Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2010

Applied Science (Double Award)

APSC/2F

F

Unit 2 Science for the Needs of Society

Written Paper

Friday 28 May 2010 9.00 am to 10.30 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 1 hour 30 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 90.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice
- In all calculations, show clearly how you work out your answer.

Answer **all** questions in the spaces provided.

1 Salt is a very common substance that we use every day.

Salt can be mined from the ground or separated from seawater.

1 (a) (i) Sodium chloride is the chemical name for table salt.

Name the **two** elements present in table salt.

1 .....

2 .....

(1 mark)

1 (a) (ii) Draw a ring around the correct description of sodium chloride.

composite **compound** **element** **mixture**

(1 mark)

1 (b) Seawater contains dissolved sodium chloride.

Draw a ring around the correct description of seawater.

aerosol **emulsion** **solution** **suspension**

(1 mark)

1 (c) Rock salt is mined from the ground. Sodium chloride can be separated from rock salt in four stages. The stages are named in the box but they are not in the correct order.

A: Mix	**B: Filter**	**C: Add water**	**D: Evaporate water**

Put the stages in the correct order by writing the correct letter for each stage in the boxes.

Stage 1 ☐

Stage 2 ☐

Stage 3 ☐

Stage 4 ☐

(1 mark)

1 (d) Salt can be put on roads to prevent ice forming.

The sentences describe how ice on the road can lead to an accident.

Draw a ring around the correct word to complete each sentence.

1 (d) (i) Ice (increases / reduces / stops) grip between the tyres and the road.

(1 mark)

1 (d) (ii) Ice causes cars to (stop / skid / accelerate) when the driver brakes.

(1 mark)

1 (d) (iii) Salt causes the ice to (melt. / freeze. / evaporate.)

(1 mark)

Turn over ▶

1 (e) Salt is used to make bleach.

1 (e) (i) Draw a ring around the best description of a use for bleach.

antibiotic **antibody** **antiseptic** **disinfectant**

(1 mark)

1 (e) (ii) Why is bleach suitable for the use you have chosen in 1(e)(i)?

.....

.....

(1 mark)

9

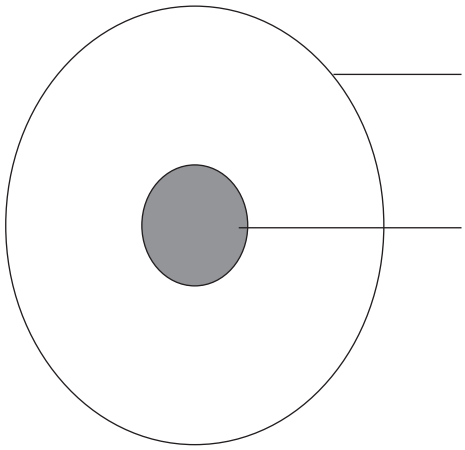
2 Living organisms are made of cells.

Microbiologists study the structure of cells.

2 (a) The diagram shows a typical animal cell.

Use **two** words from the box to complete the labels on the diagram.

chloroplast	**membrane**	**nucleus**	**vacuole**



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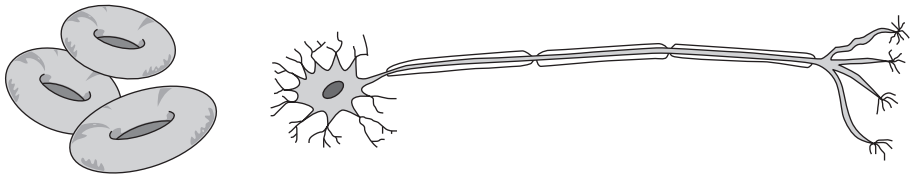
(2 marks)

2 (b) Cells in the body look different because they have different functions.

The diagram shows red blood cells and a nerve cell.

Red blood cells **Nerve cell**



State **two** differences that you can see between the red blood cells and the nerve cell.

1 .....

2 .....

(2 marks)

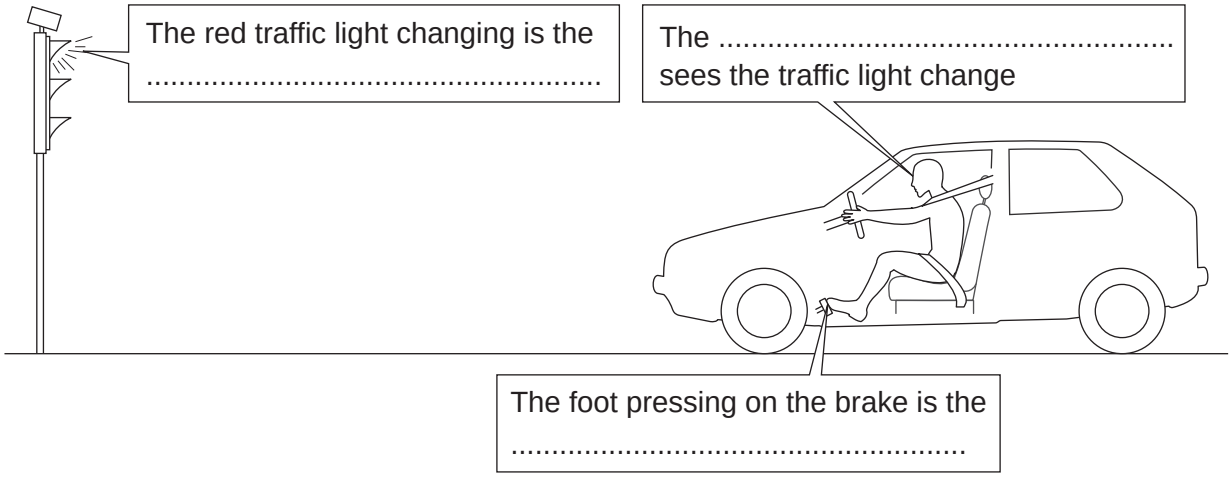
Question 2 continues on the next page

2 (c) A driver puts his foot on the brake of a car when he sees a red traffic light.

Look at the diagram of a driver pressing on the brake as he approaches a red traffic light.

Use words from the box to complete the labels on the diagram.

brain	**eye**	**neurone**	**response**	**stimulus**



(3 marks)

2 (d) Cells called receptors detect stimuli (changes in the environment).

The table shows four receptors.

Complete the table by adding the stimulus that **each** receptor detects. One has been done for you.

Receptor	Stimulus
Ear	
Skin	touch
Tongue	
Nose	

(3 marks)

2 (e) Messages can be carried around the body in the blood.

Which chemical carries messages around the body in the blood?

Draw a ring around **one** answer.

glucose **hormone** **enzyme** **oxygen**

(1 mark)

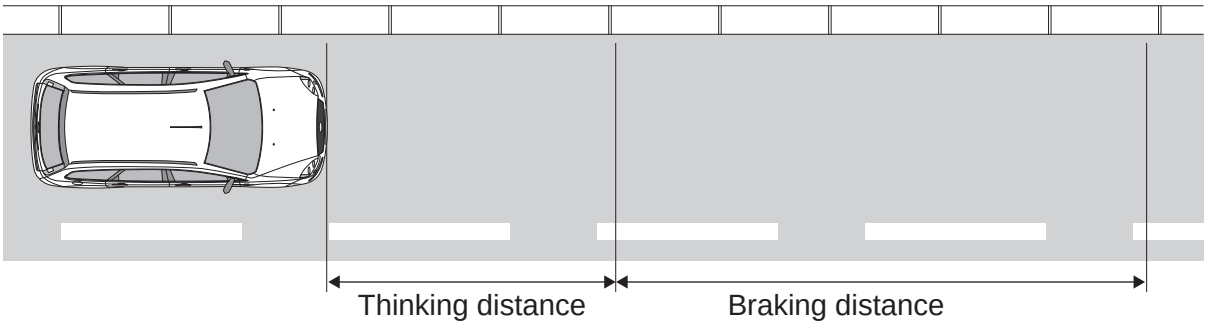
11

Turn over for the next question

3 A car travelling along the road cannot stop instantly. The overall stopping distance is made up of two parts:

1 the thinking distance

2 the braking distance.



3 (a) Give **two** factors that affect the braking distance.

1 .....

2 .....

(2 marks)

3 (b) The table shows the thinking, braking and stopping distances of a car travelling at different speeds.

Speed in miles per hour	**Thinking distance in metres**	**Braking distance in metres**	**Overall stopping distance in metres**
20	6	6	12
30	9		23
40	12	24	
50	15	38	53

3 (b) (i) Complete the table by writing in the **two** missing numbers.

(2 marks)

3 (b) (ii) What happens to the overall stopping distance as speed increases?

.....

.....

(1 mark)

3 (b) (iii) Use the data in the table to predict the thinking distance at 60 mph. ..... m

(1 mark)

3 (c) The formula in the box is used to calculate the distance that a car travels in a given time.

Distance (in miles)	=	speed (in miles per hour)	×	time (in hours)

Use the formula to calculate the distance that a car driven at 60 miles per hour will travel in 3 hours.

Show clearly how you work out your answer.

.....

.....

.....

.....

..... miles

(2 marks)

Question 3 continues on the next page

3 (d) The article below is from a newspaper.

Man without a car arrested for drink driving

A local man was tested for alcohol by the police in the early hours of Saturday morning and was found to be over the limit. The man had his car keys in his pocket. He said "I could not believe it, I was nowhere near my car when I was stopped and searched." He was fined £1000 and banned from driving for 6 months. A spokesman for the police said "In the 5 years before this law, there were 25 deaths due to drink driving in this area. In the last 5 years there have been only 3."

The law states that someone who is drunk and has their car keys with them could be sent to jail for 3 years, given a fine of £2500 and banned from driving.

Use this information to help you to answer the questions.

3 (d) (i) How does drinking alcohol affect the stopping distance of a car?

.....

.....

(1 mark)

3 (d) (ii) How has the law changed the number of people killed due to drink driving?

.....

.....

(1 mark)

3 (d) (iii) Suggest why a driver with his keys does not need to be near the car to be arrested.

.....

.....

(1 mark)

3 (d) (iv) Why do you think some people oppose this law?

.....

.....

(1 mark)

3 (d) (v) What test might a police officer use to find out if a driver has been drinking alcohol?

.....

.....

(1 mark)

13

Turn over for the next question

4 A farmer buys an area of woodland. He cuts down the trees to use the land for the intensive farming of wheat.

The area as woodland

The area as a field of wheat

4 (a) (i) Growing only one crop in a field affects the local wildlife.

How is wildlife affected?

Tick (✓) **one** box.

Number of species increases ☐

Number of species decreases ☐

Number of predators increases ☐

Number of weeds increases ☐

(1 mark)

4 (a) (ii) Suggest **one** advantage to the farmer of intensive farming.

.....

.....

(1 mark)

4 (b) We obtain many useful products from the crops grown by farmers.

4 (b) (i) Apart from food, name **one** other useful product that we obtain from plants.

.....

(1 mark)

4 (b) (ii) Wheat is used to produce flour for bread making.
Name the single-celled organism that is normally used to make flour into bread.

.....

(1 mark)

4 (c) The farmer has to add minerals to the soil.

4 (c) (i) Draw a ring around the type of chemical that contains minerals for the plant.

fertiliser **fungicide** **herbicide** **pesticide**

(1 mark)

4 (c) (ii) Draw **one** line from **each** mineral to the substance that the mineral helps the plant to make.

Mineral	**Used to make**
	Chlorophyll
Nitrates	
	Starch
	Proteins
Magnesium	
	Sugars

(2 marks)

4 (c) (iii) Plants make food by photosynthesis.

Complete the word equation for photosynthesis.

Water + ... → Glucose + ...

(2 marks)

4 (c) (iv) Describe **one** natural method that farmers could use to add more minerals to the soil.

.....

.....

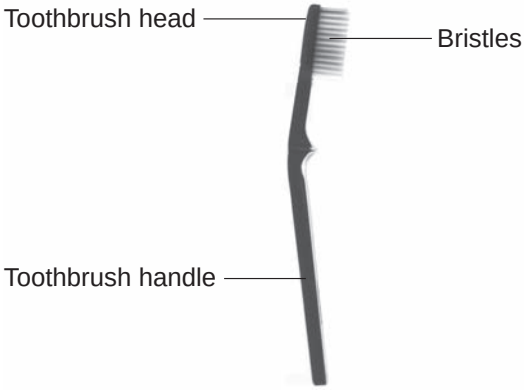
(1 mark)

10

5 The first toothbrush was invented in China in the late 1400s.

It consisted of stiff hairs from a pig's neck that were attached to a wooden stick.

Now our toothbrushes are made from polymers.



5 (a) Which **two** properties would the material of a good toothbrush handle have?

Draw a ring around **two** answers.

low density **soft** **brittle** **resistant to chemicals** **low melting point**

(2 marks)

5 (b) The handle of a toothbrush can be made from a plant-based polymer instead of oil-based polymers.

5 (b) (i) Give **one** reason why it is better to use a polymer made from plants.

.....

(1 mark)

5 (b) (ii) Name **one** other item used in the bathroom that is made from a polymer.

.....

(1 mark)

5 (c) Polymers are used for many purposes because they have a lot of useful properties.

Polymers have been used to replace more traditional materials because they are often better.

What is the advantage of using a polymer to replace:

5 (c) (i) a paper food container

.....

.....

(1 mark)

5 (c) (ii) a glass drink bottle

.....

.....

(1 mark)

5 (c) (iii) a wooden children's toy?

.....

.....

(1 mark)

5 (d) (i) A polymer is not a good choice of material for making a saucepan.

Name **one** material that would be suitable for making a saucepan.

.....

(1 mark)

5 (d) (ii) Explain why you chose the material.

.....

.....

(1 mark)

5 (d) (iii) Suggest **one** reason why a polymer is a good choice for making a saucepan handle.

.....

.....

(1 mark)

10

6 In Brazil, it is the law that people must fuel their cars with a blend of petrol and ethanol containing 25% ethanol.

This fuel is called gasohol.

6 (a) (i) A mechanic fills the 40 litre fuel tank of a car with gasohol.

Calculate how many litres of ethanol there would be in the fuel tank.

Show clearly how you work out your answer.

.....

.....

.....

..... litres

(2 marks)

6 (a) (ii) Give **one** advantage of using gasohol instead of petrol.

.....

.....

(1 mark)

6 (b) The quantity of carbon dioxide in the atmosphere is increasing.

Give **two** effects of increasing the amount of carbon dioxide in the atmosphere.

1 .....

2 .....

(2 marks)

6 (c) Hydrogen-fuelled cars are another alternative to petrol-fuelled cars.

When hydrogen burns in air, it reacts with oxygen.

6 (c) (i) Complete the word equation.

Hydrogen + Oxygen → .....

(1 mark)

6 (c) (ii) What is the chemical formula for oxygen gas? .....

(1 mark)

6 (c) (iii) Hydrogen fuel is burned in the car engine to produce energy.

For every 3000 J of energy supplied, 1140 J is turned into useful energy.

Calculate the efficiency of the car engine using the equation in the box.

$$\text{Efficiency (\%)} = \frac{\text{Useful energy output}}{\text{Total energy output}} \times 100$$

Show clearly how you work out your answer.

.....

.....

.....

Efficiency = ... %

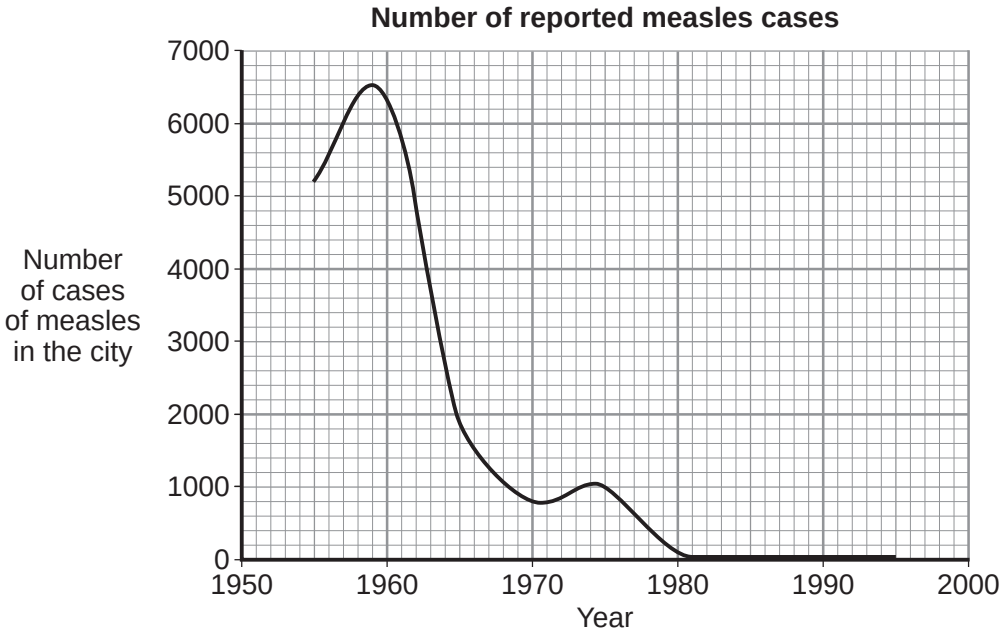
(3 marks)

10

Turn over for the next question

7 Health authorities record how many cases of measles have been reported in a city.

The graph shows the number of reported cases of measles in a city between 1955 and 1995.



7 (a) The measles vaccine was introduced to this city in 1959.

7 (a) (i) How many measles cases were reported in 1959?

.....

(1 mark)

7 (a) (ii) Describe how the number of reported cases of measles changed after 1959.

.....

.....

(1 mark)

7 (b) The MMR vaccination protects against measles and two other diseases.

Name the **two** other diseases it protects against.

1 .....

2 .....

(2 marks)

7 (c) A scientist suggested that it may be safer to have separate vaccinations instead of the MMR, which is a 'three-in-one' vaccine.

Having three separate vaccines may lead to an increase in the number of measles cases.

Suggest **one** reason why the number of cases might increase.

.....

.....

(1 mark)

7 (d) Some components in our blood also protect us from microorganisms.

From the box, choose **two** components of blood that help to protect us from microorganisms.

For each component you choose, describe how it helps to protect our body from microorganisms.

red blood cells	**white blood cells**	**hormones**
platelets	**oxygen**	

7 (d) (i) Component 1 .....

How it helps to protect the body .....

.....

.....

.....

(2 marks)

7 (d) (ii) Component 2 .....

How it helps to protect the body .....

.....

.....

.....

(2 marks)

9

8 Metals are very useful in the modern world. Without metals there would be no cars, computers or light bulbs.

8 (a) Unreactive metals that are found in the Earth can be used straight from the ground.

Give **one** example of a metal that can be used straight from the ground.

.....

(1 mark)

8 (b) Most metals are mined from the ground as ores.

Lead ore is being mined near a town.

The mining company wants to expand the mine, which will bring more employment to the area.

Give **two** disadvantages of expanding the mine.

1 .....

.....

2 .....

.....

(2 marks)

8 (c) Metals can be extracted from their oxides by reduction with carbon.

8 (c) (i) Complete the word equation for the reaction between lead oxide and carbon.

Lead oxide + carbon $\rightarrow$ ..... + ...

(2 marks)

8 (c) (ii) Give **one** use for lead.

.....

(1 mark)

8 (c) (iii) Name **one** other metal that can be extracted from its oxide using carbon.

.....

(1 mark)

8 (d) Some metals are more reactive than others.

The table shows some facts about four metals.

Metal	Reaction
Calcium	Reacts with cold water to make hydrogen gas
Copper	Does not react with water
Magnesium	Reacts very slowly with hot water
Sodium	Reacts violently with water and has to be stored in oil so the oxygen in the air cannot react with it

8 (d) (i) Write down the four metals in order of reactivity, with the most reactive first.

most reactive .....

.....

.....

least reactive .....

(1 mark)

8 (d) (ii) Copper can be used for electrical wiring.

Give **two** properties of copper that make it a good choice of material for electrical wiring.

1 .....

2 .....

(2 marks)

10

Turn over for the next question

9 Many electromagnetic waves are used in communication devices.

9 (a) The first commercial mobile phones were used in Japan in 1979.

9 (a) (i) Which part of the electromagnetic spectrum do mobile phones use to communicate over long distances?

.....

(1 mark)

9 (a) (ii) This part of the electromagnetic spectrum can be quite dangerous. Some scientists believe that mobile phones should carry a health warning.

Why would a mobile phone company not want to do this?

.....

.....

(1 mark)

9 (a) (iii) Over very short distances some mobile phones can use infrared radiation.

Name **one** other use for infrared radiation.

.....

(1 mark)

9 (a) (iv) Frequency is the number of waves per second.

Name the units used for measuring frequency. .....

(1 mark)

9 (a) (v) Name an electromagnetic wave with a higher frequency than infrared.

.....

(1 mark)

9 (b) Visible light can be received by telescopes.

An astronomer noticed that the light coming from other galaxies appeared to be different from the light emitted in our own galaxy. The further away the galaxy from Earth, the more noticeable the difference.

9 (b) (i) Describe how the light coming from other galaxies appears to be different.

.....

.....

.....

.....

(2 marks)

9 (b) (ii) What does this suggest is happening to the universe?

.....

(1 mark)

8

END OF QUESTIONS

There are no questions printed on this page

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