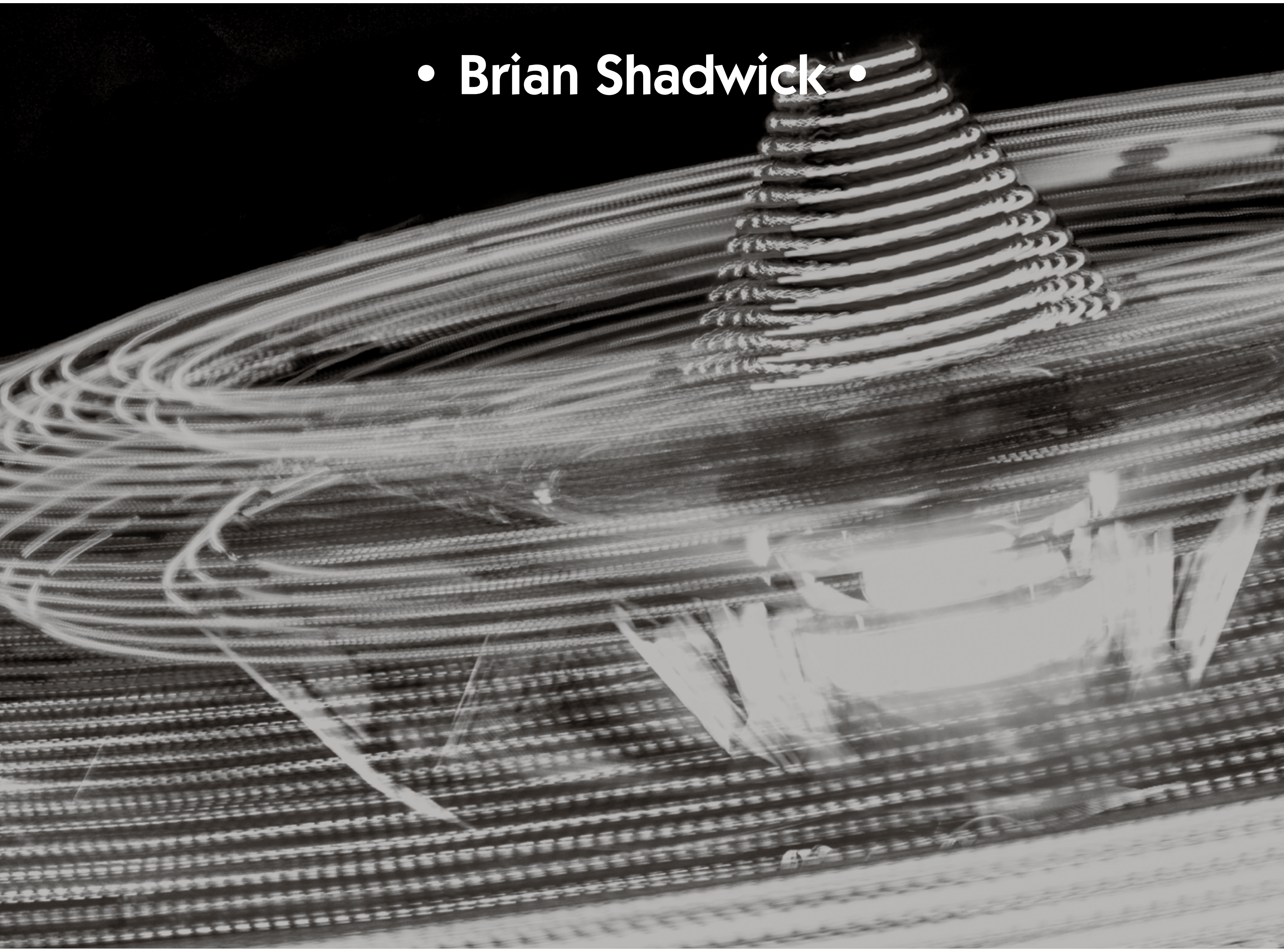
DOT POINT

NATIONAL SCIENCE YEAR 7



• Brian Shadwick •

Science Press

First published 2015

Science Press
Private Bag 7023 Marrickville NSW 1475 Australia
Tel: +61 2 9516 1122 Fax: +61 2 9550 1915
sales@sciencepress.com.au
www.sciencepress.com.au

Contents

Words to Watch

account, account for State reasons for, report on, give an account of, narrate a series of events or transactions.

analyse Interpret data to reach conclusions.

annotate Add brief notes to a diagram or graph.

apply Put to use in a particular situation.

assess Make a judgement about the value of something.

calculate Find a numerical answer.

clarify Make clear or plain.

classify Arrange into classes, groups or categories.

comment Give a judgement based on a given statement or result of a calculation.

compare Estimate, measure or note how things are similar or different.

conctruct Represent or develop in graphical form.

contrast Show how things are different or opposite.

create Originate or bring into existence.

deduce Reach a conclusion from given information.

define Give the precise meaning of a word, phrase or physical quantity.

demonstrate Show by example.

derive Manipulate a mathematical relationship(s) to give a new equation or relationship.

describe Give a detailed account.

design Produce a plan, simulation or model.

determine Find the only possible answer.

discuss Talk or write about a topic, taking into account different issues or ideas.

distinguish Give differences between two or more different items.

draw Represent by means of pencil lines.

estimate Find an approximate value for an unknown quantity.

evaluate Assess the implications and limitations.

examine Inquire into.

explain Make something clear or easy to understand.

extract Choose relevant and/or appropriate details.

extrapolate Infer from what is known.

hypothesise Suggest an explanation for a group of facts or phenomena.

identify Recognise and name.

interpret Draw meaning from.

investigate Plan, inquire into and draw conclusions about.

justify Support an argument or conclusion.

label Add labels to a diagram.

list Give a sequence of names or other brief answers.

measure Find a value for a quantity.

outline Give a brief account or summary.

plan Use strategies to develop a series of steps or processes.

predict Give an expected result.

propose Put forward a plan or suggestion for consideration or action.

recall Present remembered ideas, facts or experiences.

relate Tell or report about happenings, events or circumstances.

represent Use words, images or symbols to convey meaning.

select Choose in preference to another or others.

sequence Arrange in order.

show Give the steps in a calculation or derivation.

sketch Make a quick, rough drawing of something.

solve Work out the answer to a problem.

state Give a specific name, value or other brief answer.

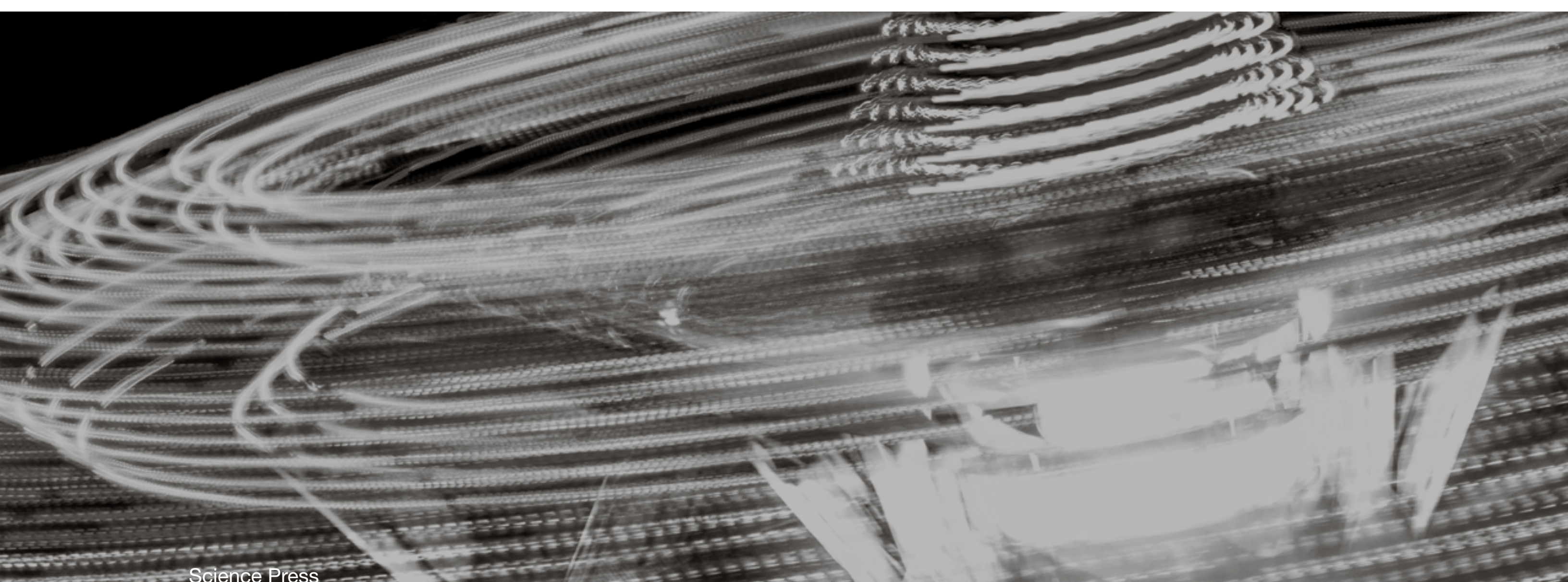
suggest Put forward an idea for consideration.

summarise Give a brief statement of the main points.

synthesise Combine various elements to make a whole.

DOT POINT

1 What is Science?



Science Press

FACTS YOU should know!

Science is a process of solving problems by designing and doing carefully controlled experiments.

Science investigates problems by researching information, doing experiments, surveying, modelling and analysing.

Factors which can affect the results of experiments are called variables.

Variables are controlled if they are kept constant and therefore cannot affect experimental results.

A ‘fair test’ in science is an experiment in which only the measured variables affect the results.

The properties of a substance are the things we use to distinguish it from other substances.

The five senses are hearing, sight, smell, touch and taste.

We can use the five senses to determine some of the properties of things.

An experiment always starts with a question which needs to be answered.

Observations we make in experiments should be recorded in the most appropriate way.

We record observations in statements, tables of information, bar charts, pie graphs, histograms.

The analysis of observations may include drawing graphs and making calculations.

A conclusion is the statement in an experiment that answers the problem the experiment was addressing.

You should follow correct procedure to dispose of waste chemicals so that you do not damage our environment.

The microscope is an instrument we use to magnify things a lot.

The top lens in a microscope is the eyepiece, the bottom lens is the objective lens.

Scale diagrams are those drawn in exact proportions to the real size, but either smaller or larger.

Good scientific process is to take several reading and then use an average rather than to just make one reading.

When reading articles in magazines, it is important to think about the truth rather than to believe sensationalism.

The process where we judge the truth or fiction of something is known as evaluation.

It is not science to present opinions as evidence. Facts must be given.

1.1 Questioning and predicting.

1.1.1 What is science?

1.1.1.1 Complete the sentence by writing one of the following words in each space (not in correct order): analysing; answers; doing experiments; observations; questions; recording results.

Your completed sentence will define science.

Science is a way of .... and ....

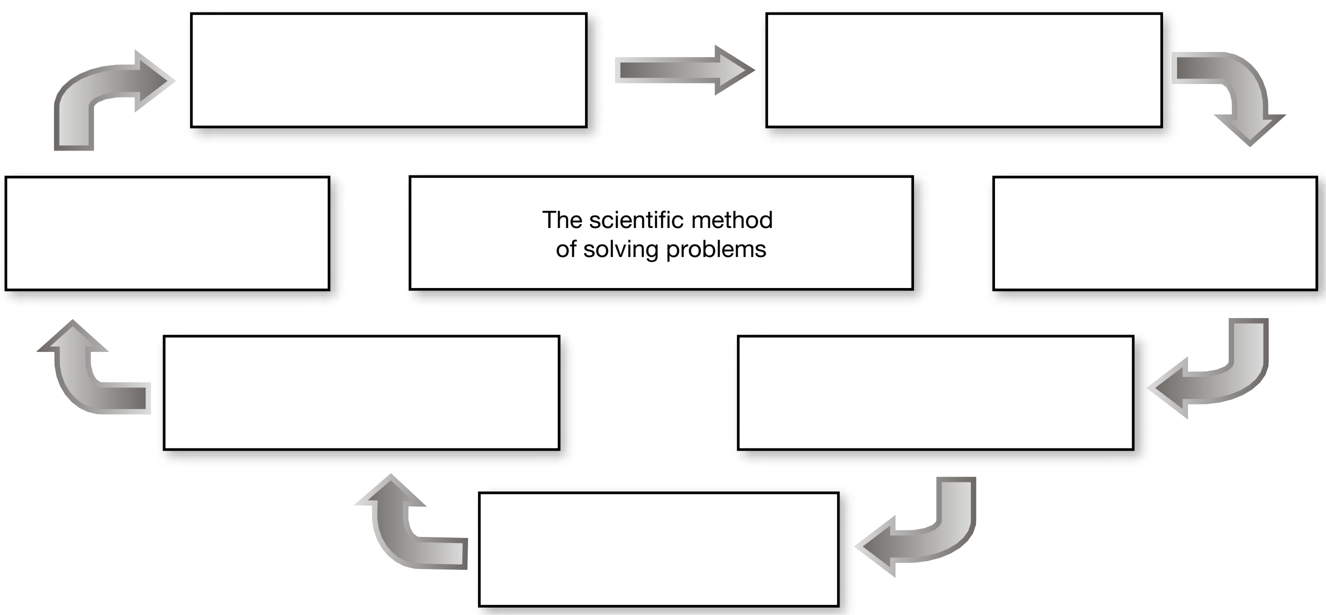
.... or .... information to explain ....

so we can find out the .... to ....

1.1.2 The scientific method.

1.1.2.1 Complete the cycle to summarise the scientific method. You will need to use the following phrases in the boxes (not in correct order):

Record your observations, Write a conclusion, Identify a problem, Observe what happens, Plan how to solve it, Analyse your results, Follow your plan.



1.1.2.2 What should you do if after the analysis of the observations you make during an experiment leads to other, unanswered questions?

....

1.1.2.3 What is a 'conclusion'? ....

....

1.1.2.4 How does a conclusion to an experiment relate to the problem the experiment was designed to solve?

....

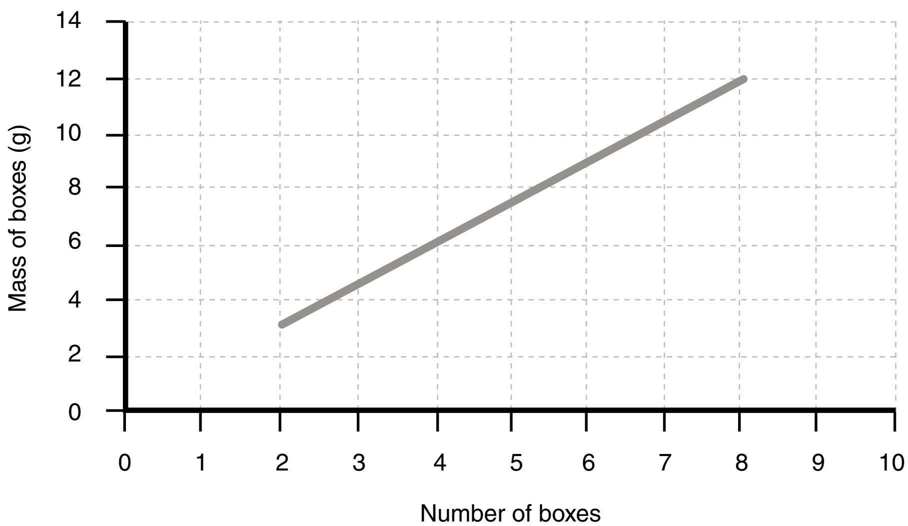
1.1.2.5 Identify the relationship between the observations made during an experiment and the conclusion to that experiment.

....

....

1.1.3 Solving a problem.

1.1.3.1 The graph shows the results of an experiment where the students found the masses of various numbers of identical boxes.



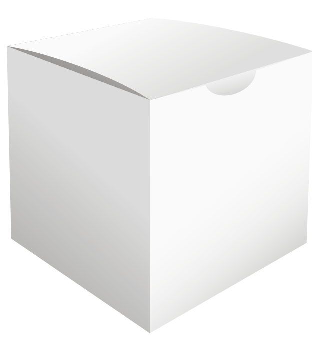
(a) What would be the mass of 10 boxes? ....

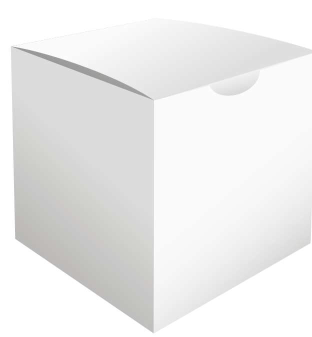
(b) If four additional boxes were added to the balance, what would it read? ....

(c) The balance has nine boxes on it. What would it read if three were removed? ....

(d) How many boxes would be on the balance if it read 30 g? ....

(e) In the same experiment, another group of students put a plastic sheet on the balance and put the boxes on top of the plastic. The plastic had a mass of 3 g. On the graph, draw a line to represent their results.





Science Press

1.1.3.2 You have been given this problem to solve: Which melts more quickly, a block of ice that is cube shaped, or a block of ice that is rectangular prism shaped?

(a) What is the purpose for this experiment? ....

....

....

(b) Write a hypothesis for the experiment. ....

....

(c) List three factors which would have to be controlled if this experiment was to be a fair test.

....

....

....

(d) List the equipment you would need for this experiment and state the function of each piece.

....

....

(e) What observations and/or measurements would you need to make?

....

....

(f) Imagine that you have done the experiment, and the rectangular prism shaped iceblock melted more quickly than the cube. Propose a reason as to why this might have happened.

....

....

(g) Write a conclusion for this imaginary experiment. ....

....

Science Press

1.2 Investigating methods.

1.2.1 Ways to investigate.

1.2.1.1 List five different strategies we could use to solve a problem.

1.2.2 Planning cooperatively.

1.2.2.1 Outline the advantages in planning how to do an experiment to solve a problem and in discussing the plan with your friends.

1.2.2.2 Outline any disadvantages there might be in planning how to do an experiment to solve a problem and in discussing the plan with your friends.

1.2.3 Fire safety.

1.2.3.1 Outline the fire safety strategies in your school laboratory.

1.3 Planning and conducting.

1.3.1 What is a fair test?

1.3.1.1 Outline what is meant by a fair test. ....

....

....

1.3.2 Designing fair tests.

1.3.2.1

(a) Suppose we wanted to test to see if brand X wheat seeds would germinate and grow more quickly than brand Y wheat seed. Name four variables that would need to be controlled if your experiment was to be a fair test.

....

....

....

....

(b) What should be the only variable left uncontrolled in this experiment? ....

....

(c) If different amounts of seed X and seed Y were used, how might this affect the result? Would it still be a fair test? Explain your answer.

....

....

....

....

(d) How could the result of the experiment be affected if seeds X received more water than seeds Y? Would this still be a fair test?

....

....

....

....

....

....

....

....

1.4 Using equipment safely.

1.4.1 Safety first!

1.4.1.1 In the space provided next to each cartoon, indicate the laboratory safety rule each refers to.

A

Safety rule shown by cartoon

B

Safety rule shown by cartoon

C

Safety rule shown by cartoon

D

Safety rule shown by cartoon

E

Safety rule shown by cartoon

F

Safety rule shown by cartoon

Science Press

1.4.2 Identifying scientific equipment.

1.4.2.1
1. The wonder word contains the names of 18 pieces of equipment. Find the names, list them in the table.
2. Unjumble the letters left over to find the name of another piece of apparatus (2 words).
3. What is this last piece of apparatus used for?

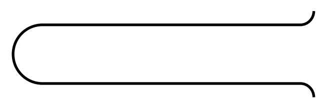
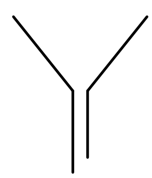
R	T	E	S	T	T	U	B	E	C	D	L
E	D	B	T	R	I	P	O	D	R	O	E
N	N	E	E	F	L	A	S	K	U	R	N
R	A	A	N	T	O	F	S	P	C	G	N
U	T	K	G	O	L	A	H	M	I	N	U
B	S	E	A	N	C	C	E	A	B	I	F
N	T	R	M	G	A	I	A	L	L	R	R
E	R	G	S	S	N	L	D	C	E	R	E
S	O	A	A	L	U	T	A	P	S	I	T
N	T	U	H	E	A	T	M	A	T	T	L
U	E	Z	K	G	A	S	J	A	R	S	I
B	R	E	P	A	P	R	E	T	L	I	F

	Apparatus		Apparatus
1		10	
2		11	
3		12	
4		13	
5		14	
6		15	
7		16	
8		17	
9		18	

Final piece and its function:

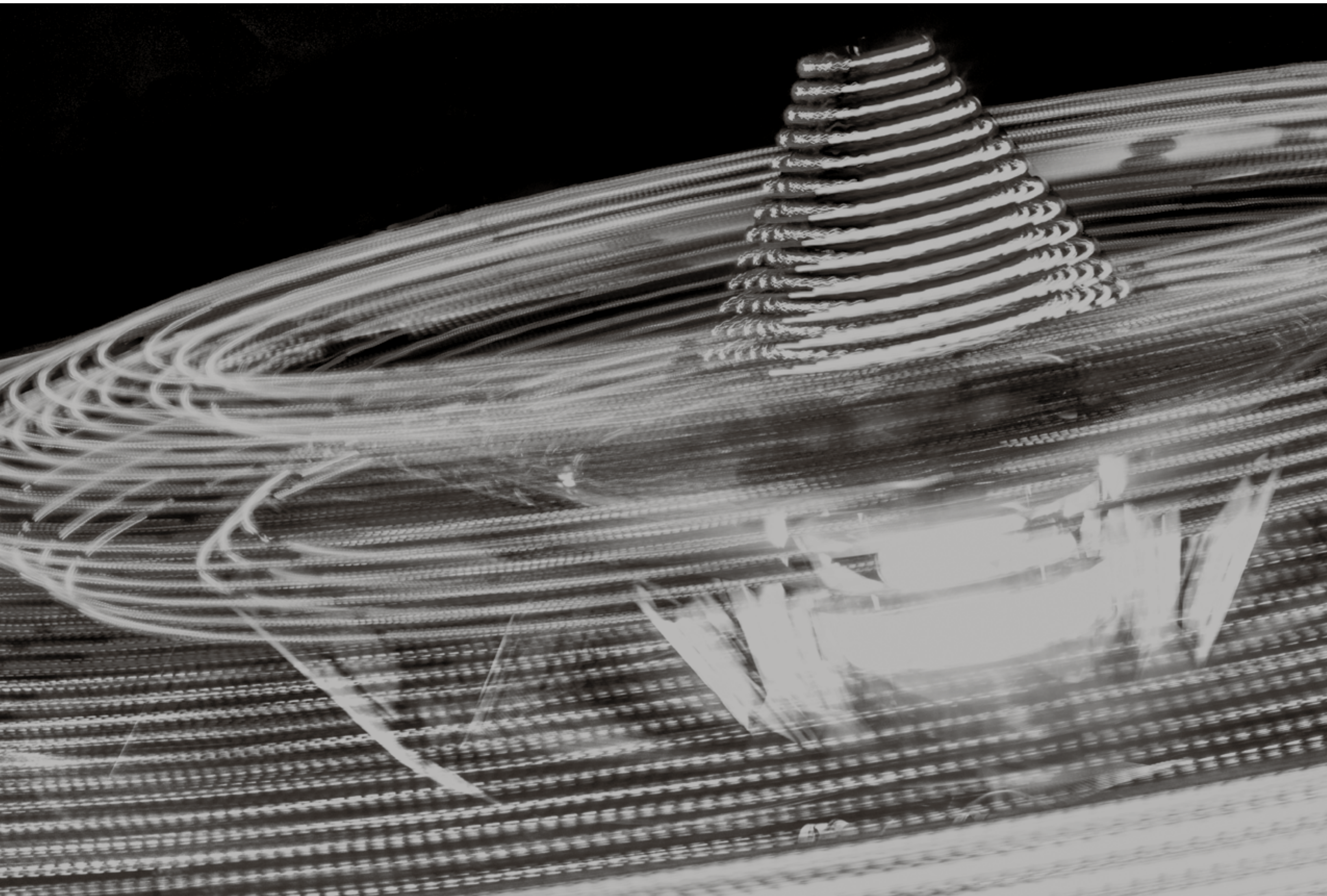
1.4.3 Drawing scientific equipment.

1.4.3.1 Complete the table.

Equipment name	Equipment function	Diagram
	Supporting equipment while contents are heated.	
		
Graduated beaker		
	Used to contain small amounts of liquids while they are heated strongly.	
		
Measuring cylinder		

DOT POINT

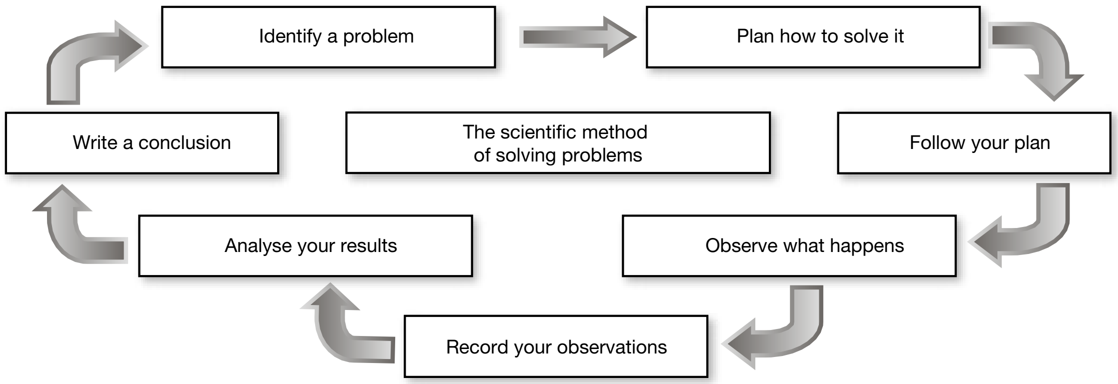
ANSWERS



Chapter 1 What is Science?

1.1.1.1 doing experiments, recording results, analysing, observations, answers, questions

1.1.2.1



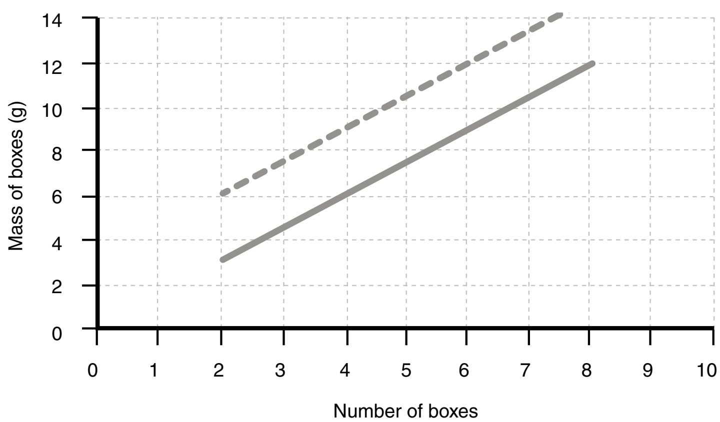
1.1.2.2 Repeat the process to find answers to these questions as well.

1.1.2.3 A conclusion is the end statement for an experiment and should provide the answer to the question the experiment was addressing.

1.1.2.4 It answers that question.

1.1.2.5 The observations, when analysed, should enable the conclusion to be made based on the evidence they contain.

1.1.3.1
(a) 15 g
(b) 18 g
(c) 9 g
(d) 20 boxes
(e)



1.1.3.2
(a) To determine which melts more quickly, a block of ice which is cube shaped, or a block of ice which is rectangular prism shaped.
(b) The rectangular shaped block will melt more quickly than the cube shaped block.
(c) The mass of water in each block, the initial temperature of the block, the environment each block is placed in to melt.
(d) Two equal sized beakers (to hold each iceblock, two stopwatches (to time the melt), tongs (to handle the iceblocks).
(e) Need to observe when the last piece of the ice disappears, and the time at that moment for each iceblock.
(f) For the same volume of ice, the rectangular block will have a greater surface area than the cube, so will be more exposed to the environment.
(g) The rectangular iceblock melted first.

1.2.1.1
1. Do an experiment.
2. Research information.
3. Take a survey.
4. Do modelling.
5. Analyse data collected by other people.

1.2.2.1
- Different people will bring a wider variety of suggestions to the plan.
- The work load can be shared.
- More people to recognise possible errors or flaws in design and implementation.
- Measurements can be duplicated to check for errors.
- Makes you share ideas and listen to other ideas.
- Allows the group to practise democracy.

1.2.2.2
- Dominant personalities may 'take over' the experiment.
- Sharing means your practice in doing things is more limited.
- Some members of the group may be lazy and not contribute their share.
- If one or more members work too slowly this can affect the group's ability to complete the work on time.
- You may not notice, and therefore have no control over the errors other members may make.
- A group member may not be so dedicated to doing well and may just 'mess about' and affect results.

1.2.3.1 Answers will vary as different labs will have different strategies in different positions, but answers could include:
- Sand bucket behind the main entrance door for covering smouldering materials.
- Fire blanket hanging behind the main door to smother fire.
- Fume cupboards in which all dangerous experiments should be done, including those likely to catch fire.
- Main gas tap under teacher's bench so that gas supply to student desks can be cut to minimise accidents by students doing the wrong thing, or to turn off gas if fire occurs in the lab.
- Fire extinguisher mounted on a wall bracket towards the front of the room.
- Main electrical switch on teacher's bench to cut power to students' desks in case of an electrical fire.

1.3.1.1 A fair test is one in which all variables likely to affect the results of the experiment are controlled (kept constant) except the variable being tested.

1.3.2.1
(a) The type and amount of soil used to plant the seeds in, the amount of water given to each, the time at which both were watered, the amount of light each group receives, the temperature of their environment.
(b) The different type of seed used.
(c) No, it would not be a fair test, because this variable is not controlled. Maybe the more crowded seed bed would germinate more slowly, maybe the crowded plants will grow more slowly – less water each, less light each.
(d) They may germinate and grow more quickly, they may germinate more slowly as too much water may cause seed rot.

1.4.1.1 Answers will vary. Several safety concepts may be gleaned from each cartoon.
A Clean up any spillages immediately.
B Take care how you move around the laboratory.
C Clean apparatus properly before putting it away so it is safe and ready for the next user.
D In the event of an accident, alert the teacher immediately.
E Keeps lids on containers. If you need to smell chemicals use the proper procedure and waft your hand across the container towards your nose so you only get a small amount of the chemical near you.
F Do not do unauthorised experiments or play around with possible explosive mixtures of chemicals.

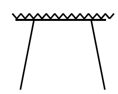
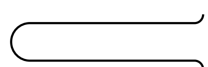
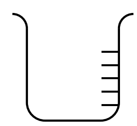
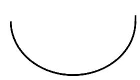
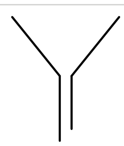
1.4.2.1

	Apparatus		Apparatus
1	Filter funnel	10	Stirring rod
2	Test tube	11	Crucible
3	Flask	12	Clamp
4	Tongs	13	Gas jar
5	Gauze	14	Heat mat
6	Bunsen burner	15	Spatula
7	Tripod	16	Magnet
8	Beaker	17	Filter paper
9	Retort stand	18	Bosshead

R	T	E	S	T	T	U	B	E	C	D	L
E	D	B	T	R	I	P	O	D	R	O	E
N	N	E	E	F	L	A	S	K	U	R	N
R	A	A	N	T	O	F	S	P	C	G	N
U	T	K	G	O	L	A	H	M	I	N	U
B	S	E	A	N	C	C	E	A	B	I	F
N	T	R	M	G	A	I	A	L	L	R	R
E	R	G	S	S	N	L	D	C	E	R	E
S	O	A	A	L	U	T	A	P	S	I	T
N	T	U	H	E	A	T	M	A	T	T	L
U	E	Z	K	G	A	S	J	A	R	S	I
B	R	E	P	A	P	R	E	T	L	I	F

Final piece and its function: conical flask – used to contain liquids or solutions and to heat them on a gauze on a tripod.

1.4.3.1

Equipment name	Equipment function	Diagram
Tripod and gauze	Supporting equipment while contents are heated.	
Test tube	To contain solutions and mixture for mixing, reacting, heating.	
Graduated beaker	To contain and measure liquid volumes more accurately than an ungraduated beaker. To heat liquids on tripod and gauze.	
Evaporating basin	Use to contain small amounts of liquids while they are heated strongly.	
Filter funnel	To filter undissolved solid from liquid.	
Measuring cylinder	To measure volumes of liquids accurately.