Sc

KEY STAGE
3

TIER
4–7

Year 9 science test

Paper 1

First name _____

Last name _____

Class _____

Date _____

Please read this page, but do not open your booklet until your teacher tells you to start. Write your name, your class and the date in the spaces above.

Remember:

- The test is 1 hour long.
- You will need a pen, pencil, rubber and ruler. You may find a protractor and a calculator useful.
- The test starts with easier questions.
- Try to answer all of the questions.
- The number of marks available for each question is given below the mark boxes in the margin. You should not write in this margin.
- Show any rough working on this paper.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.

TOTAL MARKS	

1. Ravi is finding out about plant growth.

tray 1 **tray 2** **tray 3**

He has three trays of the same plants.

(a) Ravi put **tray 1** in a cupboard in the classroom.
The leaves of the plants became floppy and changed from green to yellow.

(i) Why did the leaves change from green to yellow?
Tick the correct box.

There was not enough...

heat.	☐	light.	☐
oxygen.	☐	water.	☐

☐ ai
1 mark

(ii) Why did the leaves become floppy?
Tick the correct box.

There was not enough...

heat.	☐	light.	☐
oxygen.	☐	water.	☐

☐ aii
1 mark

(b) Ravi left **tray 2** outside.

He took some of the plants out of **tray 3** and planted them in a large pot. He left the pot outside.

Two weeks later the plants in the pot had grown more than the plants left in **tray 2**.

Give **one** reason why the plants had grown more in the pot.

_____

_____

b

1 mark

(c) When Ravi took the plants out of **tray 3** he damaged the roots on one plant.

Complete the sentence below.

The plant with the damaged roots absorbed less _____

and _____ from the soil.

c

1 mark

c

1 mark

maximum 5 marks

Total

5

2. Remains of living things can be found in rocks. They are evidence of past life.

(a) Number the boxes 1 to 3 to show the correct order for how a fossil is formed.

Number	
	Bones are replaced by minerals. Mud becomes rock.
	An animal dies.
	The body becomes buried in mud.

a

1 mark

(b) What type of rocks are fossils usually found in?

Tick the correct box.

igneous rocks		metamorphic rocks		sedimentary rocks	

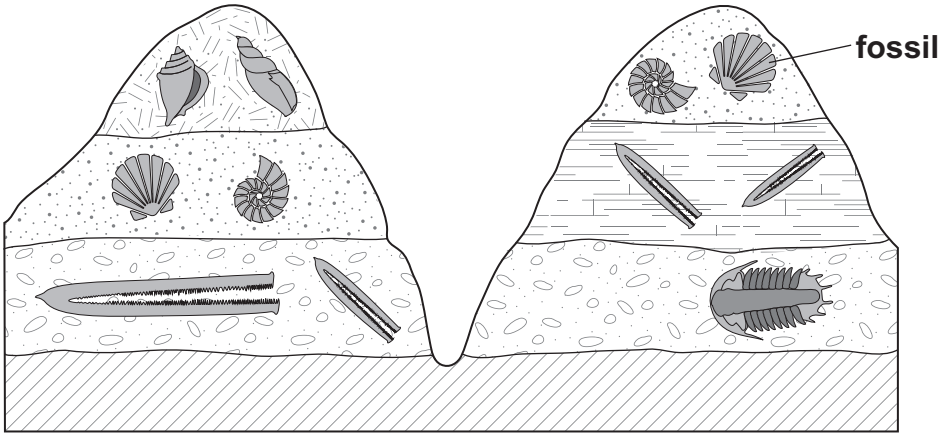
b

1 mark

(c) Each layer of rock contains fossils of animals that existed when the rock was formed.

If two different rocks contain the same fossils they are likely to be the same age. The diagram below shows the fossils contained in each layer of rock.

(i) Draw **one** line connecting two layers of rock that are likely to be the same age.



ci

1 mark

(ii) Which layer is likely to be the oldest rock in the diagram above? Tick the correct box.

cii

1 mark

(d) Fossils in rock can become uncovered after many years.

What are two conditions that are most likely to uncover a fossil?

Tick **two** correct boxes.

sunlight ☐ rain ☐ wind ☐ fog ☐

d

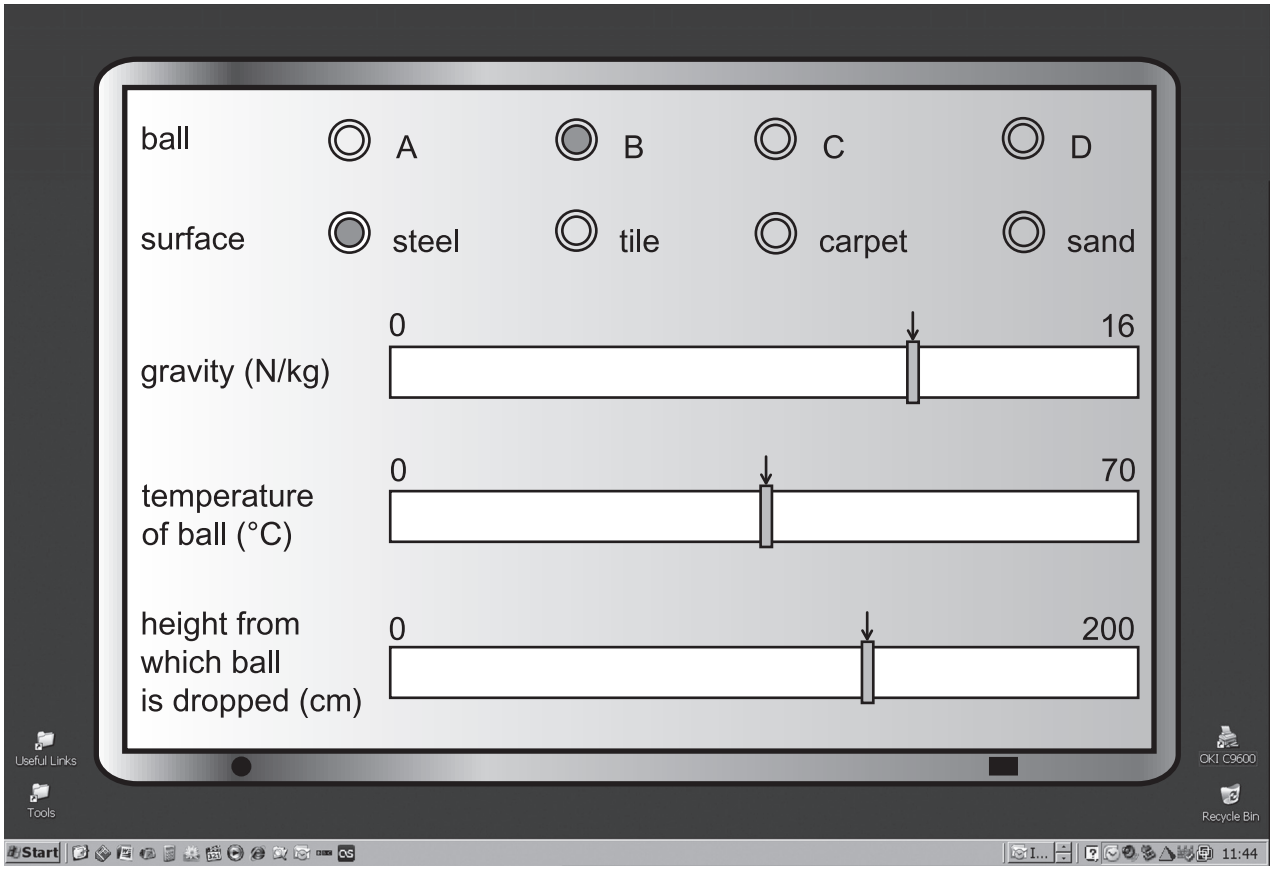
1 mark

maximum 5 marks

Total

5

3. Ben and Laura are finding out how high a ball can bounce.
They use a computer program.
The diagram below shows a screen from the computer program.



(a) The diagram shows the variables that can be changed in the computer program.
There are four different balls that could be used in the model.
The diagram shows that ball B and a temperature of 35°C have been chosen.

(i) What **surface** has been chosen?

_____

ai
1 mark

(ii) The range of heights that can be used is from 0 cm to 200 cm.
What is the range of **gravity** settings that can be used?

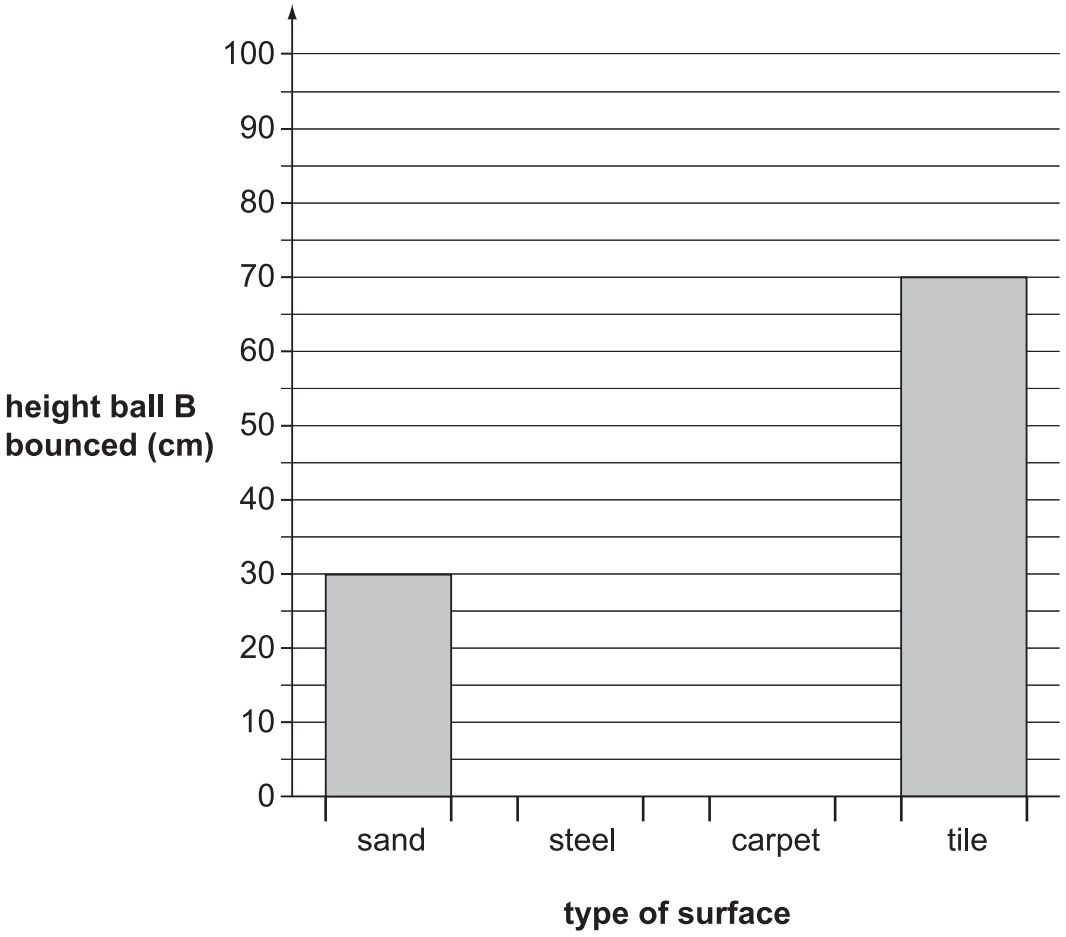
from _____ N/kg to _____ N/kg

aii
1 mark

(b) Ben and Laura use the computer program to find out how high ball B bounced on each of the four surfaces.
Here are Ben and Laura's results.

type of surface	height ball B bounced (cm)
sand	30
steel	95
carpet	40
tile	70

Use the information in the table to complete the bar chart. Use a ruler.
Two have been done for you.



b

1 mark

Please turn over for parts (c) and (d).

(c) Ball C was used in another experiment. The computer program showed the results below.

height from which ball C is dropped (cm)	50	100	150	200
height ball C bounced (cm)	30	50	72	95

Which one of these statements is the correct relationship shown in the table above?
Tick the correct box.

Ball C bounced higher than ball B. ☐

The higher the drop, the higher the bounce. ☐

The ball bounced to the same height with different gravities. ☐

The hotter the ball, the higher it bounced. ☐

☐ c
1 mark

(d) It can be an advantage to use a computer program to carry out this investigation instead of doing it in real life.

Suggest a reason why.

_____

_____

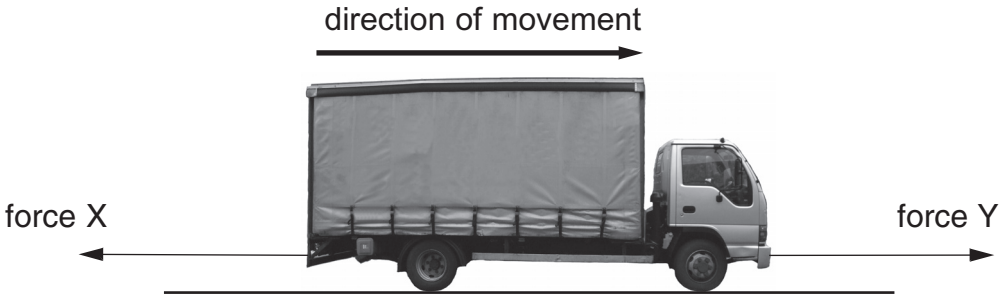
☐ d
1 mark

maximum 5 marks

Total ☐ 5

Please turn over for question 4.

4. The lorry below is moving. Two forces are acting on the lorry.



(a) (i) What produces force Y?

ai
1 mark

_____

(ii) Name force X.

aii
1 mark

_____

(iii) When the lorry is moving at constant speed, force Y is 1000 N.

What is the size of force X?

aiii
1 mark

_____ N

(b) The lorry speeds up. Which of the following is true?
Tick the correct box.

b
1 mark

X is greater than Y ☐ X is equal to Y ☐ X is less than Y ☐

(c) A deflector is fitted to the lorry as shown below.

The deflector makes the lorry more streamlined. This decreases force X.

Complete the sentences below by choosing the correct words from the box.

increase	decrease	not change

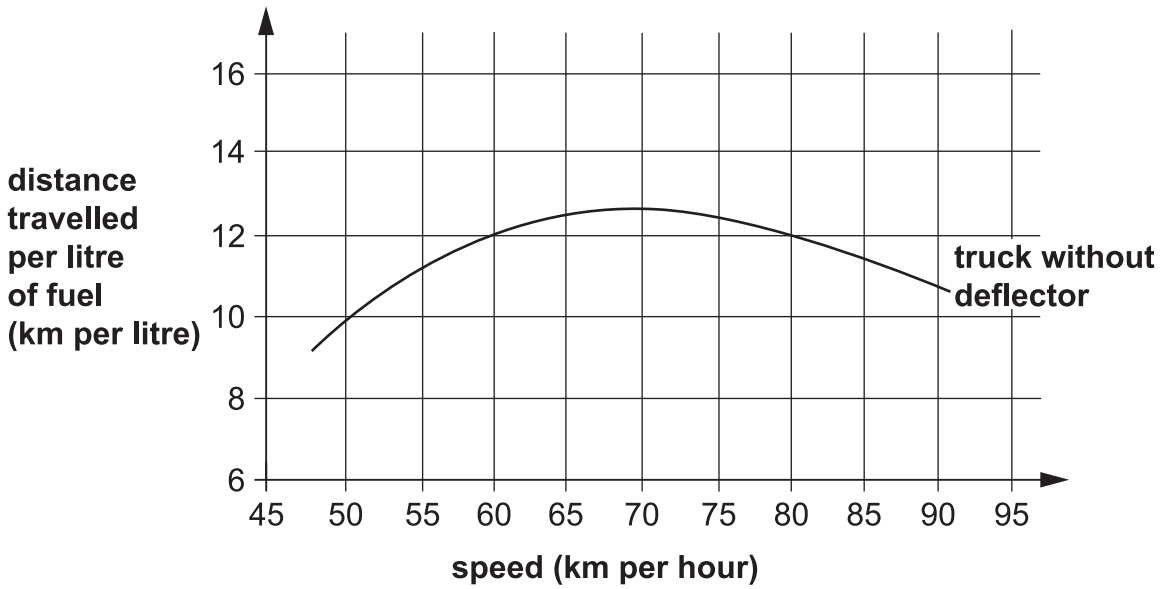
(i) Fitting a deflector will _____ the speed of the lorry when force Y is 1000 N.

ci
1 mark

(ii) Fitting a deflector will _____ the amount of fuel used to travel a distance of 60 km at a speed of 50 km per hour.

cii
1 mark

(d) The graph below shows how much fuel a lorry uses at different speeds.



(i) At what speed will the lorry travel the greatest distance per litre of fuel?

_____ km per hour

di
1 mark

(ii) The graph shown is for a lorry that is **not** fitted with a deflector.

On the graph above, draw a suitable line for a lorry fitted with a deflector. Your line should be drawn over the range 50 to 90 km per hour.

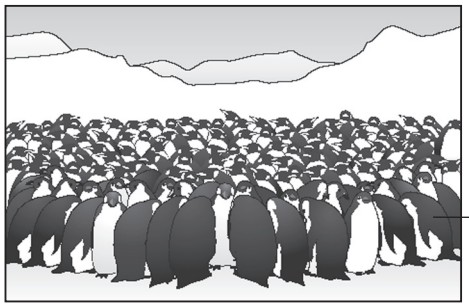
dii
1 mark

dii
1 mark

maximum 9 marks

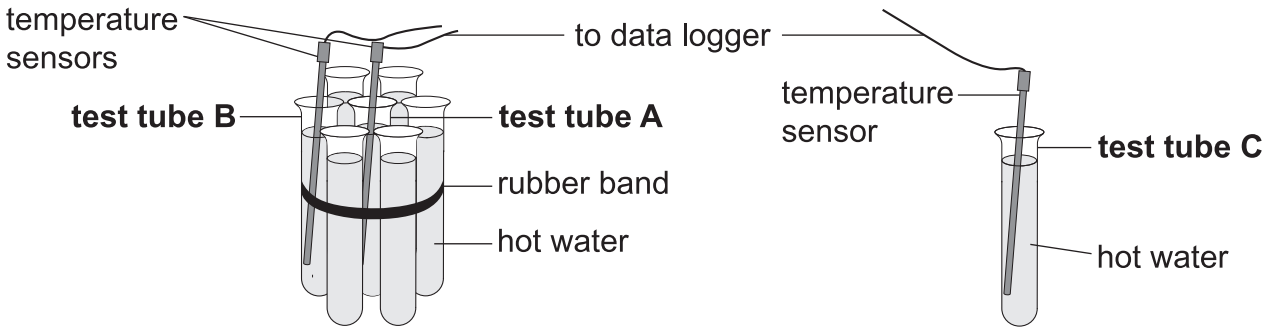
Total
9

5. Emperor penguins live in the Antarctic. In the Antarctic the temperature can drop to –80°C. Emperor penguins 'huddle' together to keep warm.



Ryan investigates whether 'huddling' helps to keep the penguins warm.
He has a group of 7 test tubes and a single test tube all containing hot water.

'huddle' of test tubes **single control test tube**



He records the temperature inside test tubes A, B and C every minute for 10 minutes using a data logger.

(a) In the diagram above, what do the test tubes filled with hot water represent?

_____ a

1 mark

(b) Suggest why Ryan uses **hot** water in the test tubes in this investigation.

_____

_____ b

1 mark

(c) Give **two** variables Ryan should keep the same to make his investigation fair.

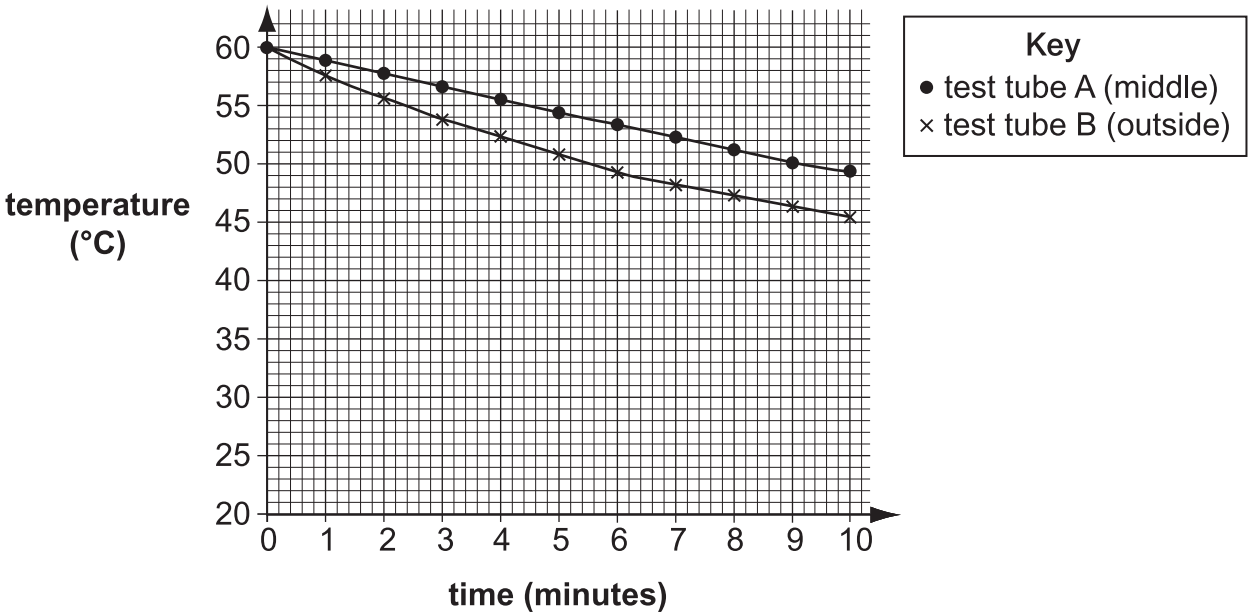
1. _____ c

1 mark

2. _____ c

1 mark

(d) Ryan records his results for the 'huddle' of test tubes on the graph below.



How does the graph suggest that huddling keeps the middle penguin warmer?

_____

_____

d
1 mark

(e) On the graph **above** draw a line to predict the results for test tube C.

e
1 mark

(f) Penguins move around to different places in the huddle.
Suggest why this helps a group of penguins to survive.
Use the results from the investigation to help you.

_____

_____

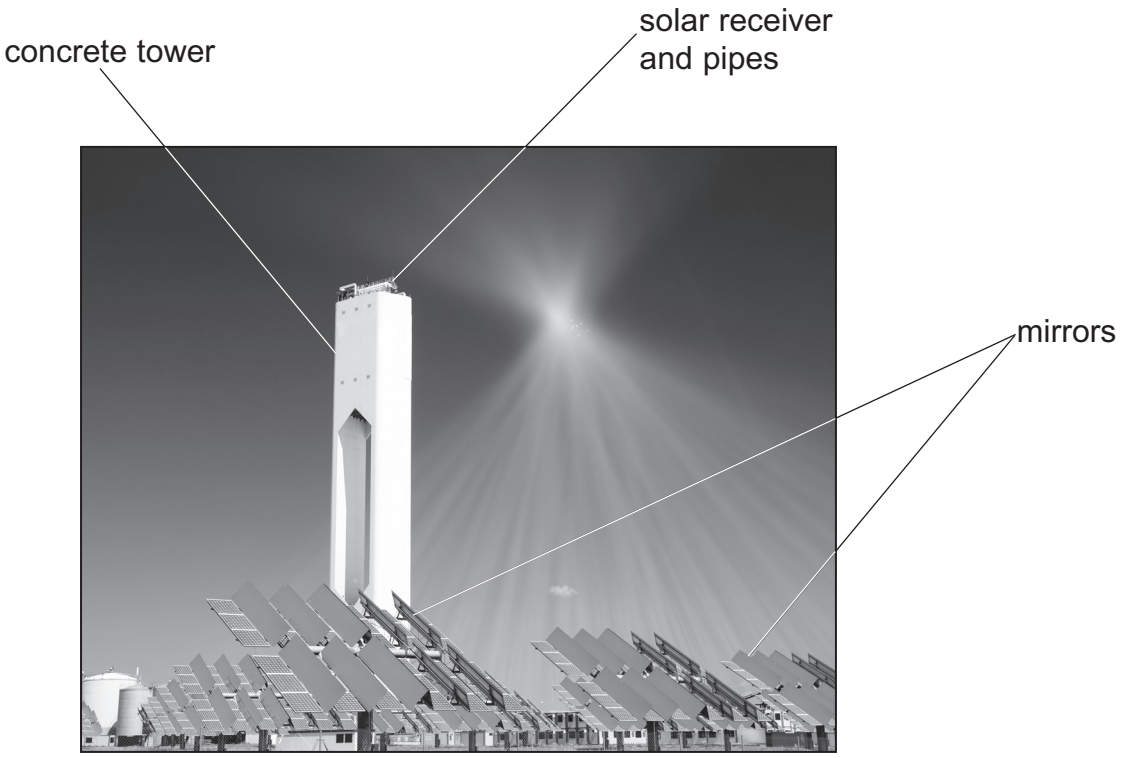
e
1 mark

f
1 mark

maximum 8 marks

Total
8

6. A solar power station has been built in Spain.



(a) Mirrors are used to direct the Sun's rays onto the solar receiver at the top of the tower.

What happens to the light at the surface of the mirror?

_____

a

1 mark

(b) The mirrors **turn** during the day. How does this make the solar power station more efficient?

_____

_____

_____

b

1 mark

b

1 mark

(c) The solar energy is used to heat water in pipes at the top of the tower. The heat turns the water into steam which is used to turn a turbine. The turbine is used to generate electricity.

What **colour** should the pipes be so that the water heats up as quickly as possible?

_____

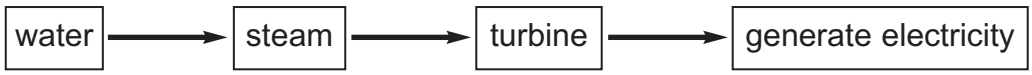
Explain your answer.

_____

_____

c
1 mark

(d)



Complete the paragraph below to show the main energy transfers which take place when electricity is generated in a solar power station. Use words from the box below.

solar	**kinetic**	**thermal**	**chemical**	**electrical**	**light**

Steam from the water turns a turbine which is connected to a generator.

_____ energy from the turbine is transferred to

_____ energy in the generator.

d
1 mark

d
1 mark

(e) Steam can be stored in tanks and can be used up to one hour later.

Give an example of when it would be useful to be able to use the steam later.

_____

_____

e
1 mark

(f) Give **one** reason why solar power stations are considered to be more environmentally friendly than coal burning power stations.

_____

_____

maximum 8 marks

f
1 mark

Total
8

7. The table below gives symbols and particle diagrams for the atoms of four elements.

element	symbol	diagram
carbon	C	
oxygen	O	
hydrogen	H	
chlorine	Cl	

(a) The particle diagram  represents the formula of O_2.
What formula does  represent? Use the table above to help you.

_____

a

1 mark

(b) Methane and chlorine will react together.
Parts (i), (ii) and (iii) all show the chemical reaction between methane and chlorine.
Complete the missing information below for:
(i) the word equation
(ii) the symbol equation
(iii) the particle diagram

Use the table above to help you.

(i) word equation:

methane + chlorine ⟶ chloromethane + _____

bi

1 mark

(ii) symbol equation:

_____ + Cl_2 ⟶ CH_3Cl + HCl

bii

1 mark

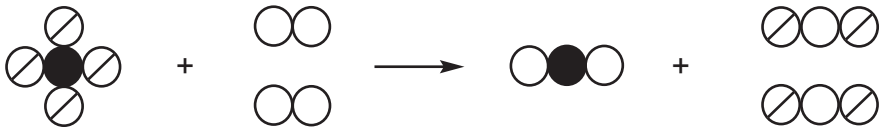
(iii) particle diagram:

 +  ⟶ _____ + 

biii

1 mark

(c) The following particle diagram equation shows the chemical reaction between methane and oxygen.



(i) How many molecules of water are produced for each methane molecule in this reaction?

_____

ci

1 mark

(ii) Explain how the particle diagrams show that mass is conserved in this reaction.

_____

_____

cii

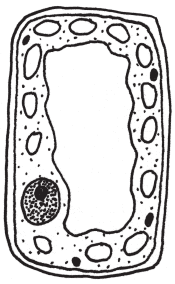
1 mark

maximum 6 marks

Total

6

8. (a) The diagram below shows a plant cell.



The list below describes different cell parts.

A. contains a green chemical called chlorophyll
B. allows substances in and out of the cell
C. jelly-like substance where cellular reactions occur
D. helps give the cell shape and supports it

Complete the table below by writing the letter to match each description to each cell part.

cell part	description
cell membrane	
cell wall	
cytoplasm	
chloroplast	

a
1 mark

a
1 mark

(b) Complete the **word equation** for photosynthesis.

_____ + _____ → glucose + oxygen

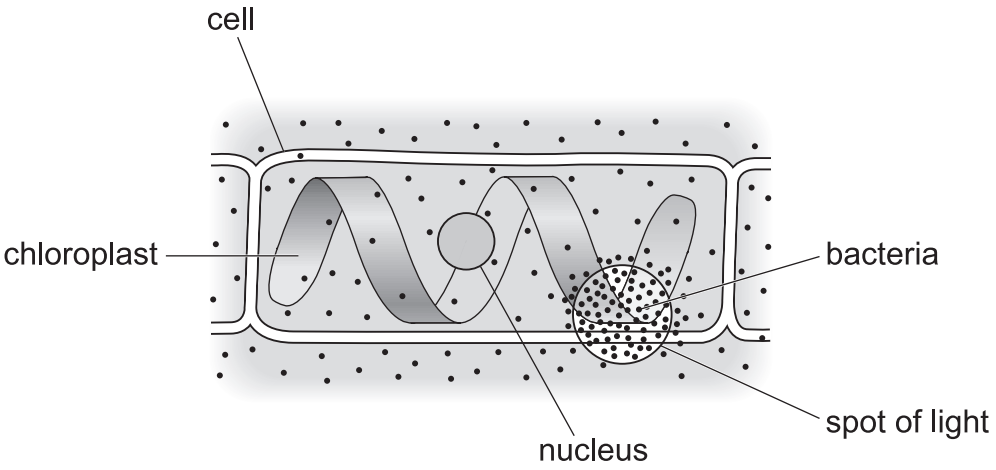
b
1 mark

b
1 mark

(c) A scientist has a sample of cells that can photosynthesise.
There is a ribbon-shaped chloroplast in each cell.
The diagram below shows one of these cells.

The scientist carries out the following investigation.

- She observes the cells under a microscope.
- In a dark room, she shines a tiny spot of light onto a chloroplast.
- She adds bacteria that are attracted by oxygen.



not to scale

Explain why most of the bacteria are found around the spot of light.

_____

_____

_____

c
1 mark

c
1 mark

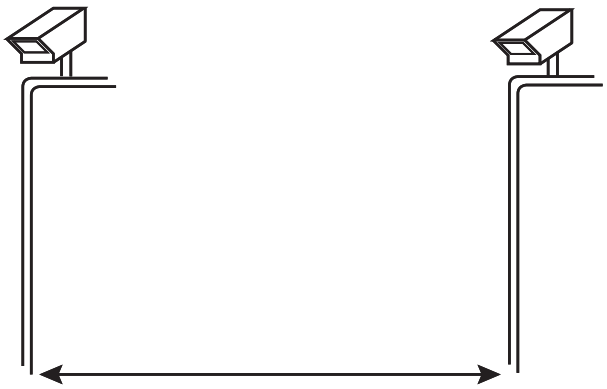
maximum 6 marks

Total
6

9. (a) The photograph below shows a speed camera.

On some roads, **two** cameras are used to measure the **average** speed of cars. The cameras are 5000 m apart.

The diagram below shows two cameras that can be used to calculate average speed.



5000 m

(i) The speed cameras record that the time a car takes to travel 5000 m is 200 seconds.
Calculate the average speed of the car.
Show your working. Give the unit.

ai
1 mark

ai
1 mark

(ii) The speed limit on a road is 80 kilometres per hour.
A car has an average speed of just under 80 kilometres per hour. You cannot be sure if the car has gone over the speed limit from the average speed.
Explain why.

aii
1 mark

(b) The table below shows details about a two-stage journey from Birmingham to London.

stage	distance (km)	average speed (km/hr)	time (hr)
Birmingham to Banbury	80	80	1.0
Banbury to London	120	40	?

(i) How many hours does it take the car to travel from Banbury to London?

_____

_____ hours

bi
1 mark

(ii) Calculate the average speed of the car for the **total** journey from Birmingham to London.
Show your working. Give the unit.

_____

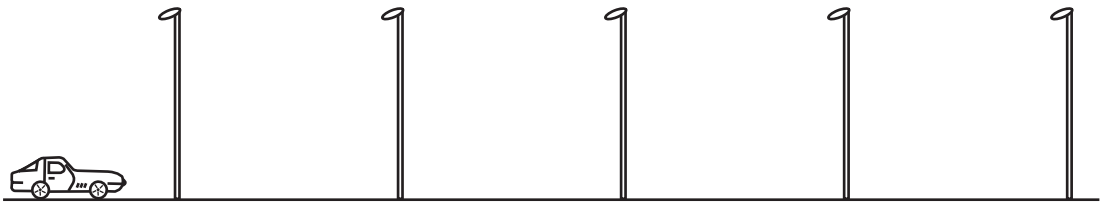
_____

_____

bii
1 mark

bii
1 mark

(c) Laila watched a car drive past some lamp posts outside her house.
The lamp posts are the same distance apart.



How could Laila work out if the car was speeding up?
Your answer should state:
• what Laila should measure
• how Laila could use the measurements to show the car is speeding up

_____

_____

_____

_____

maximum 8 marks

c
1 mark

c
1 mark

Total
8

END OF TEST

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