SURNAME ..... FIRST NAME .....

JUNIOR SCHOOL ..... SENIOR SCHOOL .....

Independent Schools Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

SCIENCE

LEVEL 1

Specimen Paper

(for first examination in Autumn 2017)

Please read this information before the examination starts.

- This examination is 60 minutes long.
- Answer **all** the questions.
- You are allowed to use a calculator.

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1. Underline the option which best completes each of the following.

(a) An example of a luminous source is

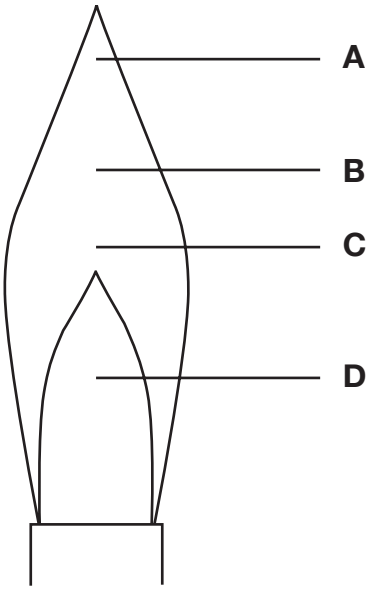
the eye **a mirror** **the Moon** **the Sun**

(b) A food chain will always be made up of

a producer and one consumer **a producer and more than one consumer**

a producer, a herbivore and a carnivore **a producer and one or more consumers**

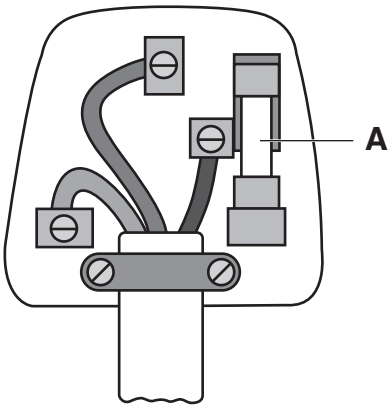
(c)



The hottest part of a Bunsen flame is

A **B** **C** **D**

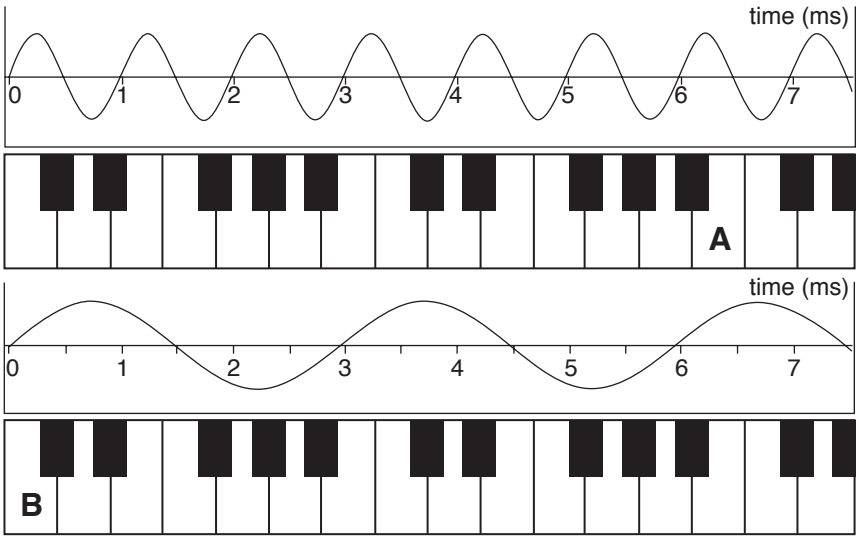
(d)



The component labelled A in the plug above is

a diode **a fuse** **an insulator** **a resistor**

(e) The diagrams below show a keyboard and the sound waves produced when the keys **A** and **B** are pressed.



Sound waves for

A and B have the same frequency **A has a higher frequency than B**

A has a lower frequency than B **A is louder than B**

(f) A molecule of copper sulfate has one atom of copper, one atom of sulfur and four atoms of oxygen. The formula for copper sulfate is usually shown as

CuO_4S **$CuSO_4$** **$SCuO_4$** **O_4CuS**

(g) In seawater, salt is the

solid **solute** **solution** **solvent**

(h) Eye colour in humans is an example of

chance variation **continuous variation**

discontinuous variation **random variation**

(i) Solar energy is an example of a

non-renewable resource **non-reusable resource**

renewable resource **reusable resource**

(j) The symbol C stands for an atom of

calcium **carbon** **chlorine** **copper**

(10)

2. Some students measured the solubility of two salts: sodium chloride and potassium nitrate.

For each salt they measured the maximum amount of salt which would dissolve in 100 cm^3 water at different temperatures.

They obtained the following results:

temperature, in °C	maximum amount of salt which would dissolve in 100 cm^3 water, in g	
	sodium chloride	potassium nitrate
0	37	13
10	37	21
20	37	31
30	37	46
40	37	62
50	38	83
60	38	109
70	39	135

The graph showing the line of best fit for the solubility of sodium chloride is on the opposite page.

(a) (i) On the same graph, plot the data in the table for the solubility of potassium nitrate. (4)

(ii) Join the points with a curved line of best fit. (1)

(b) Using your graph

(i) state the temperature at which the solubilities of sodium chloride and potassium nitrate are the same.

.....°C (1)

(ii) underline the words in the boxes to complete the sentence below describing how the solubility of sodium chloride changes with temperature.

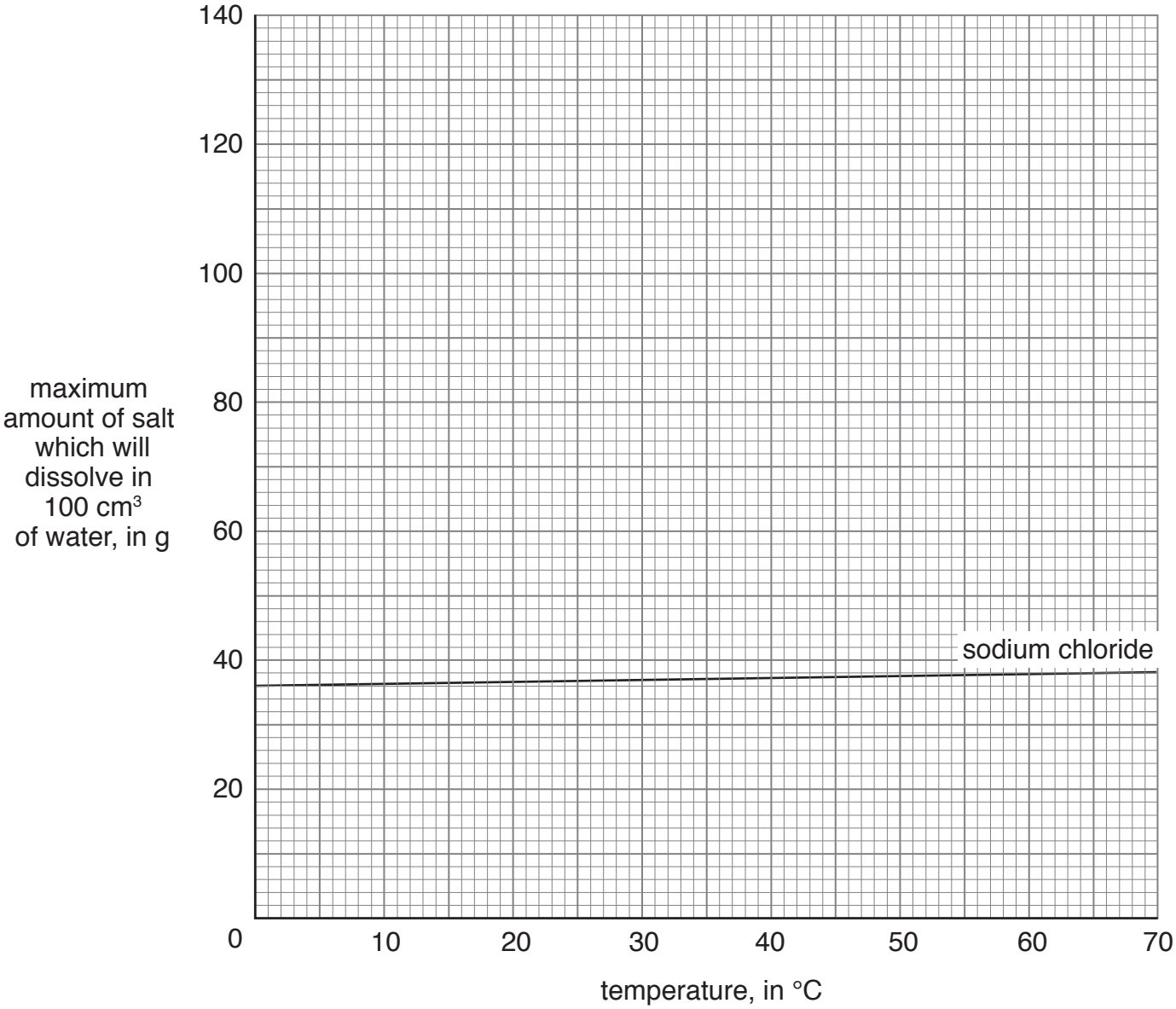
As temperature increases, the solubility of sodium chloride | **falls** / **rises** | | **rapidly** / **slowly** | .

(2)

(iii) Underline the words in the boxes to complete the sentence below which describes how the solubility of potassium nitrate changes with temperature.

As temperature increases, the solubility of potassium nitrate | **falls** / **rises** | | **rapidly** / **slowly** | .

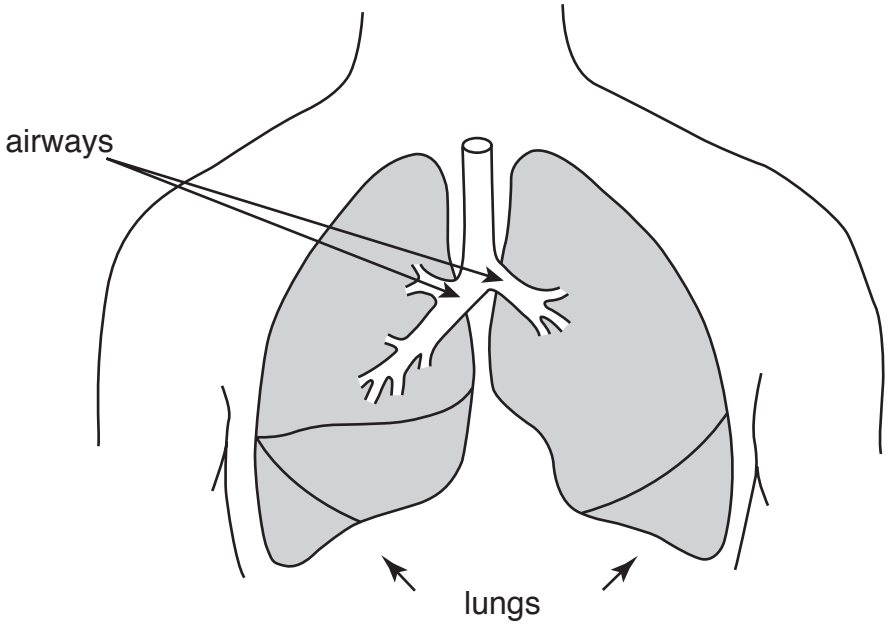
(2)



(c) State the name given to a solution which has the maximum amount of a salt dissolved in it.

..... (1)

3. The diagram below shows the lungs.



The lung surface is greatly folded, has very thin walls and has an extensive blood supply.

(a) (i) Suggest why the lung surface is greatly folded.

..... (1)

(ii) Suggest why the walls of the lung are very thin.

..... (1)

(iii) Suggest why the lungs have an extensive blood supply.

..... (1)

(b) To which organ does the blood flow after it has passed through the lungs?

..... (1)

Asthma is a condition where the muscles round the walls of the airways tighten and the lining of the airways swells.

Mucus, a sticky clear liquid, can also be produced and this will further narrow the airways.

(c) Suggest why a person having an asthma attack finds it difficult to breathe.

.....

..... (2)

People with asthma usually use an inhaler when breathing becomes difficult.



The inhaler contains a medicine, which works by relaxing the muscles surrounding the narrowed airways.

(d) Suggest why the inhaler will make breathing easier.

.....

..... (2)

Smoking cigarettes can also cause problems with breathing.

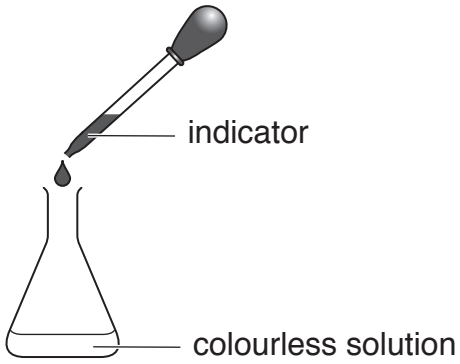
(e) Explain how smoking can cause breathing difficulties.

.....

..... (2)

4. Solutions can be classified as acid, neutral or alkaline.

Indicators are substances which change colour in different solutions.



The best indicators show a good range of colours.

Below is a table showing the colours of some natural indicators in acid, neutral or alkaline solutions.

indicator	acid	neutral	alkaline
red cabbage water	red/pink	purple	blue/green/yellow
red onion water	red	violet	green
turmeric water	yellow	yellow	red
pink litmus	pink	pink	blue
blue litmus	pink	blue	blue

(a) (i) Why is red cabbage water a good indicator for distinguishing between a very acidic solution and a very alkaline solution?

.....

..... (2)

(ii) Why is red cabbage water less useful for distinguishing between a neutral and a weakly-acidic or a weakly-alkaline solution?

.....

..... (2)

(b) Which three other indicators are good for identifying an alkaline solution?

.....

.....

..... (3)

You are given some blue and pink litmus paper.

(c) Explain how you could use the litmus paper to identify a neutral solution.

.....

.....

..... (2)

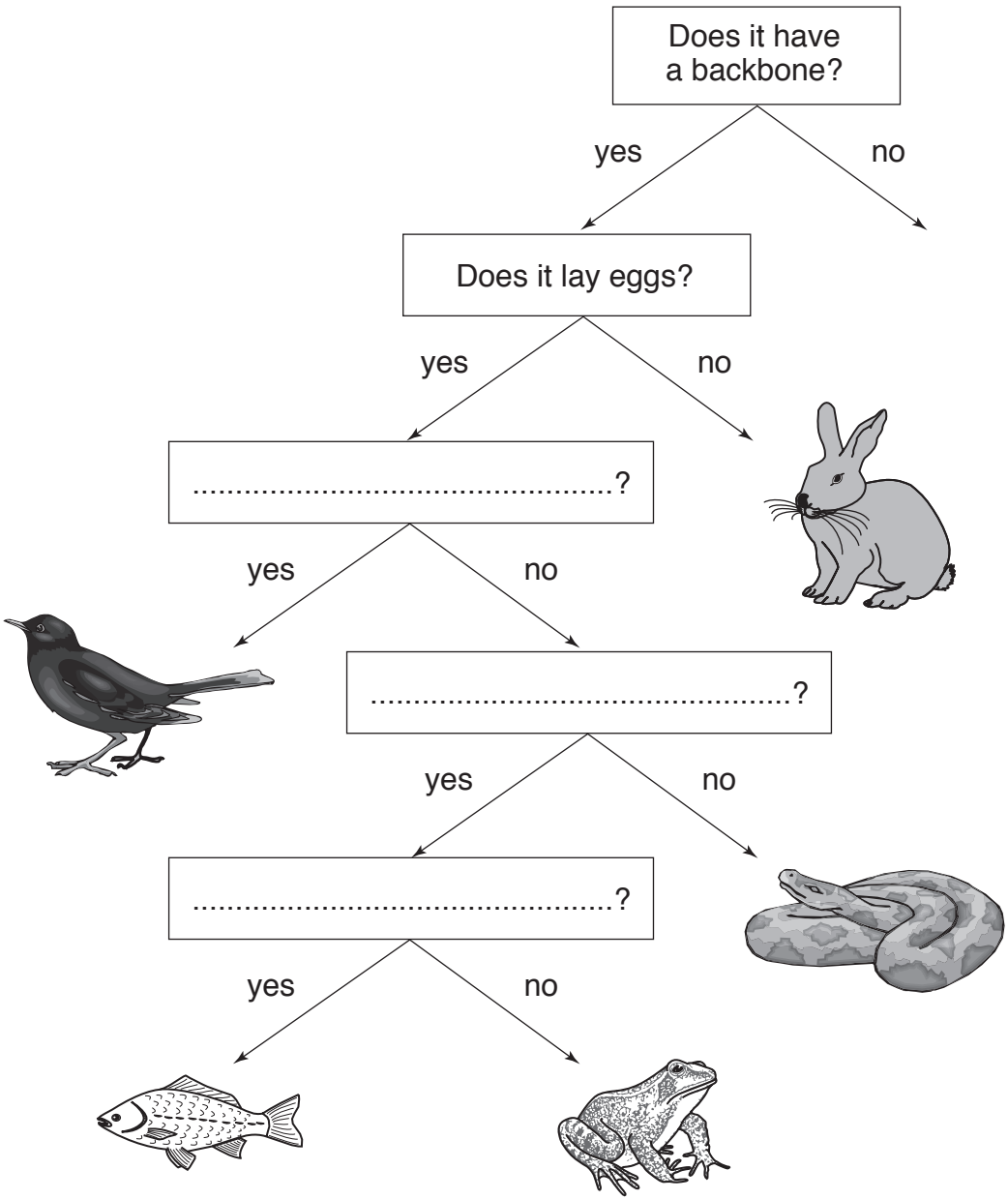
Acidity and alkalinity are also measured using the pH scale.

(d) Complete the table below to show whether a substance is acid, alkaline or neutral.

pH	acid, neutral or alkaline?
less than 7	
7	
more than 7	

(1)

5. The key below shows how to identify the main vertebrate groups.



(a) Complete the boxes with suitable questions to identify the vertebrate groups shown by the drawings. (3)

You are given a picture of a vertebrate animal and you know nothing about the way the organism lives or reproduces.

(b) Can the key above be used to identify to which group this animal belongs?

.....

Explain your answer.

.....

..... (2)

Skin-covering is a feature used to identify vertebrate groups.

(c) (i) Suggest a reason why skin-covering is useful in identifying vertebrate groups.

.....

..... (2)

(ii) Complete the table below showing how skin-covering can be used to identify the vertebrate groups.

vertebrate group	skin-covering
.....	moist and no scales
.....	.....
.....	wet scales
mammals	.....
.....	dry scales

(3)

Captain John Hunter sent the skin and a drawing of a duck-billed platypus to Great Britain from Australia in 1798.

Scientists thought this was a joke.



(d) Suggest why the scientists thought this was a joke.

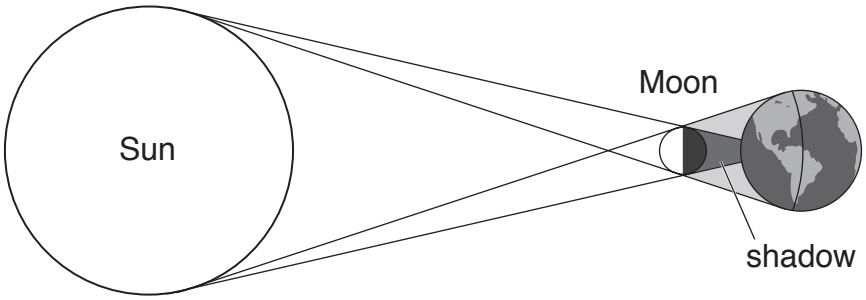
.....

..... (2)

6. On the 20th March 2015 there was a total solar eclipse over the Faroe Islands and a partial solar eclipse over Britain.

A solar eclipse occurs when the Moon passes between the Earth and the Sun.

The Moon casts a shadow on the Earth.



(a) Add the label **P** to the diagram to show where on Earth you would observe a partial eclipse. (1)

(b) Suggest two things you would notice if you were outside during a total eclipse on a cloudy day.

1: .....

2: ..... (2)

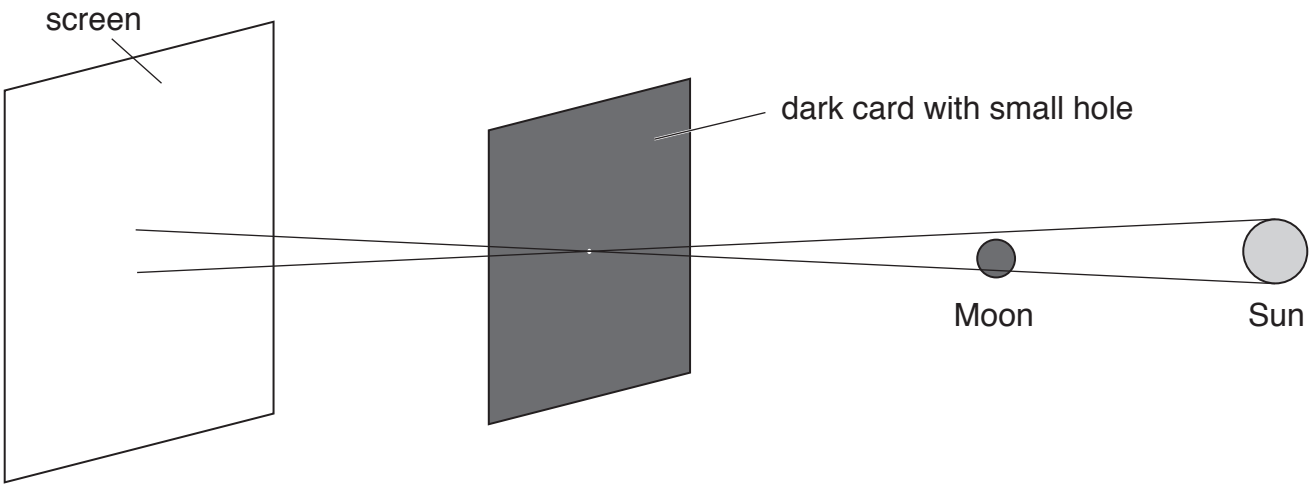
Some people construct a pinhole viewer to observe an eclipse.

(c) Suggest why people use a pinhole viewer to see an eclipse.

..... (1)

The diagram below shows a pinhole viewer being used during an eclipse.

The Moon is only partly in front of the Sun and a partial eclipse will be projected onto the screen.



(d) Draw the image of the eclipse on the screen in the diagram. (2)

(e) Tick boxes in the table below to indicate whether the objects shown in the diagram are opaque or luminous.

object	opaque	luminous
card		
Moon		
Sun		

(3)

(f) The eclipse on 20th March 2015 lasted for about four hours.

The time is measured from when the Moon first starts to pass in front of the Sun until it has completely passed to the other side, as shown below.



start finish

The Moon is travelling at approximately 3 700 km/hr.

Using the formula **distance** = **speed** × **time**, calculate how far the Moon has travelled during the eclipse.

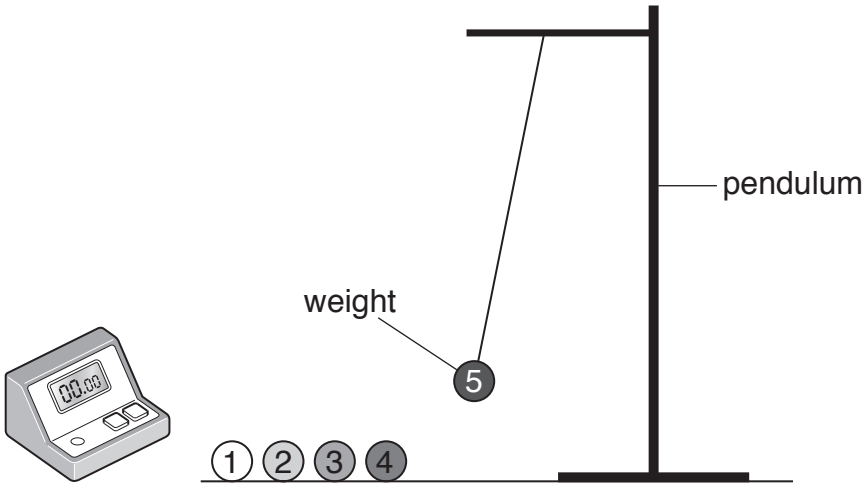
Show your working.

..... km (2)

7. William said, ‘I think that a pendulum with a heavy weight will swing faster than one with a light weight.’

His teacher said, ‘That’s a prediction; you should test it’.

William was given the apparatus shown in the diagram below.



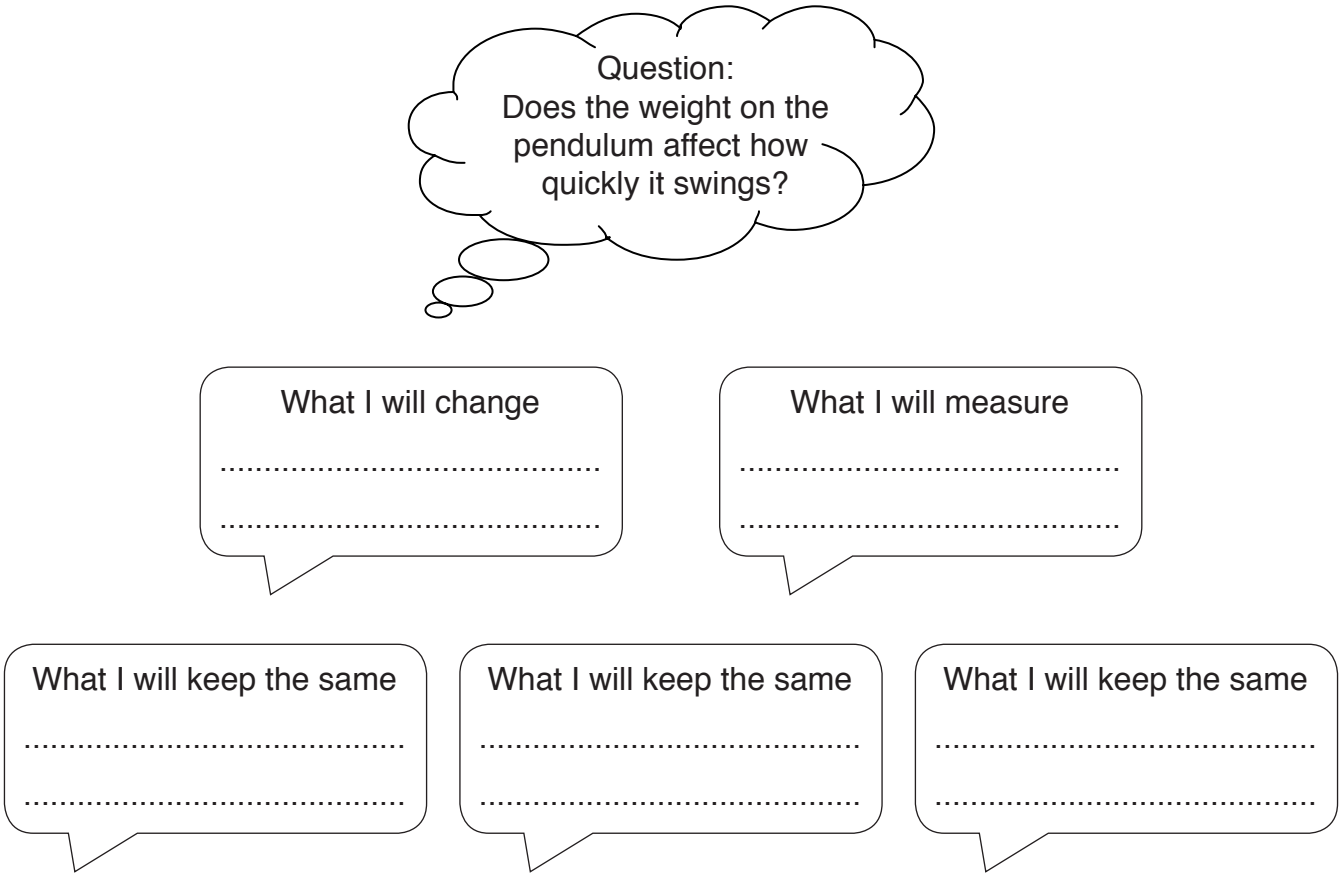
His teacher told him that he should plan his investigation carefully and make sure it was a fair test.

(a) What do you understand by the term *fair test*?

.....

..... (2)

(b) Complete the planning document below to ensure that the investigation is fair.



(5)

William's teacher suggested that he should repeat his experiment and then calculate the average of his results.

(c) Why is this a good idea?

.....

..... (1)

TURN OVER FOR QUESTION 8

8. Forces can be balanced or unbalanced.

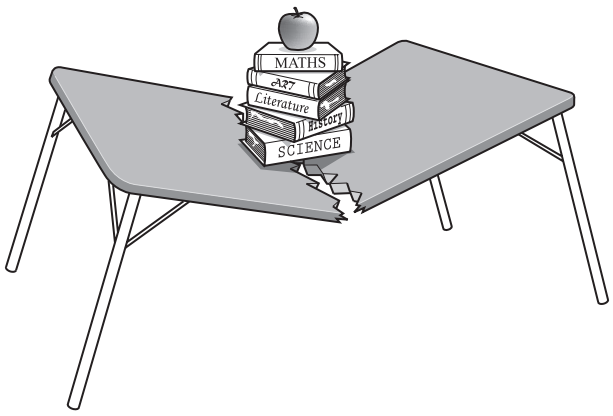
With unbalanced forces there is a change in the speed or direction of a moving object.

(a) By ticking the appropriate box, state whether the forces in the following situations are balanced or unbalanced.

	balanced	unbalanced
a formula 1 driver cornering at 120 km/hr		
a woman walking towards you at a steady 5 km/hr		
a runner on the starting blocks in a 100 m-sprint		
a runner in the first 3 seconds of a 100 m-sprint		
a plane landing at an airport		
an ice skater slowing down		

(6)

(b) Add arrows to the diagram below to show the forces acting on the table.



(2)

(Total marks: 80)