these variables aren't controlled it may affect the experimental variable. Most experiments have more than one controlled variable. Some people refer to controlled variables as "constant variables."
control	In many experiments it is important to perform a trial with the independent variable at a special setting for comparison with the other trials. This trial is referred to as a control group . The control group consists of all those trials where you leave the independent variable in its natural state.
replication	Replication occurs when an experiment is repeated. Replication minimises human error and other inaccuracies, thus improving the reliability of results. Replication allows you to identify any invalid results and possibly explain these results.



Using Scientific Method

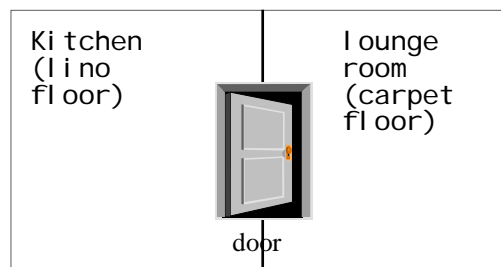
Read the following passages and answer the questions:

1. The diagram below shows part of a house. The kitchen is separated from the lounge room by a door.

A woman in the house finds that when she walks toward the door from the lounge room, she often gets an electrical shock when she places her hand on to the door handle. This does not occur when she walks from the kitchen.

The woman thinks that she is becoming statically charged as she walks over the nylon carpet in a particular type of shoe.

To test her idea she tries a number of different types of shoe on the carpet and the lino before opening the door. She records the results of the tests below:



Type of Shoe	Effect with Lino	Effect with Carpet
Type X	none	none
Type Y	none	electric shock
Type Z	none	none

From her results she decided Type Y shoe, when worn on carpet, may cause her to receive an electrical shock on the door handle.

- (a) What observations did the woman make?
- (b) What was her hypothesis?
- (c) What experiment did she carry out?
- (d) What were her results?
- (e) Was her hypothesis correct or incorrect?
- (f) What conclusion did she make?
- (g) If she was testing her hypothesis correctly, there is part of the experiment which could be left out. What is this part?
- (h) If she had found that all the shoes caused her to receive an electric shock, what would she have had to do?

2. A boy observes that his father waters his roses every day. The next door neighbour also does this, but with fertilizer added to the water. The neighbour's roses are much higher, thicker and more colourful than the boy's father's roses.

- (a) List four observations the boy made.
- (b) Write a hypothesis that the boy could use to test why the two groups of roses grew differently.
- (c) Design an experiment which the boy could use to test his hypothesis.

