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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.

construct 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.

1 What is Science?

This chapter presents the introductory skills you will need for your study of science. The questions in each unit are only a few examples of the many that are integrated into the Science Understanding topics of the course.

- | | | | |
|------|----------------------------------|--------|----------------------------------|
| 1.1 | Questioning and predicting | 1.1.1 | What is science? |
| | | 1.1.2 | The scientific method |
| | | 1.1.3 | Solving a problem |
| 1.2 | Investigating methods | 1.2.1 | Ways to investigate |
| | | 1.2.2 | Planning cooperatively |
| | | 1.2.3 | Fire safety survey |
| 1.3 | Planning and conducting | 1.3.1 | What is a fair test? |
| | | 1.3.2 | Designing fair tests |
| 1.4 | Using equipment safely | 1.4.1 | Safety first! |
| | | 1.4.2 | Identifying scientific equipment |
| | | 1.4.3 | Drawing scientific equipment |
| | | 1.4.4 | The Bunsen burner |
| | | 1.4.5 | Burning incense |
| | | 1.4.6 | Chemicals are equipment too! |
| | | 1.4.7 | Disposing of chemicals |
| | | 1.4.8 | Making chemical observations |
| | | 1.4.9 | Microscopes |
| | | 1.4.10 | Using a microscope |
| 1.5 | Observing and measuring | 1.5.1 | Making observations |
| | | 1.5.2 | A box of goodies |
| | | 1.5.3 | Scales and scale diagrams |
| | | 1.5.4 | Reading scales |
| | | 1.5.5 | Measuring length accurately |
| 1.6 | Processing and analysing results | 1.6.1 | Materials and radiators |
| | | 1.6.2 | How heavy is the class? |
| | | 1.6.3 | Processing information |
| 1.7 | Developing explanations | 1.7.1 | Cars and temperatures |
| 1.8 | Communicating | 1.8.1 | Changing data into other forms |
| | | 1.8.2 | Is the data sufficient? |
| 1.9 | Reflecting on methods | 1.9.1 | Drop an egg |
| | | 1.9.2 | Straw bridge |
| 1.10 | Evaluating evidence | 1.10.1 | Mobile phones cook eggs! |
| | | 1.10.2 | Brand A better than the rest |

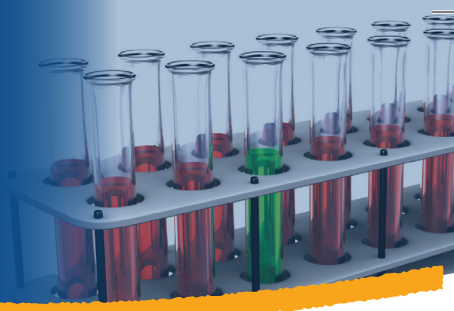
Chapter 1 Test



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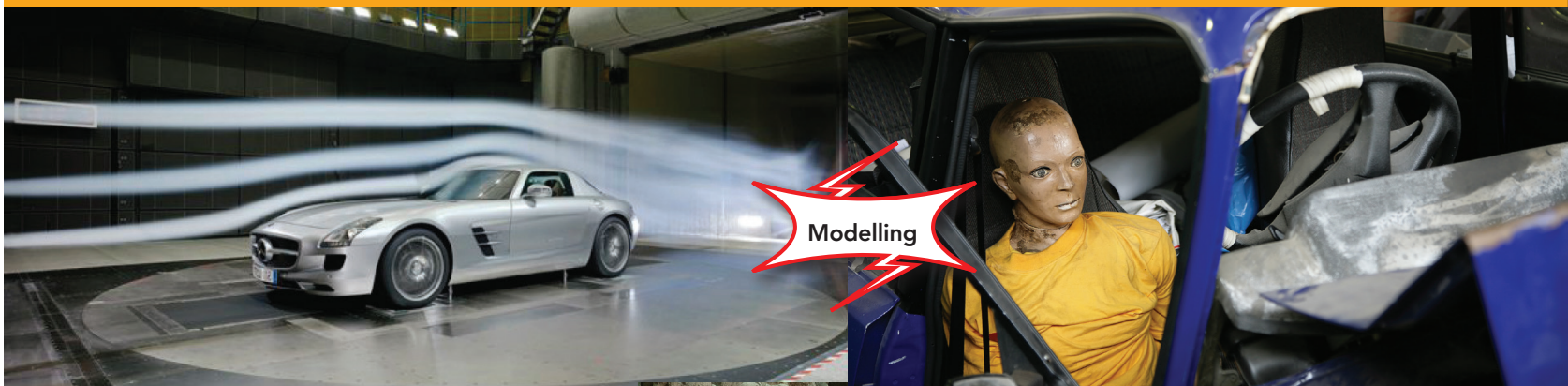
Chapter 1 What is Science?

1.2 Investigating methods



1.2.1 Ways to investigate

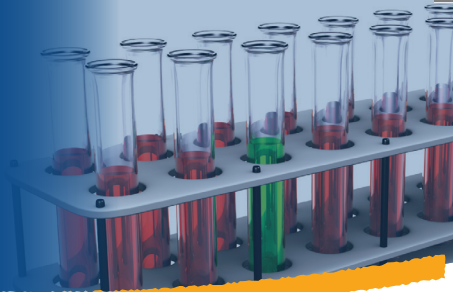
Science investigations can be done in many ways. The way we choose to do a particular investigation depends on that investigation and the resources available to us. We can do experiments, survey peoples' opinions, research information from various sources, model the situation, or analyse data collected by other people.



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Chapter 1 What is Science?

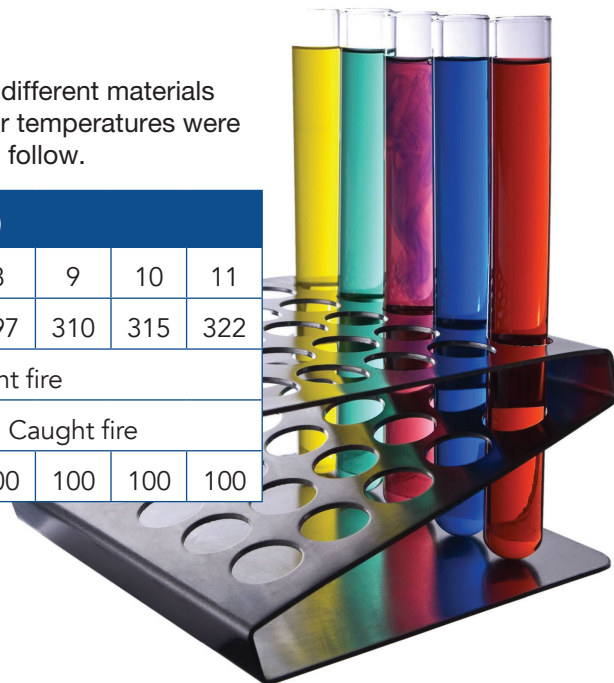
1.6 Processing and analysing results



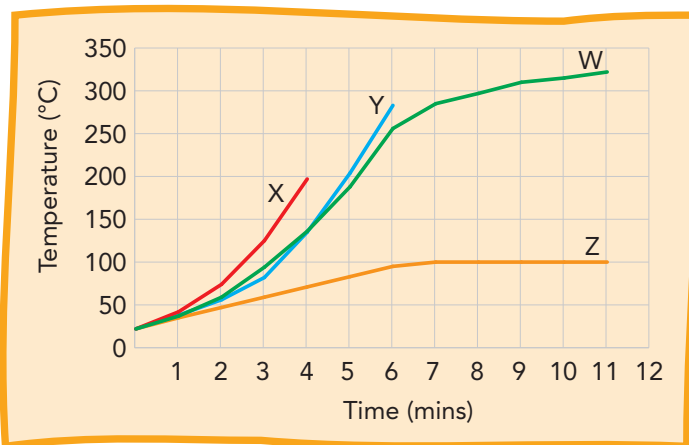
1.6.1 Materials and radiators

1.6.1.1 The table shows the results of an experiment where four different materials were placed on a stand close to an electric radiator. Their temperatures were recorded. Use the table to answer the five questions that follow.

Substances	Temperature at time t (minutes)											
	0	1	2	3	4	5	6	7	8	9	10	11
W	22	37	59	94	136	188	256	285	297	310	315	322
X	22	42	74	125	197	Caught fire						
Y	22	38	56	82	135	204	283	Caught fire				
Z	22	35	47	59	71	83	95	100	100	100	100	100



- (a) Which substance increased in temperature most uniformly?
- (A) W
(B) X
(C) Y
(D) Z
- (b) Which substance was most inflammable?
- (A) W
(B) X
(C) Y
(D) Z
- (c) Which graph opposite best shows the results of heating substance Y for the first 4 minutes?
- (A) A
(B) B
(C) C
(D) D
- (d) Which statement best explains the results of the experiment for substance Z?
- (A) Z was not heated any further after 7 minutes.
(B) No more Z remained in the container after 7 minutes.
(C) Z caught fire after 7 minutes and burned at a constant temperature.
(D) Z was water.
- (e) If this was to be a 'fair test' which variable would need to be controlled?
- (A) The mass of each substance.
(B) The temperature of each substance.
(C) The time each substance was heated.
(D) Whether or not the substances were flammable.



1.6.2 How heavy is the class?

The table shows the weights of a group of students.

55	48	37	51	66	35
65	52	56	34	42	43
48	44	70	33	44	47
63	63	43	68	48	53
49	49	39	50	60	39
28	58	52	50	29	62



1.6.2.1 Suggest an aim for this experiment. (What question do you think is being asked?)

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1.6.2.2 Reorder the readings so they are easier to analyse.

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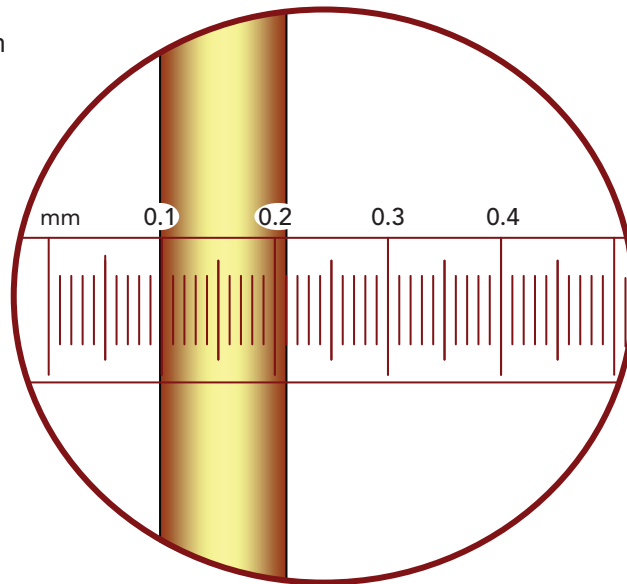
1.6.2.3 Indicate the number of students in each of the weight groups indicated in the table below.

26-30 kg	31-35 kg	36-40 kg	41-45 kg	46-50 kg	51-55 kg	56-60 kg	61-65 kg	66-70 kg

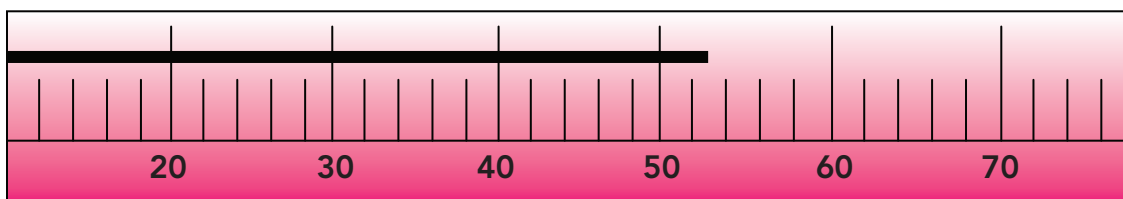
1.6.2.4 Indicate the number of students in each of the weight groups indicated in the table below.

26-35 kg	36-45 kg	46-55 kg	56-65 kg	66-75 kg

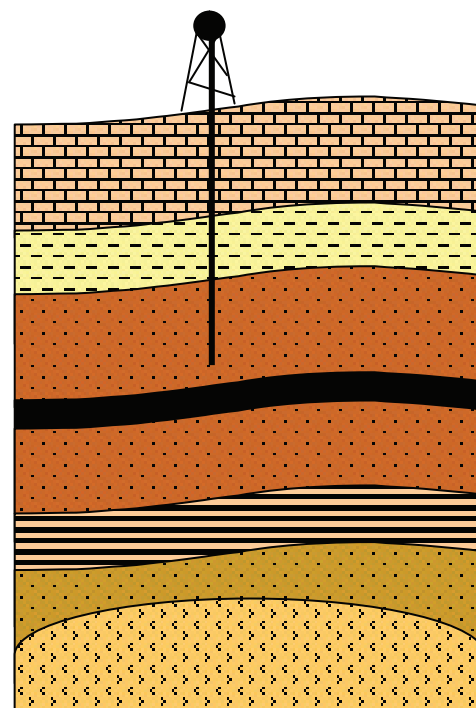
7. The diagram shows a human hair as seen through a microscope. What is the thickness of this hair?
- (A) 0.011 mm
 (B) 0.11 mm
 (C) 1.1 mm
 (D) 2.1 mm



8. What is the reading on the scale below?



- (A) 50.3
 (B) 51.5
 (C) 52.5
 (D) 53
9. The diagram shows a cross-section of part of the Earth's crust. It has been drawn to a scale where 1 cm = 50 m. How far below the surface has the drillhole reached?
- (A) 17 m
 (B) 170 m
 (C) 1700 m
 (D) 17 000 m



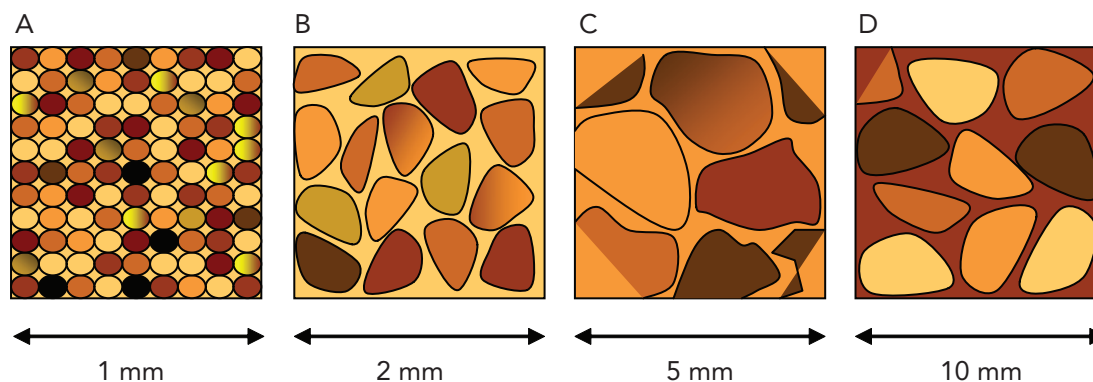
Chapter 1 Test

- 10.** An ant walks 90 cm from its nest, in a straight line, and then it turns 90° to the right and walks another 1.2 m to reach a grain of sugar.
- (a) Using your ruler, draw a scale diagram of the ant's trip (indicate the scale). Put arrowheads on the lines you draw to show the direction of the ant's movement.



- (b) On your diagram, draw a dotted line to show the path the ant could have taken if it walked directly from the nest to the piece of sugar.
- (c) How far was the sugar grain from the nest?

- 11.** The diagrams represent the grains in four different rocks. They are drawn to different scales.



On average, which rock has the largest grain size?

- (A) A
(B) B
(C) C
(D) D

Use the following information to answer the next TWO questions.

The table shows the average water usage for various activities.

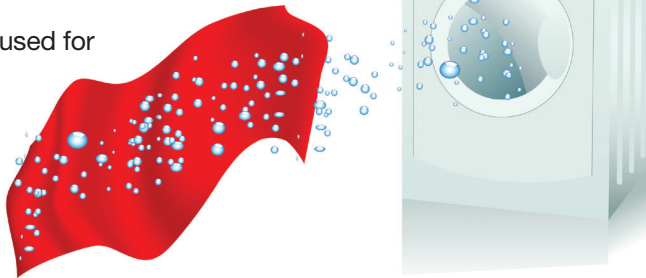
Activity	Amount of total home water use (%)
Baths	2
Clothes washing	20
Dishwashing	14
Garden	28
General cooking	3
Showers	22
Toilet flushing	11

12. In the choices below, if the dark bar represents water used in toilet flushing, which bar represents water used for clothes washing?

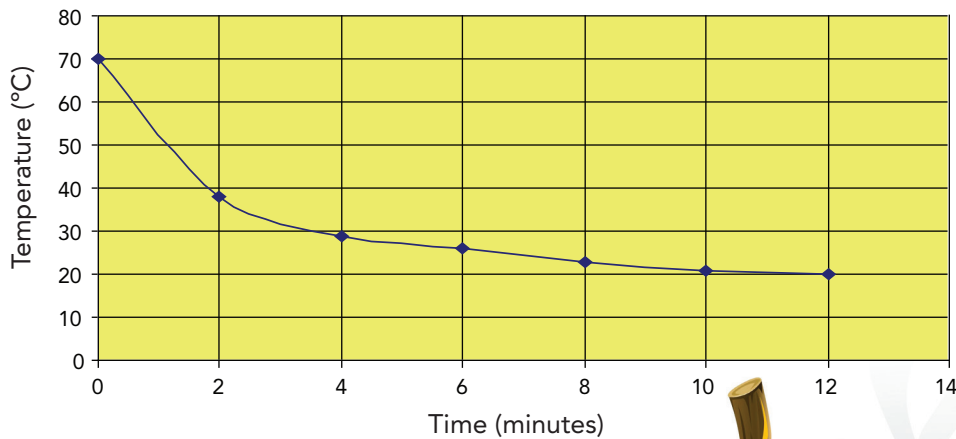


13. What total percentage of our water is used for keeping things clean?

- (A) 36%
- (B) 56%
- (C) 58%
- (D) 69%

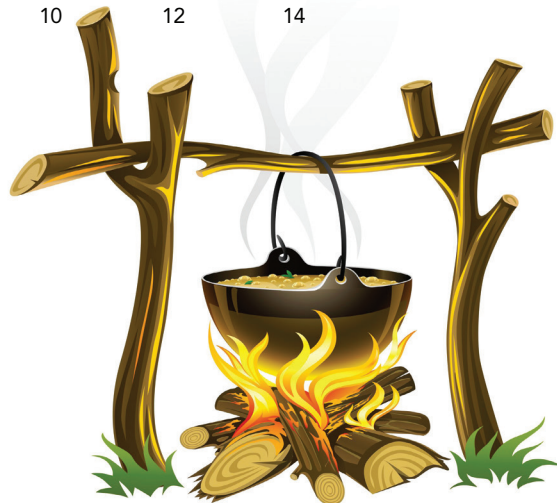


14. The graph shows how the temperature of a warm object changed over time.



How long did it take for the object to cool to 25°C?

- (A) 2.5 minutes
- (B) 6 minutes
- (C) 7 minutes
- (D) 8 minutes



Chapter 1 Test

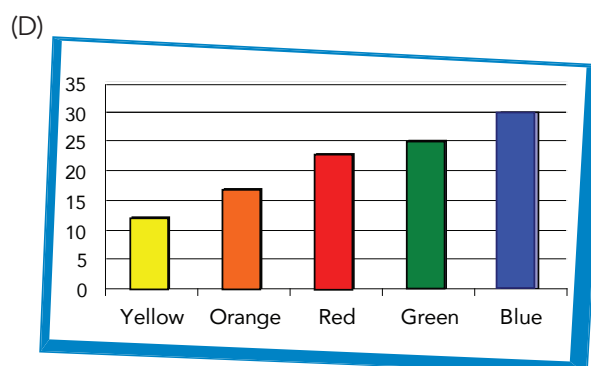
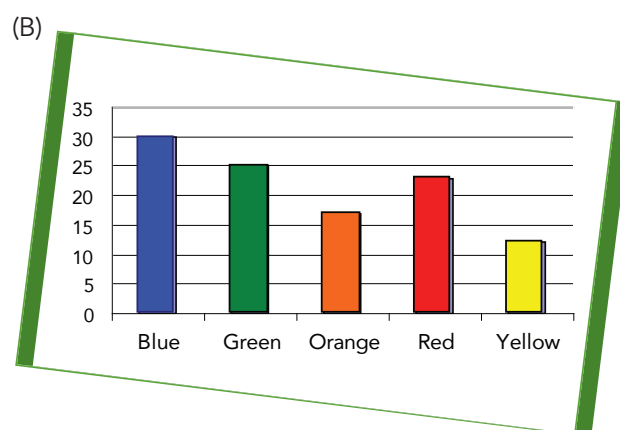
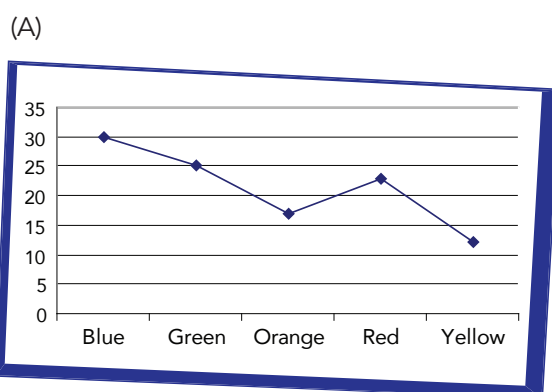
15. Which choice in the table gives two correct terms for a chemical which mixes freely with water?

(A)	Dilute	Soluble
(B)	Soluble	Immiscible
(C)	Miscible	Insoluble
(D)	Miscible	Soluble

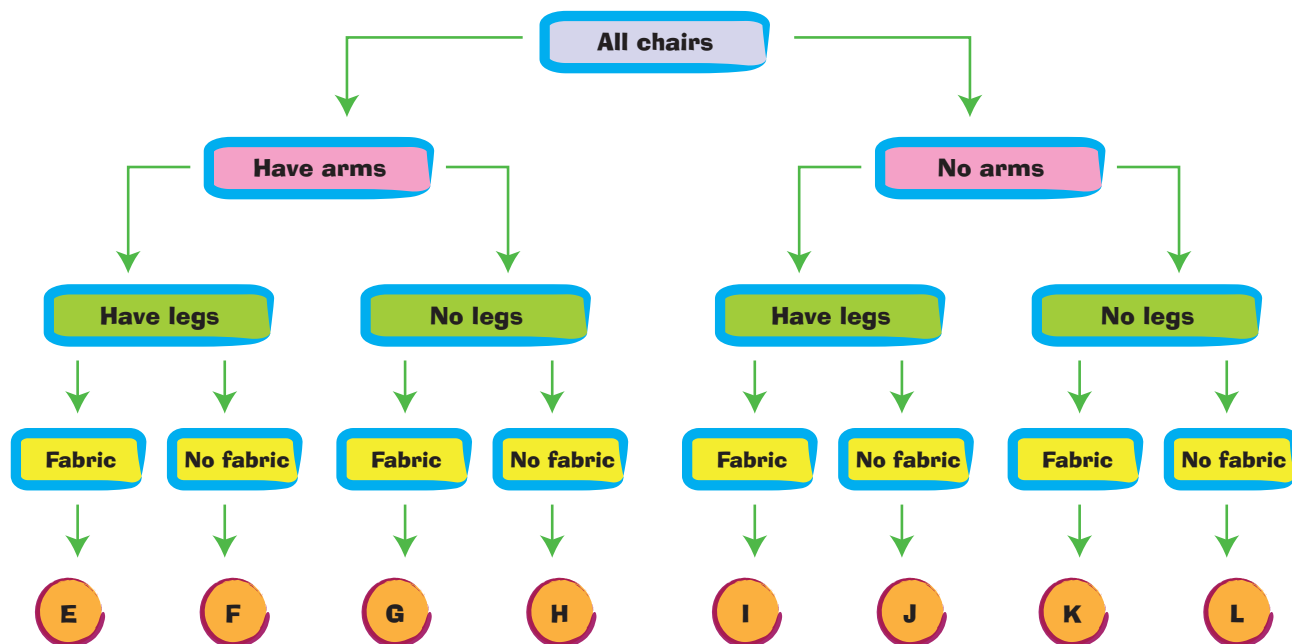
16. The table shows the number of different coloured balls in a bag.

Colour of ball	Number of balls
Blue	30
Green	25
Orange	17
Red	23
Yellow	12

Which of the following shows this information correctly and most appropriately?



Use this dichotomous key to answer Questions 17 and 18.



17. Which chair could be a lab stool?

- (A) I
- (B) J
- (C) K
- (D) L

18. Chair F on the key is most probably a:

- (A) Lounge chair.
- (B) Park bench seat.
- (C) Kitchen chair.
- (D) Movie theatre seat.

19. The diagram represents a warning sign. What does it warn against?

- (A) Biohazardous material.
- (B) Explosive material.
- (C) High speed fan.
- (D) Radioactive materials.



20. What does it mean if we say that a variable in an experiment is controlled?

- (A) It is kept constant.
- (B) It is the one we are measuring.
- (C) It is the variable which affects the outcome of the experiment.
- (D) It is a variable which does not affect the outcome.

2.6

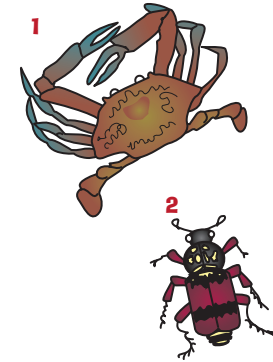
Using keys to identify organisms



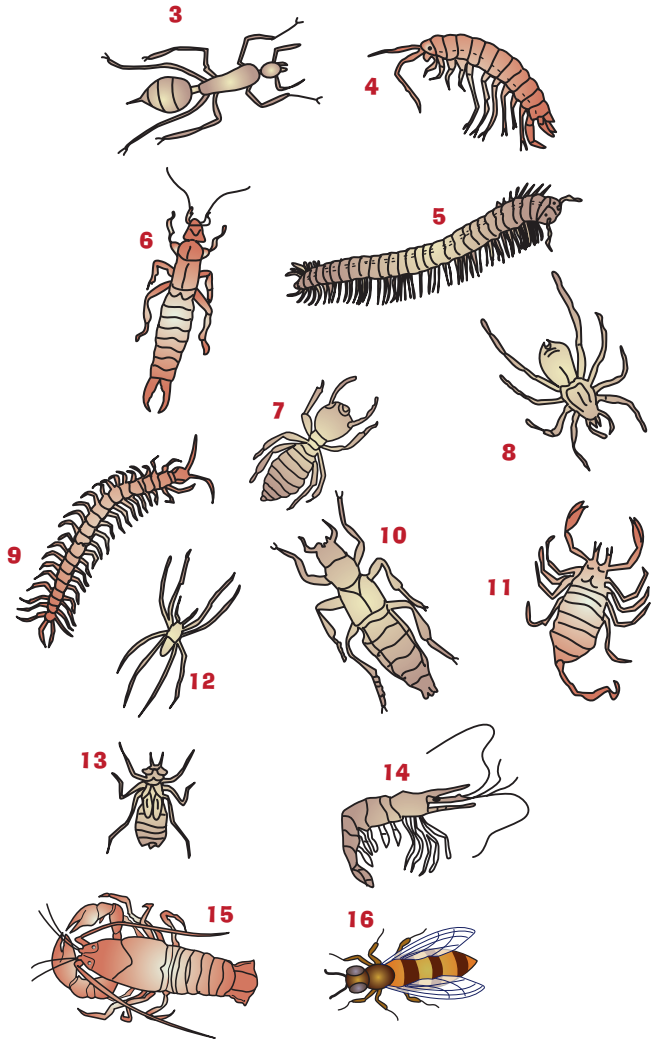
2.6.1 Phylum Arthropoda

2.6.1.1 Use the information in the table to classify each of the arthropods shown. Write your answers in the table.

Classification of arthropods	
Insects	Body has three parts, have three pairs of legs.
Arachnids	Body has two parts, have four pairs of legs.
Crustaceans	Five to 12 pairs of legs with other smaller limbs.
Centipedes	Many body segments, one pair of legs per segment.
Millipedes	Many body segments, two pairs of legs per segment.



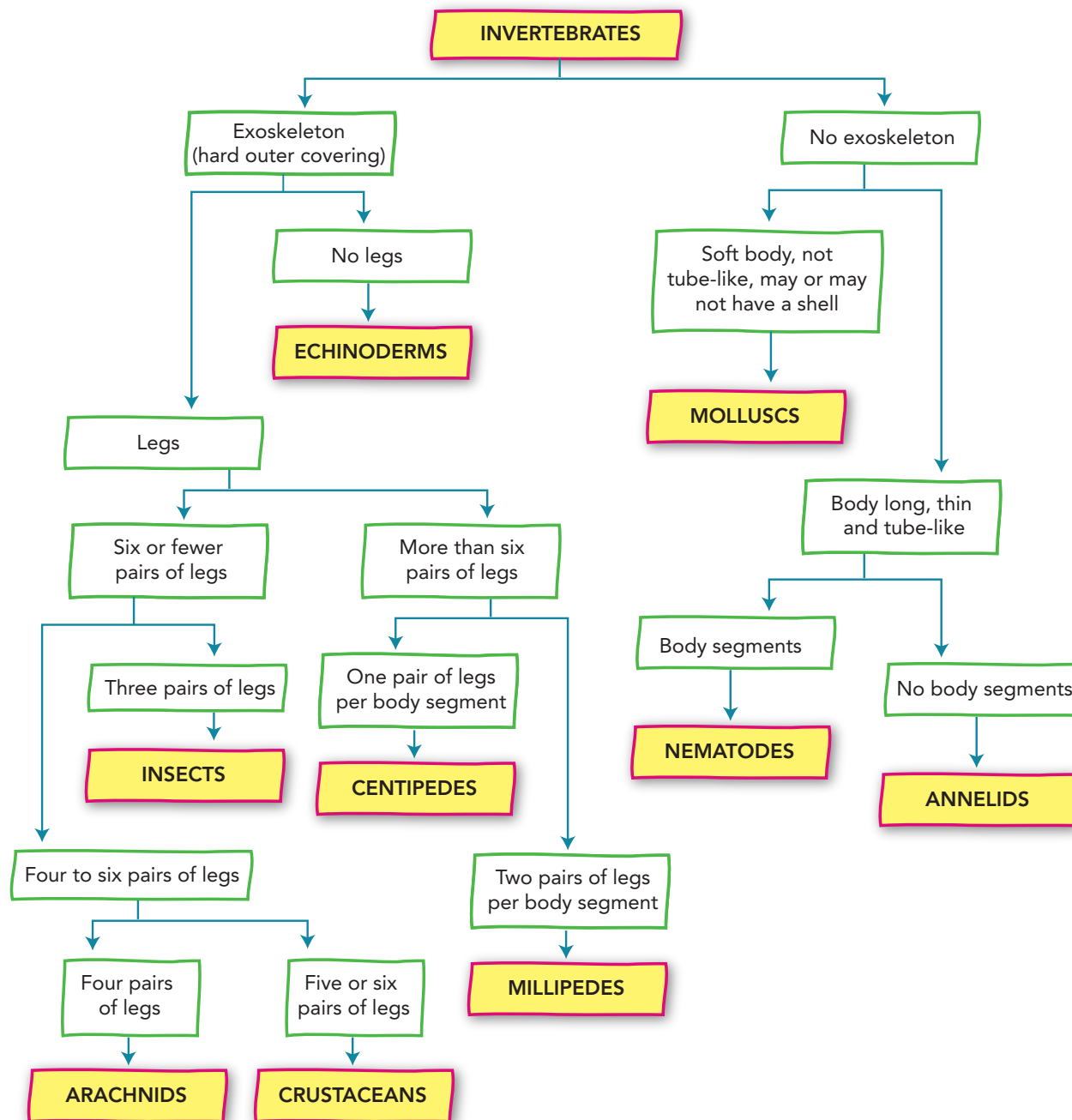
Picture	Classification
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	



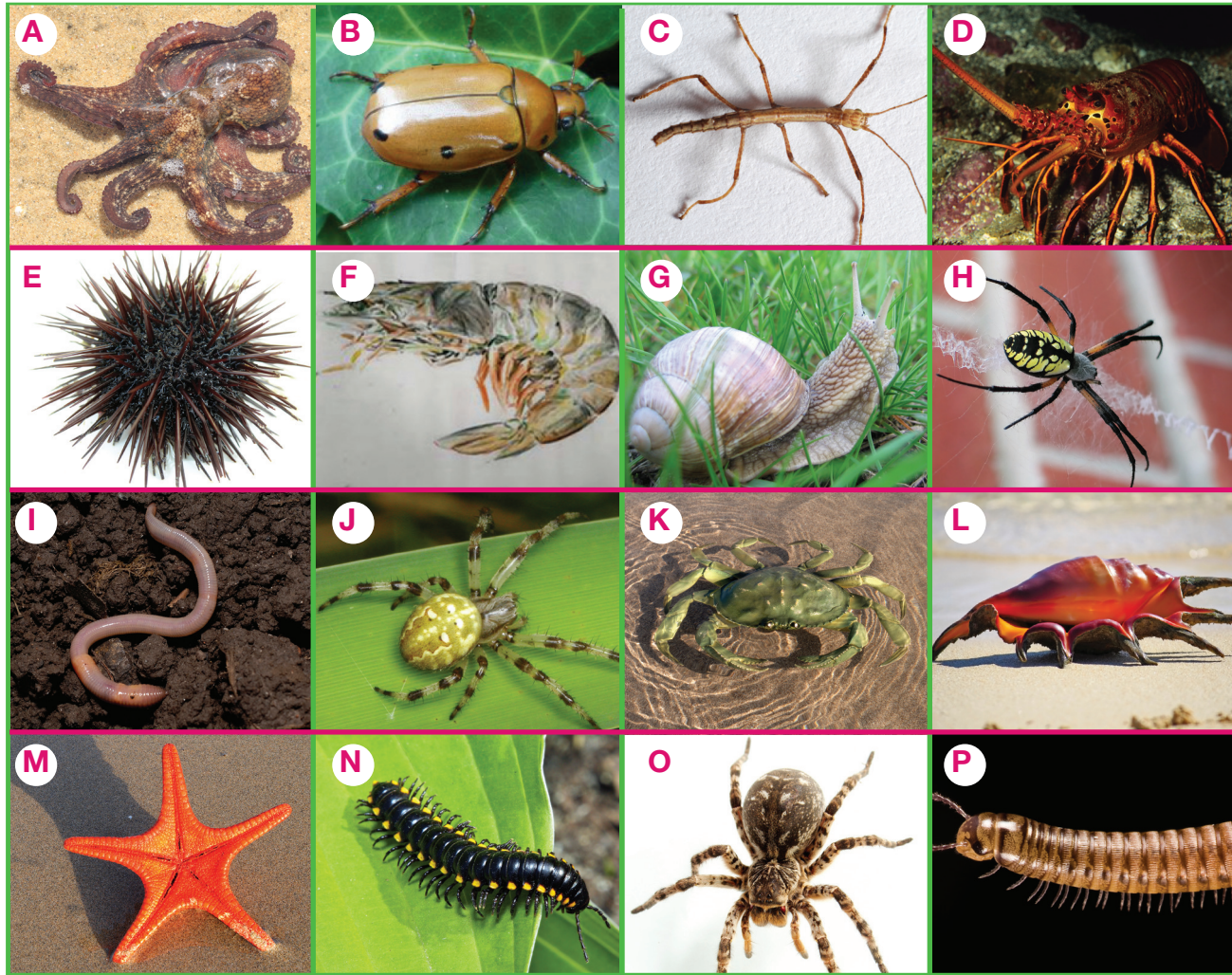
2.6.2 Another way to do it

2.6.2.1 The flow diagram below is a classification tool known as a **dichotomous key**. Each section of the chart divides into two new sections as the criteria for classification become more specific (hence the di-). This chart can be used to distinguish between some (not all) common invertebrate animals (animals who do not have a backbone). Note that an **exoskeleton** is a hard, protective layer on the outside of the body.

Use the diagram below to identify the animals pictured on the next page.



2.6 Using keys to identify organisms



A		E		I		M	
B		F		J		N	
C		G		K		O	
D		H		L		P	

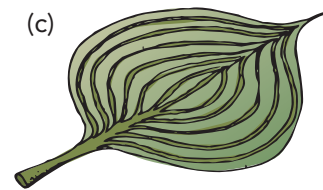
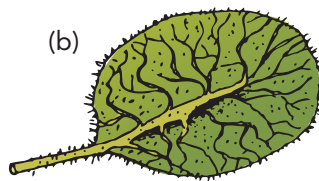
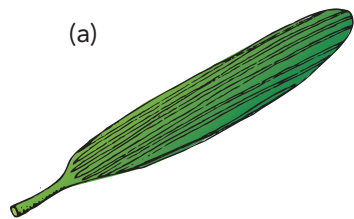


2.6.3 Using a dichotomous key

Look briefly at the following information, which gives a dichotomous key used to identify some plants on the imaginary planet Xenos, and then use it to answer the questions.

(A) Are the leaves long and thin?	Yes: go to (B) No: go to (D)	(I) Does the leaf have hairs?	Yes: is a DRON No: is a PLIM
(B) Do the leaves have parallel veins?	Yes: go to (C) No: go to (E)	(J) Does the leaf have hairs?	Yes: is a HINJ No: is a KLUN
(C) Do the leaves have a pointed tip?	Yes: go to (H) No: go to (I)	(K) Does the leaf have hairs?	Yes: is a BLAP No: is a MUNQ
(D) Do the leaves have parallel veins?	Yes: go to (F) No: go to (G)	(L) Does the leaf have hairs?	Yes: is a CLAS No: is a ZONJ
(E) Do the leaves have a pointed tip?	Yes: go to (J) No: go to (K)	(M) Does the leaf have hairs?	Yes: is a YINK No: is a FLUB
(F) Do the leaves have a pointed tip?	Yes: go to (L) No: go to (M)	(N) Does the leaf have hairs?	Yes: is a JANG No: is a NILG
(G) Do the leaves have a pointed tip?	Yes: go to (N) No: go to (O)	(O) Does the leaf have hairs?	Yes: is a LEYT No: is a RIRK
(H) Does the leaf have hairs?	Yes: is a GRIN No: is a SIND		

2.6.3.1 Use the key above to name the plants these leaves come from.



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2.6.3.2 Draw a diagram of each of the following leaves.

(a) Jang

(b) Munq

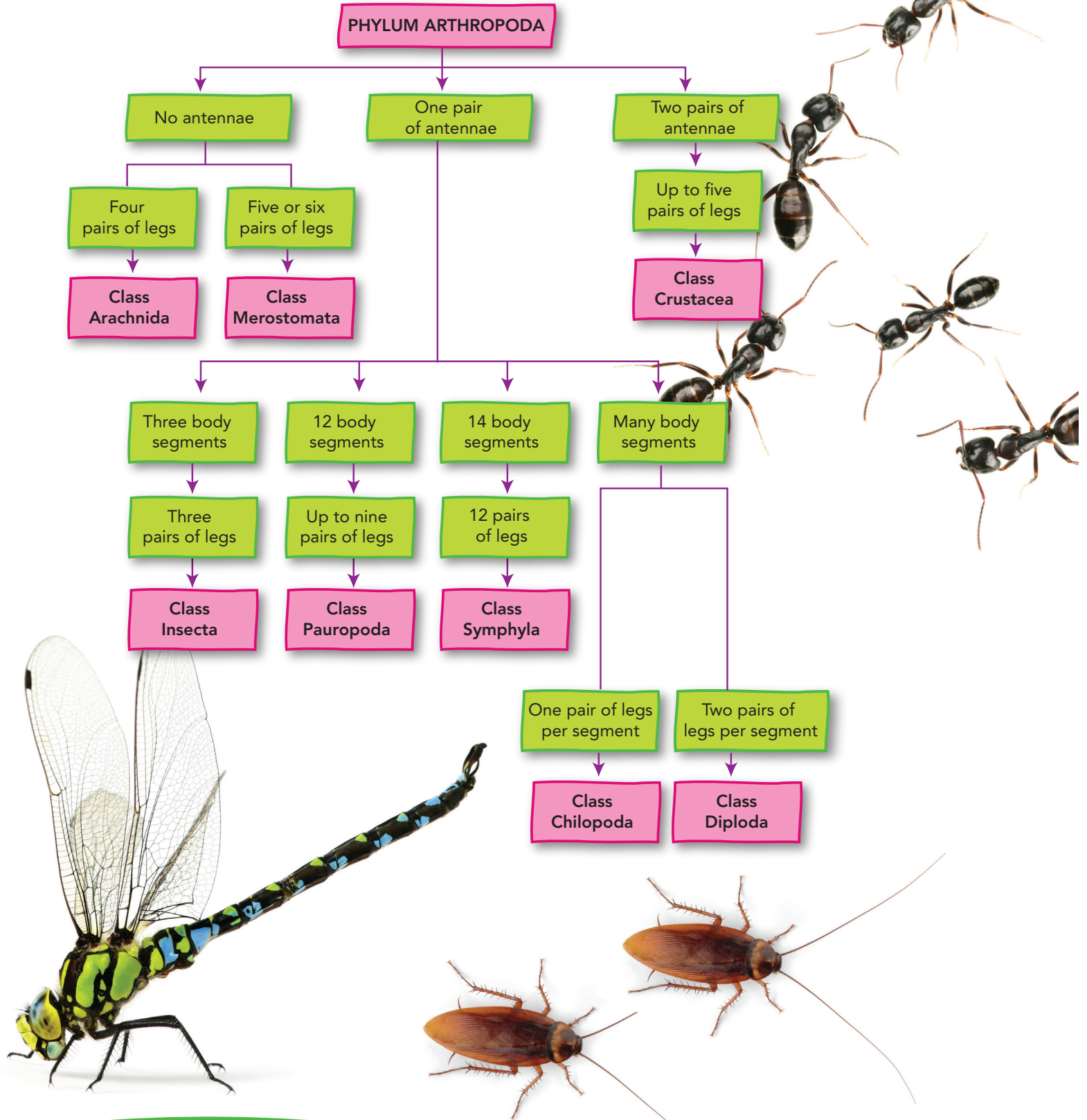
(c) Klun

2.6.3.3 Describe a yink leaf.

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Use the following information to answer the next FIVE questions.

The classification diagram below shows the classes of arthropods.



Chapter 2 Test

- 7.** What are the distinguishing features between arachnids and insects?

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- 8.** What is the distinguishing feature between chilopoda and diploda?

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- 9.** What is the distinguishing feature between insects and symphyla?

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- 10.** Into which class would you classify an arthropod with 3 pairs of legs, 2 sets of wings, 1 pair of antennae and 3 body sections?

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- 11.** What do symphyla and crustaceans have in common?

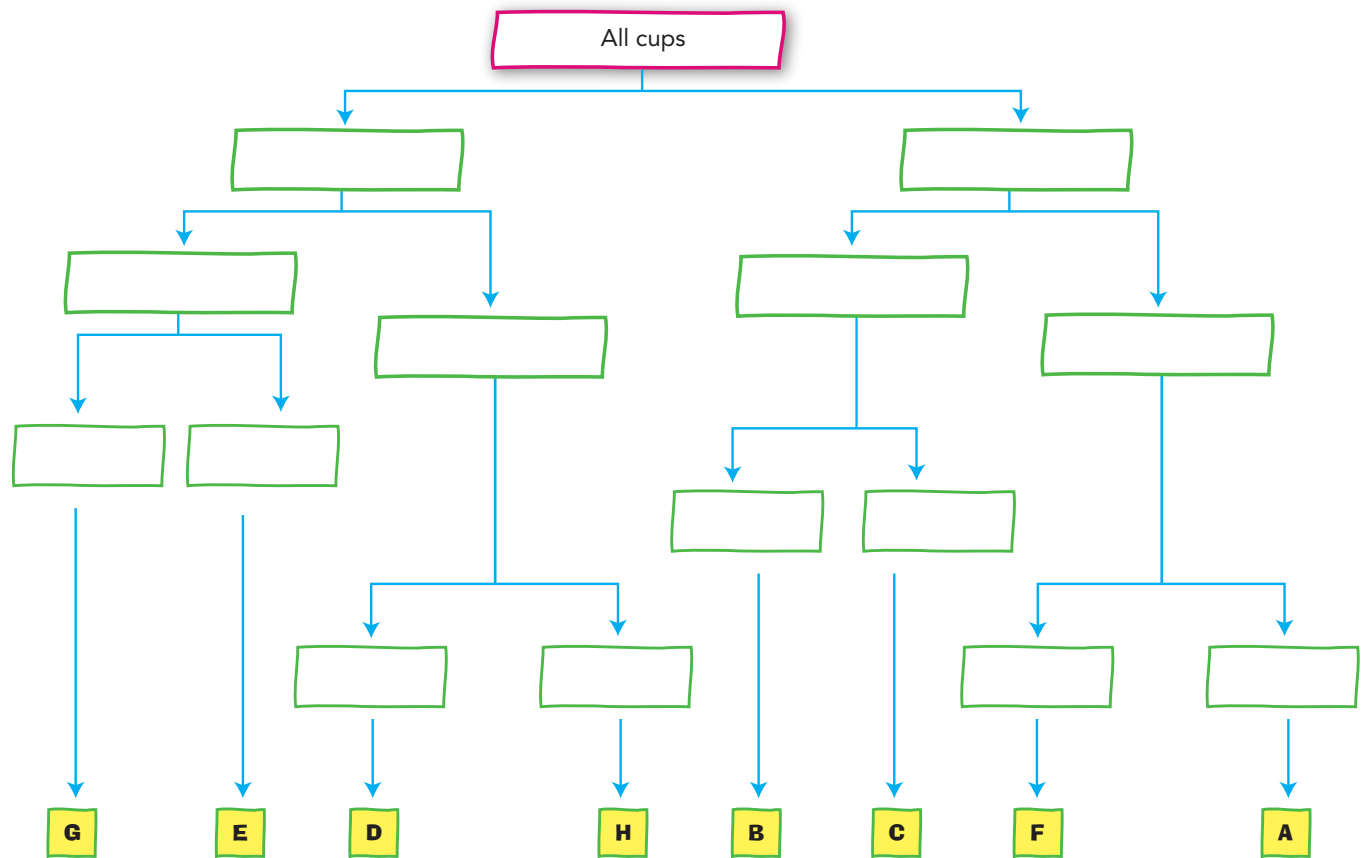
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12. In the space below, complete a dichotomous key that could be used to identify each of the following cups.



5.1 Pure substances and mixtures

5.1.7.4 Imagine that you are doing an experiment in which you dissolve different amounts of an orange-coloured chemical, potassium dichromate, in different volumes of water in four identical test tubes. The table shows the contents of each test tube.

Test tube	Amount of solute (g)	Amount of solvent (mL)
A	10	100
B	20	150
C	10	75
D	5	40

Draw coloured diagrams to show the results you would expect to get in this experiment. Explain your reasoning.

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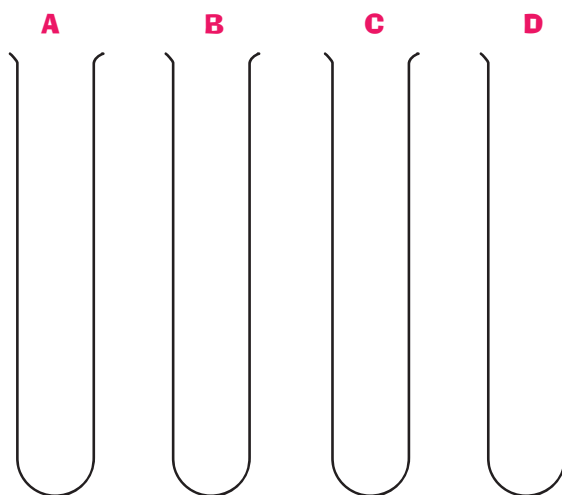
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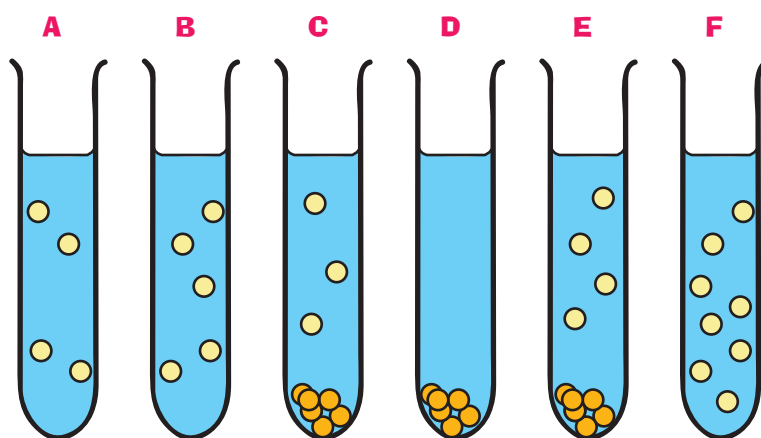
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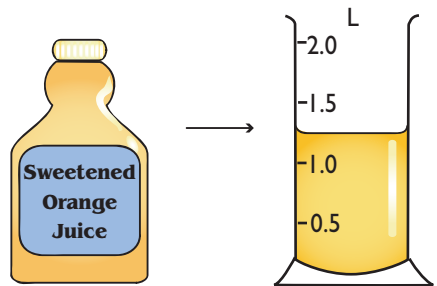
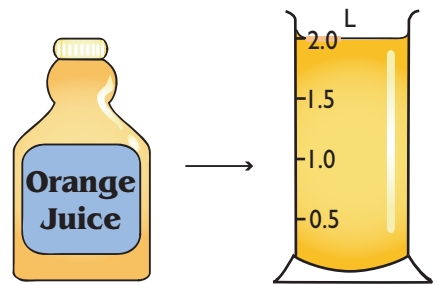
5.1.7.5 Consider the following particle diagrams representing solutions.



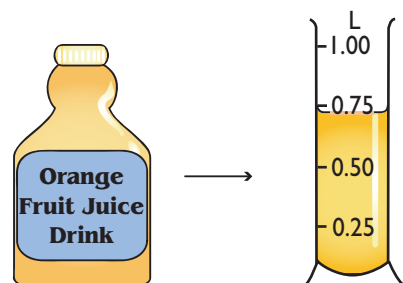
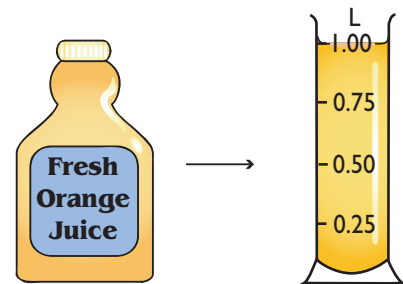
- (a) Which test tubes contain solutions?
- (b) Which diagrams represent saturated solutions?
- (c) List the solutions in order of increasing concentration.

5.1 Pure substances and mixtures

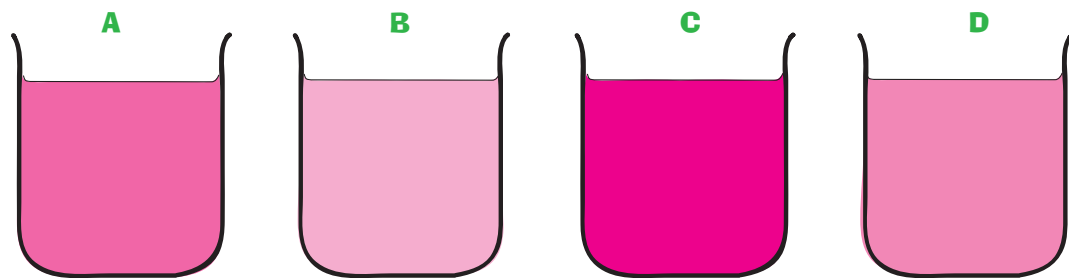
5.1.7.6 The measuring cylinders show the amount of orange juice mixed in with water to make up the 2.0 L in each of four containers of different types of orange juice (distinguished by the labels on the bottles). Present this information in a table.



5.1.7.7 Present this information in a histogram.



5.1.7.8 List the solutions in the beakers in order of increasing concentration.



5.2 Identifying solvents and solutes

5.2.1 What is the solvent and solute?

5.2.1.1 The photographs show five common drinks. Some carbonated Fanta®, orange juice, Coca-Cola®, a glass of lemonade and a cup of tea. One is not a solution. Complete the table to show the names of the solutions, the solvent involved and the solutes dissolved in each (there may be more than one).



Solution	Solvent	Solute(s)

5.2 Identifying solvents and solutes

5.2.1.2

(a) Which photo in Question 5.2.1.1 shows something that is not a solution?

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(b) How can you tell this is not a solution?

.....

(c) Describe what this photo is showing.

.....

5.2.1.3 'Pure' water is really a mixture of at least two chemicals. Identify the solvent and at least one solute in 'pure' water.

(a) The solvent is

(b) One solute is

5.2.1.4 The picture shows a young Ugandan girl holding a container of the water she drinks.

(a) What is the solvent in this container?
Explain your answer.

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.....

(b) Suggest what else is in the jar.

.....

(c) How would we classify the mixture in the container?

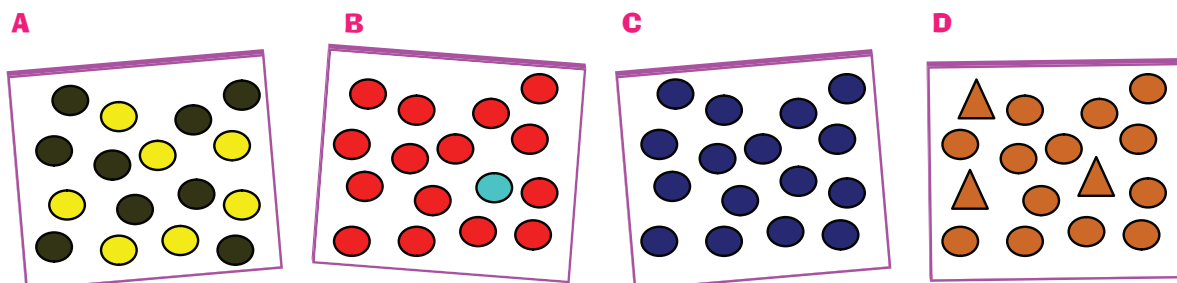
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Chapter 5 Test



1. Which one of the following particle diagrams represents a pure substance?



2. Which of the following is a pure substance?

- (A) Air.
- (B) Iron.
- (C) Lemonade.
- (D) Blood.

3. Which definition is correct?

- (A) A solvent is any substance which will dissolve in a solute.
- (B) A solute is formed when a solvent dissolves a solution.
- (C) A solution forms when a solvent dissolves in a solute.
- (D) A solute is any substance which will dissolve in a solvent.

4. Which choice is correct?

	Salt water		Solution of copper sulfate	
	Solute	Solvent	Solute	Solvent
(A)	Salt	Water	Copper sulfate	Water
(B)	Salt	Water	Water	Copper sulfate
(C)	Water	Salt	Copper sulfate	Water
(D)	Water	Salt	Water	Copper sulfate

5. What is meant by the term insoluble?

- (A) A substance is insoluble if it will not dissolve in a solvent.
- (B) A substance is insoluble if it dissolves in water, but not in another solvent.
- (C) A substance is insoluble if solutes will not dissolve in it.
- (D) A substance is insoluble if it dissolves easily in water.