

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**B623/01**

**GATEWAY SCIENCE  
ADDITIONAL SCIENCE B**

**Unit 1 Modules B3 C3 P3 (Foundation Tier)**

**WEDNESDAY 19 JANUARY 2011: Morning**

**DURATION: 1 hour**

**SUITABLE FOR VISUALLY IMPAIRED CANDIDATES**

**Candidates answer on the question paper.  
A calculator may be used for this paper.**

**OCR SUPPLIED MATERIALS:**

**None**

**OTHER MATERIALS REQUIRED:**

**Pencil**

**Ruler (cm/mm)**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully. Make sure you know what you have to do before starting your answer.**
- **Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).**
- **Answer ALL the questions.**

## **INFORMATION FOR CANDIDATES**

- **The number of marks is given in brackets [ ] at the end of each question or part question.**
- **A list of physics equations is printed on page three.**
- **The Periodic Table is printed on the back page.**
- **The total number of marks for this paper is 60.**

## EQUATIONS

$$\text{speed} = \frac{\text{distance}}{\text{time taken}}$$

$$\text{acceleration} = \frac{\text{change in speed}}{\text{time taken}}$$

$$\text{force} = \text{mass} \times \text{acceleration}$$

$$\text{work done} = \text{force} \times \text{distance}$$

$$\text{power} = \frac{\text{work done}}{\text{time}}$$

$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

**Answer ALL the questions.**

**SECTION A – MODULE B3**

**1 Read this newspaper article carefully.**

**SCIENTISTS CLONE A FROZEN MOUSE**



**Scientists have produced clones of a mouse that has been dead and frozen for 16 years.**

**This comes 11 years after the first living adult mammal was cloned.**

**Cloning dead, frozen animals was thought to be impossible due to cell damage.**

**Genetic material is destroyed when ice crystals form inside cells.**

**The scientists used genetic material from brain cells because the high fat content protected the cells from ice damage.**

**This work may be used on humans in the future. This would raise many ethical issues.**

**(a) Ice crystals often destroy the genetic material (genes) in cells.**

**(i) Which part of the cell contains the genetic material?**

\_\_\_\_\_ [1]

**(ii) What chemical is the genetic material made of?**

\_\_\_\_\_ [1]

**(b) Write down the name of the first mammal that was cloned from an adult.**

\_\_\_\_\_ [1]

**(c) The article claims that there are possible ethical issues if this technique were to be used on humans.**

**ONE of these statements does NOT contain an ethical issue.**

**Put a tick (✓) in the box next to this statement.**

**In the future, humans could be frozen after death and cloned.**

**The technique took years to develop.**

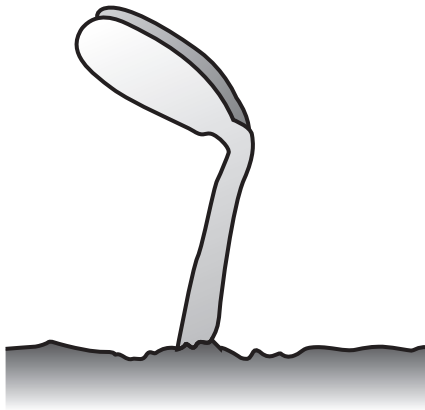
**Many of the embryos produced by this technique die because they are abnormal.**

**Children produced by cloning may be expected to develop certain skills.**

**[1]**

**[Total: 4]**

**2 The diagram shows a soya plant growing out of the soil.**



**(a) The shoots and roots of the soya plant grow in different directions.**

**Finish these sentences to explain the direction of their growth.**

**The shoots grow upwards in response to**

\_\_\_\_\_.

**The roots grow downwards in response to**

\_\_\_\_\_.

**[2]**

**(b) The growth of the soya plant is controlled by plant hormones.**

**(i) Write down the name of ONE of these plant hormones.**

\_\_\_\_\_ [1]

**(ii) Plant hormones control other features.**

**Put a tick (✓) in the box next to the feature controlled by plant hormones.**

**the colour of the flowers**

**the type of seed made**

**when the plant produces flowers**

[1]

**(c) To grow, soya plants need to make new cells.**

**Write down TWO OTHER reasons why a plant needs to make new cells.**

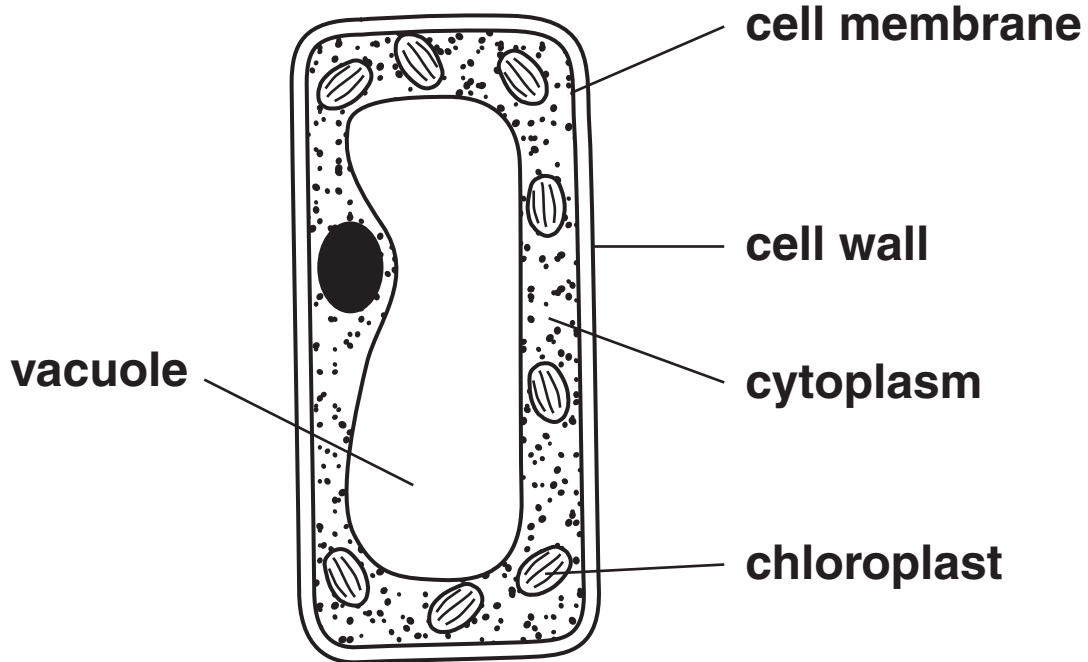
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]



(d) The diagram shows a cell from the leaf of a soya plant.



Which TWO labelled parts of the plant cell help to support the plant?

\_\_\_\_\_ and \_\_\_\_\_ [2]

(e) Scientists have produced soya plants that are resistant to herbicides (weed killers).

They have done this by genetic engineering.

What is meant by GENETIC ENGINEERING?

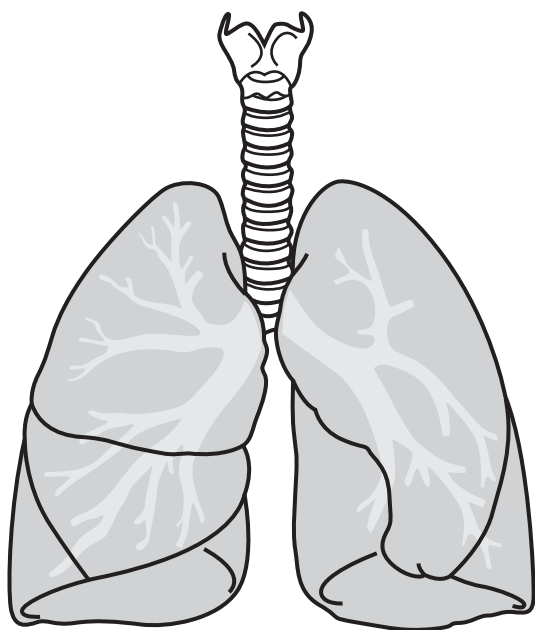
\_\_\_\_\_  
\_\_\_\_\_ [1]

[Total: 9]

**3 The diagram shows human lungs.**

**Air passes down the windpipe to lots of small air sacs.**

**The air sacs allow gases to pass into and out of the blood.**



**(a) What is the name of the small air sacs in the lungs?**

\_\_\_\_\_ [1]

**(b) Put ticks (✓) next to the TWO statements that describe where oxygen enters and leaves the blood.**

**Oxygen enters the blood in the lungs.**

**Oxygen enters the blood in body tissues.**

**Oxygen leaves the blood in body tissues.**

**Oxygen leaves the blood in the lungs.**  [1]

**(c) Julie has difficulty getting air into her lungs.**

**This is because her windpipe is damaged.**

**Doctors repair her windpipe using stem cells.**

**Suggest why they use stem cells.**

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[1]

**[Total: 3]**

**4 The table shows some information about the three main types of blood vessel in the body.**

<b>type of blood vessel</b>	<b>diameter in mm</b>	<b>average thickness of wall in mm</b>	<b>percentage of the body's blood contained in the vessel</b>
<b>arteries</b>	<b>4 – 25</b>	<b>1</b>	
	<b>0.01</b>	<b>0.001</b>	<b>5</b>
<b>veins</b>	<b>5 – 30</b>	<b>0.5</b>	<b>60</b>

**(a) The name of one of the three types of blood vessel is missing from the table.**

**Write down the name of this type of blood vessel.**

\_\_\_\_\_ [1]

**(b) Which type of blood vessel contains blood at the highest pressure?**

\_\_\_\_\_ [1]

**(c) The heart contains 12% of the body's blood.**

**Calculate the percentage of the body's blood contained in the arteries.**

\_\_\_\_\_  
\_\_\_\_\_

**answer** \_\_\_\_\_ **%** [1]

**(d) The heart pumps blood into two arteries.**

**One of these is the pulmonary artery.**

**Write down the name of the OTHER artery.**

\_\_\_\_\_ [1]

**[Total: 4]**

## SECTION B - MODULE C3

5 This question is about the elements in the Periodic Table.

Look at the list of elements.

aluminium	bromine	chlorine
fluorine	gold	helium
hydrogen	iron	oxygen
phosphorus	sulfur	zinc

Answer the questions.

Choose your answers from the list.

Each element can be used **ONCE, MORE THAN ONCE** or **NOT AT ALL**.

The Periodic Table on the back page may help you.

(a) Which element has an **ATOMIC NUMBER** of 16?

\_\_\_\_\_ [1]

(b) Which element relights a glowing splint?

\_\_\_\_\_ [1]

(c) Which element burns with a squeaky pop when ignited with a burning splint?

\_\_\_\_\_ [1]

**(d) Which METAL element is usually extracted from its mineral using electrolysis?**

\_\_\_\_\_ [1]

**(e) Which element is a green gas at room temperature?**

\_\_\_\_\_ [1]

**(f) Which element is an orange liquid at room temperature?**

\_\_\_\_\_ [1]

**[Total: 6]**

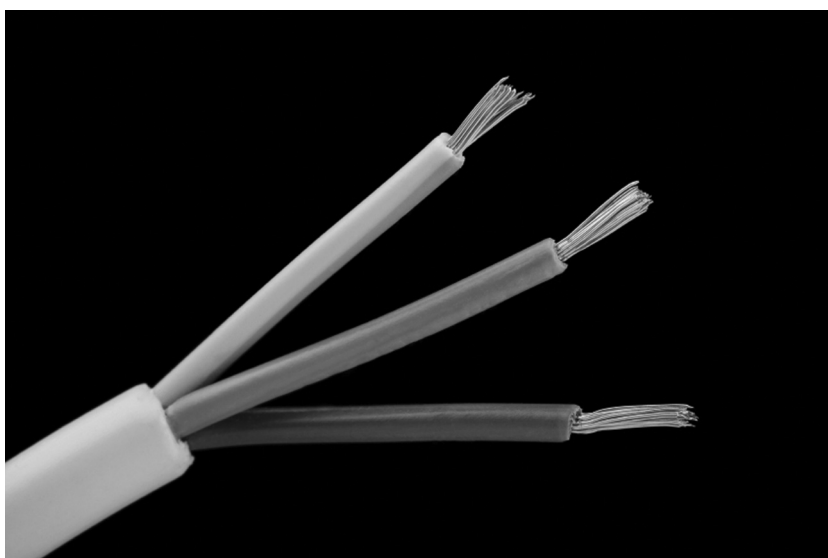
**6 Iron and copper are typical metals.**

**(a) Iron is used to make steel for bridges.**

**Write down one OTHER use for iron.**

\_\_\_\_\_ [1]

**(b) Look at the picture of some electrical wires.**



**Copper is used to make electrical wire.**

**Write down ONE reason why copper is used to make electrical wire.**

\_\_\_\_\_ [1]



**(c) Put a tick (✓) next to the correct statement about metals.**

**Most metals have low melting points.**

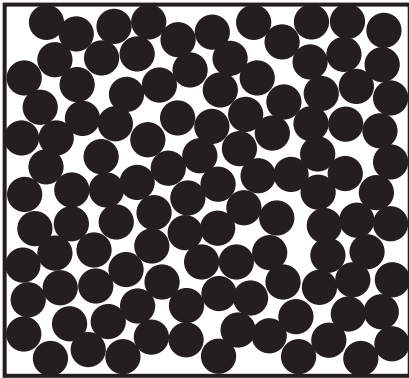
**Most metals are good conductors of heat.**

**Most metals are weak.**

**Most metals have a low density.**

**Most metals are soft.**  **[1]**

**(d) Look at the diagram. It shows how the particles are arranged in a LIQUID metal.**



**The particles are close together but not in a set pattern.**

**Describe how the particles are arranged in a SOLID metal.**

**A diagram may help you answer the question.**

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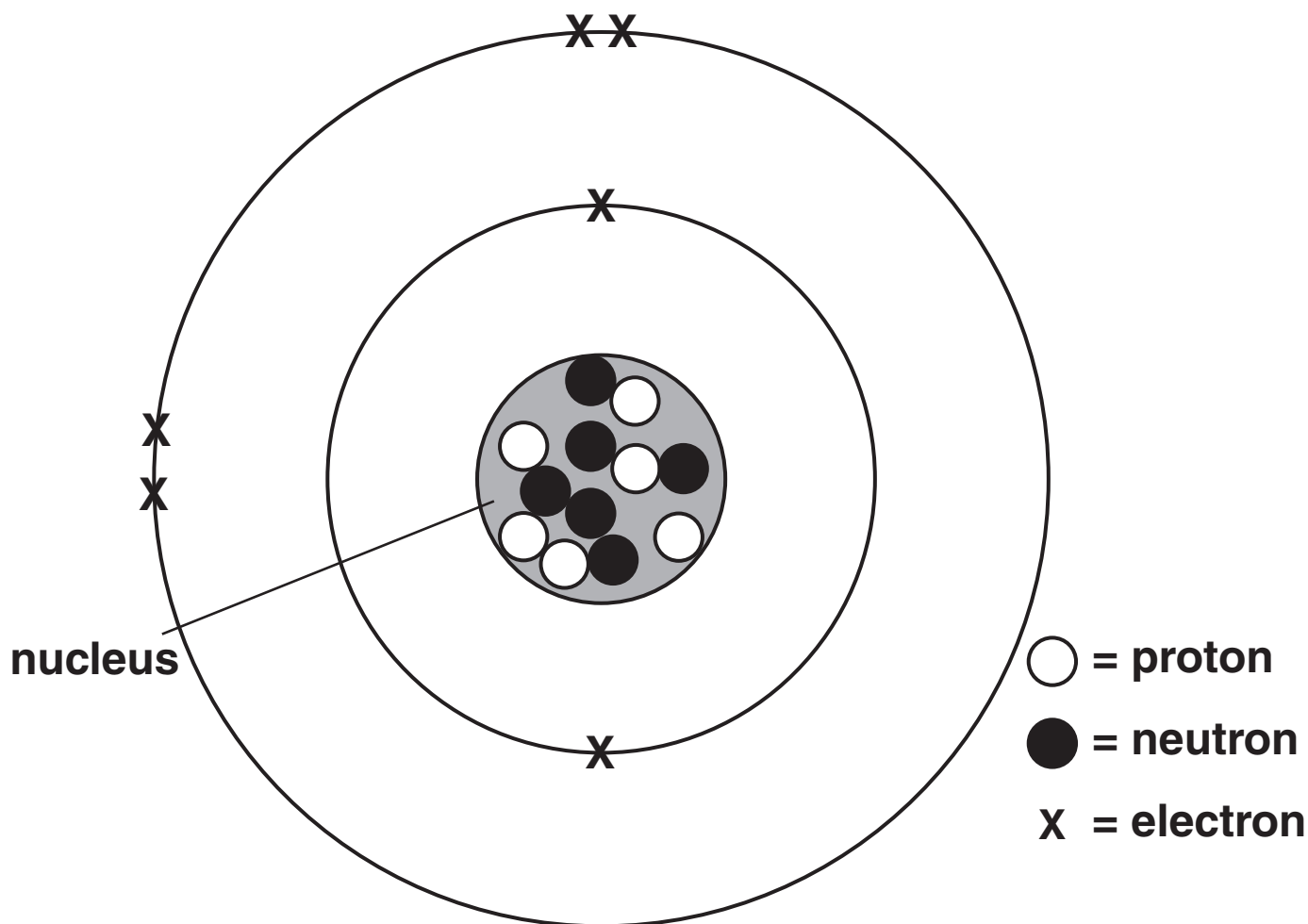
**[2]**

**[Total: 5]**

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7 All elements are made up of atoms.

Look at the diagram of an atom of an element.



(a) How many **ELECTRONS** are there in the outer shell?

\_\_\_\_\_

[1]

(b) This element is in period **2** of the Periodic Table.

How can you tell from the diagram of the atom?

\_\_\_\_\_

[1]

(c) The atom has a mass number of **12**.

How can you tell from the diagram of the atom?

\_\_\_\_\_ [1]

(d) Complete the table about the particles found in atoms.

particle	electric charge	relative mass
electron	_____	0.0005
neutron	0	_____
proton	positive	1

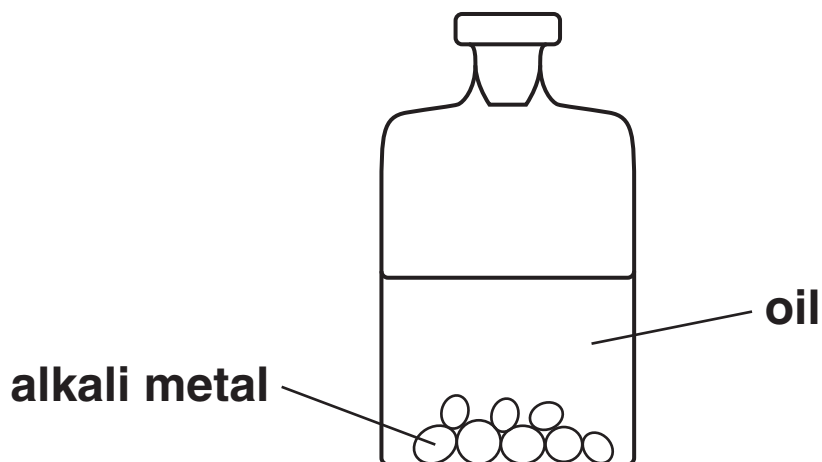
[2]

[Total: 5]

**8 Fluorine, chlorine and bromine are halogens.**

**Lithium, sodium and potassium are alkali metals.**

**Look at the diagram. It shows how the alkali metals are stored.**



**(a) Write down TWO reasons why alkali metals are stored under oil.**

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**[2]**

**(b) Lithium reacts with bromine to make lithium bromide.**

**The reaction of potassium with bromine is much more violent than the reaction of lithium with bromine.**

**Suggest why.**

\_\_\_\_\_ [1]  
\_\_\_\_\_

**(c) Lithium atoms make lithium ions,  $\text{Li}^+$ .**

**Finish the sentence about how this happens.**

**Lithium atoms lose \_\_\_\_\_ to**

**make positive lithium ions. [1]**

**[Total: 4]**

## SECTION C – MODULE P3

- 9 Neil and Jill check the speeds of cars outside their school.



**They time how long the cars take to travel between two lamp posts.**

**They use some equipment to take the measurements.**



**(a) Complete the table.**

**Choose the BEST answers from the list.**

**30 cm rule**

**clock**

**micrometer**

**stopwatch**

**tape measure**

**watch**

<b>measurement</b>	<b>equipment used</b>	<b>units</b>
<b>distance</b>		<b>m</b>
<b>time</b>		<b>s</b>

**[2]**

**(b) Neil and Jill use the measurements to calculate the SPEED.**

**What are the correct UNITS for speed?**

\_\_\_\_\_ **[1]**

**(c) Look at their results.**

<b>type of car</b>	<b>time taken to travel between lamp posts in seconds</b>
<b>Audi</b>	<b>3.2</b>
<b>BMW</b>	<b>3.4</b>
<b>Citroen</b>	<b>1.2</b>
<b>Mercedes</b>	<b>3.6</b>
<b>Skoda</b>	<b>1.8</b>
<b>Toyota</b>	<b>2.9</b>

**Which car travels the fastest between the lamp posts?**

\_\_\_\_\_ [1]

**[Total: 4]**

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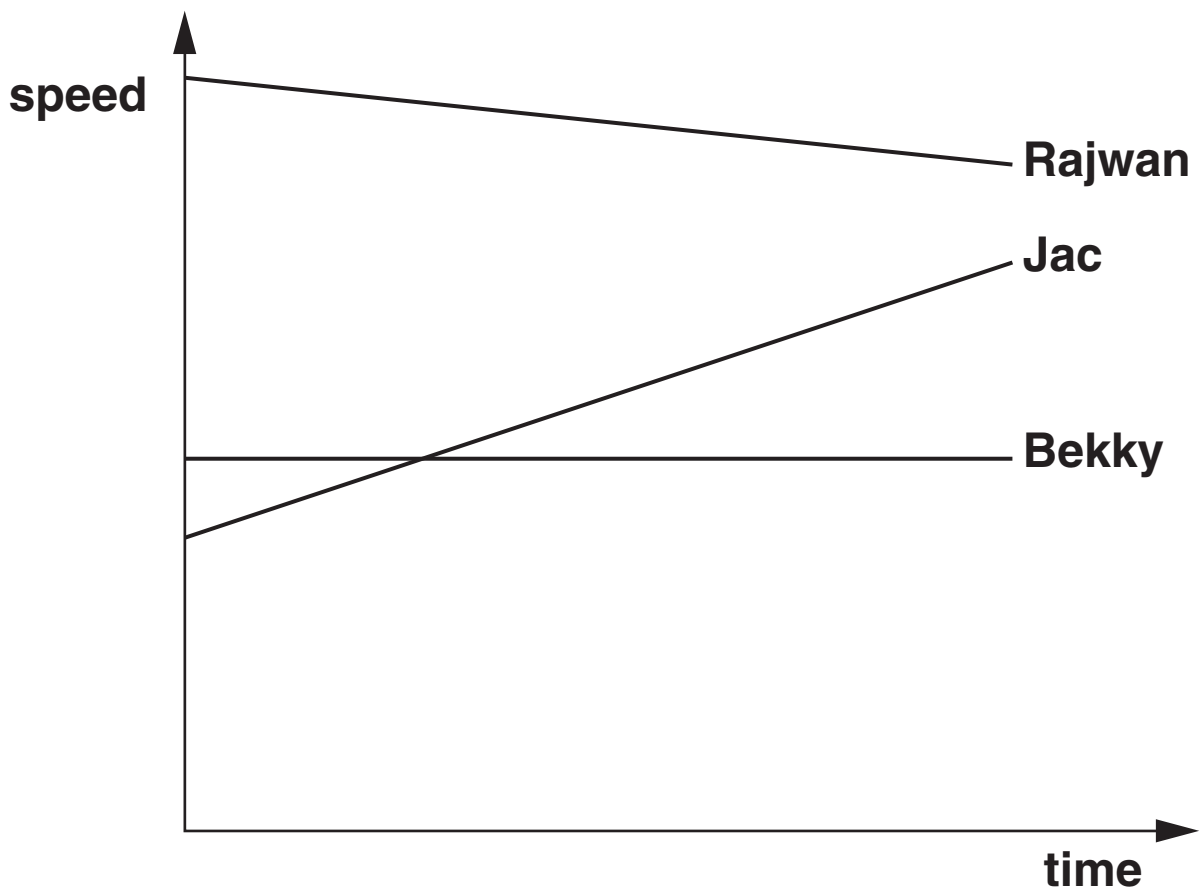
**10 Three students in a class run a race.**



**The rest of the class measure their speeds during the race.**

**The results are shown on a graph.**

**Look at the graph.**



**Complete the table.**

**Write each student's name in the correct place.**

<b>name</b>	<b>description of speed</b>
	<b>decreasing speed</b>
	<b>constant speed</b>
	<b>increasing speed</b>

**[2]**

**[Total: 2]**

**11 Look at the diagram.**

**It shows information from the Highway Code.**



**(a) What does THINKING distance mean?**

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**[2]**

**(b) What does BRAKING distance mean?**

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**[1]**

**(c) Use the information from the Highway Code to calculate the STOPPING distance.**

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answer \_\_\_\_\_ m **[1]**

**[Total: 4]**

**12 This question is about fuels and road transport.**

**Most cars use fuels made from FOSSIL fuel.**

**(a) (i) Write down the names of TWO of these fuels used to run cars.**

\_\_\_\_\_ and \_\_\_\_\_ [2]

**(ii) Look at the information on fuel consumption.**

<b>type of vehicle</b>	<b>fuel consumption in kilometres per litre</b>
<b>bus</b>	<b>3</b>
<b>car</b>	<b>11</b>
<b>motorbike</b>	<b>23</b>
<b>tractor</b>	<b>4</b>

**The motorbike has the BEST fuel consumption.**

**Use the table to explain why.**

\_\_\_\_\_  
\_\_\_\_\_ [1]

**(b) ELECTRICITY can be used to power cars.**

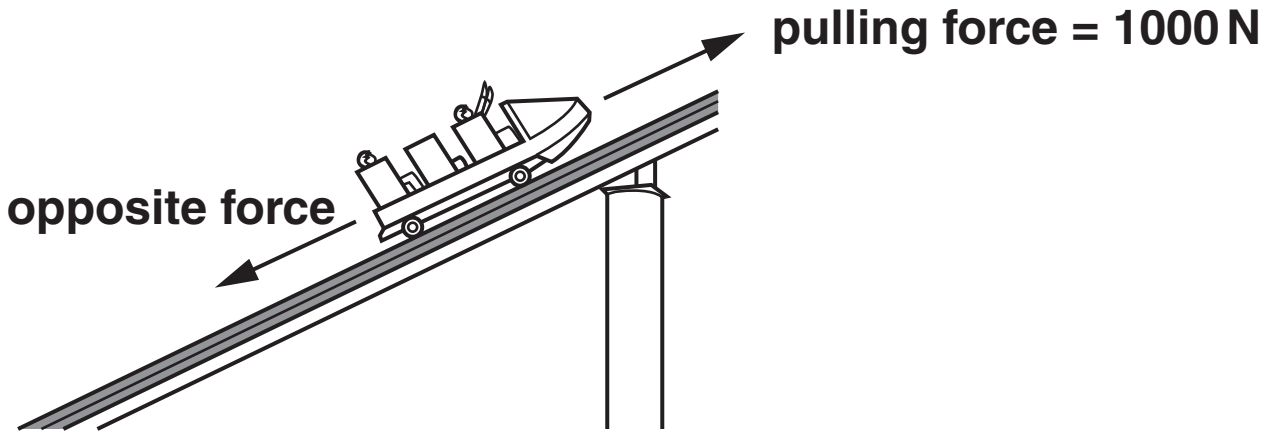
**What provides the electricity for these cars?**

\_\_\_\_\_  
\_\_\_\_\_ [1]

**[Total: 4]**

**13 This question is about the energy and speed of a roller coaster.**

**(a) An electric motor pulls the roller coaster car up the slope.**



**(i) The car moves 20 m.**

**The pulling force is 1000 N.**

**Calculate the work done on the car.**

**The equations on page 3 may help you.**

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**answer \_\_\_\_\_ J [2]**

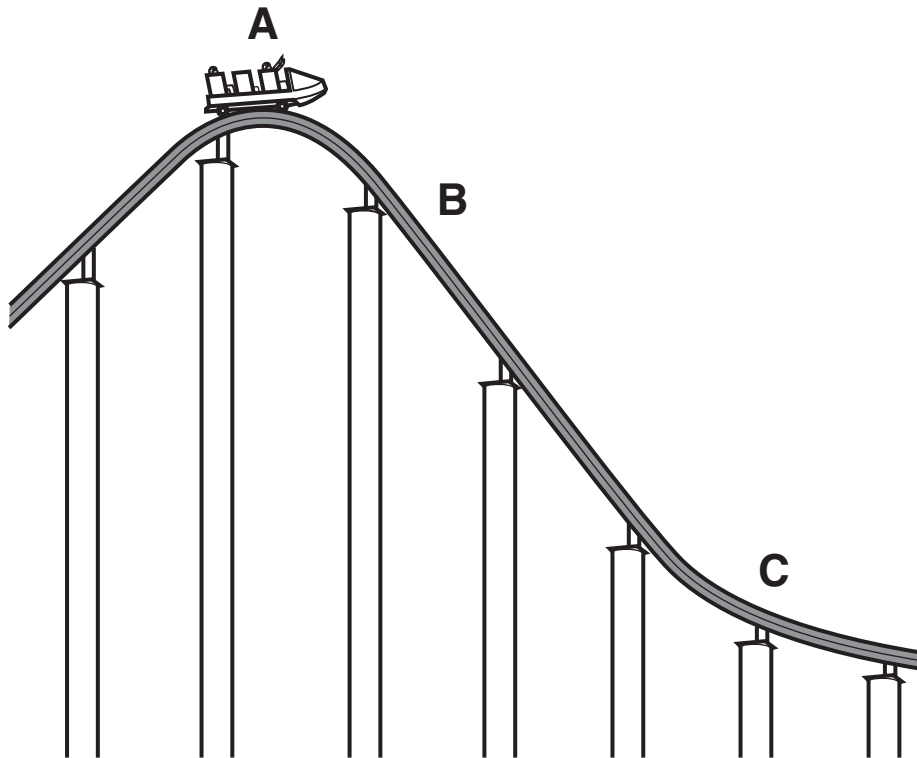
**(ii) The car climbs the slope at a STEADY SPEED.**

**What is the size of the opposite force when the speed is steady?**

**answer \_\_\_\_\_ N [1]**



**(b) Look at the diagram of the roller coaster.**



**The car stops at point A.**

**What type of energy does the car have when it stops here?**

\_\_\_\_\_ [1]

**(c) The car rolls down the slope.**

**At point B its speed is 6 m/s.**

**At point C its speed has doubled to 12 m/s.**

**What happens to its KINETIC energy between point B and point C?**

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[2]

**[Total: 6]**

**END OF QUESTION PAPER**

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# The Periodic Table of the Elements

		0						
1	2	3	4	5	6	7	8	
7 <b>Li</b> lithium 3	9 <b>Be</b> beryllium 4	11 <b>Na</b> sodium 11	12 <b>C</b> carbon 6	13 <b>Al</b> aluminium 13	14 <b>N</b> nitrogen 7	15 <b>O</b> oxygen 8	16 <b>F</b> fluorine 9	17 <b>Ne</b> neon 10
19 <b>K</b> potassium 19	20 <b>Ca</b> calcium 20	21 <b>Sc</b> scandium 21	22 <b>Ti</b> titanium 22	23 <b>V</b> vanadium 23	24 <b>Cr</b> chromium 24	25 <b>Mn</b> manganese 25	26 <b>Fe</b> iron 26	27 <b>Co</b> cobalt 27
37 <b>Rb</b> rubidium 37	38 <b>Sr</b> strontium 38	39 <b>Y</b> yttrium 39	40 <b>Zr</b> zirconium 40	41 <b>Nb</b> niobium 41	42 <b>Mo</b> molybdenum 42	43 <b>Tc</b> technetium [98]	44 <b>Ru</b> ruthenium 44	45 <b>Rh</b> rhodium 45
55 <b>Cs</b> caesium 55	56 <b>Ba</b> barium 56	57 <b>La*</b> lanthanum 57	72 <b>Hf</b> hafnium 72	73 <b>Ta</b> tantalum 73	74 <b>W</b> tungsten 74	75 <b>Re</b> rhenium 75	76 <b>Os</b> osmium 76	77 <b>Ir</b> iridium 77
[223] <b>Fr</b> francium 87	[226] <b>Ra</b> radium 88	[227] <b>Ac*</b> actinium 89	[261] <b>Rf</b> rutherfordium 104	[262] <b>Db</b> dubnium 105	[266] <b>Sg</b> seaborgium 106	[264] <b>Bh</b> bohrium 107	[277] <b>Hs</b> hassium 108	[268] <b>Mt</b> meitnerium 109
81 <b>Tl</b> thallium 81	82 <b>Pb</b> lead 82	83 <b>Bi</b> bismuth 83	84 <b>Po</b> polonium 84	85 <b>At</b> astatine 85	86 <b>Rn</b> radon 86	87 <b>Fr</b> francium 87	88 <b>Ra</b> radium 88	89 <b>Ac*</b> actinium 89
49 <b>In</b> indium 49	50 <b>Sn</b> tin 50	51 <b>Sb</b> antimony 51	52 <b>Te</b> tellurium 52	53 <b>I</b> iodine 53	54 <b>Xe</b> xenon 54	55 <b>Cs</b> caesium 55	56 <b>Ba</b> barium 56	57 <b>La*</b> lanthanum 57
31 <b>Ga</b> gallium 31	32 <b>Ge</b> germanium 32	33 <b>As</b> arsenic 33	34 <b>Se</b> selenium 34	35 <b>Br</b> bromine 35	36 <b>Kr</b> krypton 36	37 <b>Rb</b> rubidium 37	38 <b>Sr</b> strontium 38	39 <b>Y</b> yttrium 39
13 <b>Al</b> aluminium 13	14 <b>Si</b> silicon 14	15 <b>P</b> phosphorus 15	16 <b>S</b> sulfur 16	17 <b>Cl</b> chlorine 17	18 <b>Ar</b> argon 18	19 <b>K</b> potassium 19	20 <b>Ca</b> calcium 20	21 <b>Sc</b> scandium 21
5 <b>B</b> boron 5	6 <b>C</b> carbon 6	7 <b>N</b> nitrogen 7	8 <b>O</b> oxygen 8	9 <b>F</b> fluorine 9	10 <b>Ne</b> neon 10	11 <b>Na</b> sodium 11	12 <b>Mg</b> magnesium 12	13 <b>Al</b> aluminium 13
1 <b>H</b> hydrogen 1	2 <b>He</b> helium 2							

**Key**

relative atomic mass  
atomic symbol  
name  
atomic (proton) number

Elements with atomic numbers 112-116 have been reported but not fully authenticated

\* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.