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F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE PHYSICS A

A332/01

Unit 2 Modules P4 P5 P6
(Foundation Tier)

CUP/T71588

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)

Tuesday 27 January 2009
Afternoon

Duration: 40 minutes

A3320 1

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **42**.
- A list of physics equations is printed on page two.
- This document consists of **16** pages. Any blank pages are indicated.

FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	**9**	
2	**4**	
3	**7**	
4	**3**	
5	**4**	
6	**5**	
7	**6**	
8	**4**	
TOTAL	**42**	

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TWENTY FIRST CENTURY SCIENCE EQUATIONS
Useful Relationships

Explaining Motion

- $\text{speed} = \frac{\text{distance travelled}}{\text{time taken}}$
- momentum = mass × velocity
- change of momentum = resultant force × time for which it acts
- work done by a force = force × distance moved by the force
- change in energy = work done
- change in GPE = weight × vertical height difference
- kinetic energy = $\frac{1}{2}$ × mass × [velocity]^2

Electric Circuits

- $\text{resistance} = \frac{\text{voltage}}{\text{current}}$
- $\frac{V_p}{V_s} = \frac{N_p}{N_s}$
- energy transferred = power × time
- power = potential difference × current
- $\text{efficiency} = \frac{\text{energy usefully transferred}}{\text{total energy supplied}} \times 100\%$

The Wave Model of Radiation

- wave speed = frequency × wavelength

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Question 1 starts on page 4

PLEASE DO NOT WRITE ON THIS PAGE

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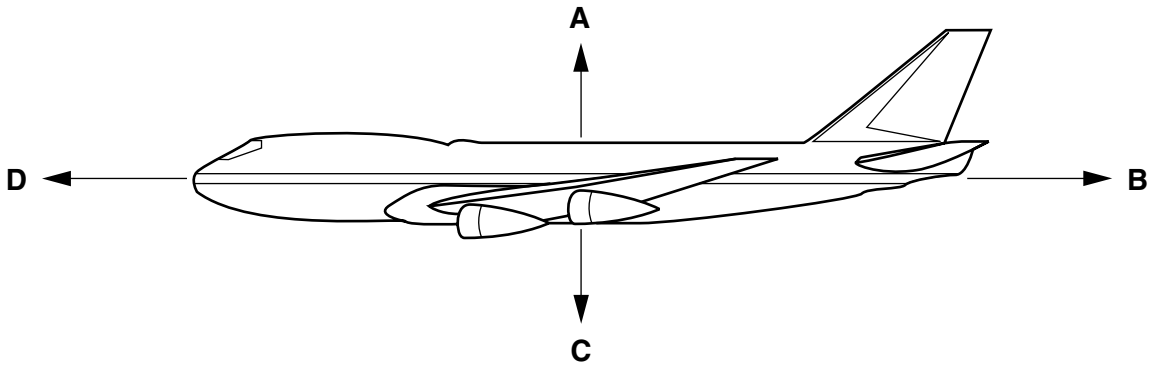
Answer **all** the questions.

1 An aeroplane in flight has four forces, **A**, **B**, **C** and **D**, acting on it.



(a) For each of the following put a (ring) around the correct force **A**, **B**, **C** or **D**.

(i) Which force is gravity? **A** **B** **C** **D**

(ii) Which force is the driving force? **A** **B** **C** **D**

(iii) Which force is air resistance? **A** **B** **C** **D**

[3]

(b) The plane flies at a steady speed and height.

Which two pairs of forces will be equal in size?

Put ticks (✓) in the boxes next to the **two** correct answers.

A and **B** ☐

A and **C** ☐

A and **D** ☐

B and **C** ☐

B and **D** ☐

C and **D** ☐

[2]

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(c) When the plane comes into land it gets slower and drops toward the ground.

Complete the following sentence by writing the letter of the missing force.

Force **D** must be smaller than force .....

[1]

(d) Choose words from this list to answer the following questions.

electrical

gravitational potential

heat

kinetic

light

(i) The plane has energy because it is moving.

What is this energy called? ..... **[1]**

(ii) As the plane descends towards the ground at a steady speed it loses energy.

What type of energy is lost? ..... **[1]**

(e) The plane travels 600 miles in 3 hours.

What is its average speed?

Put a (ring) around the correct answer.

200 mph **603 mph** **597 mph** **1800 mph**

[1]

[Total: 9]

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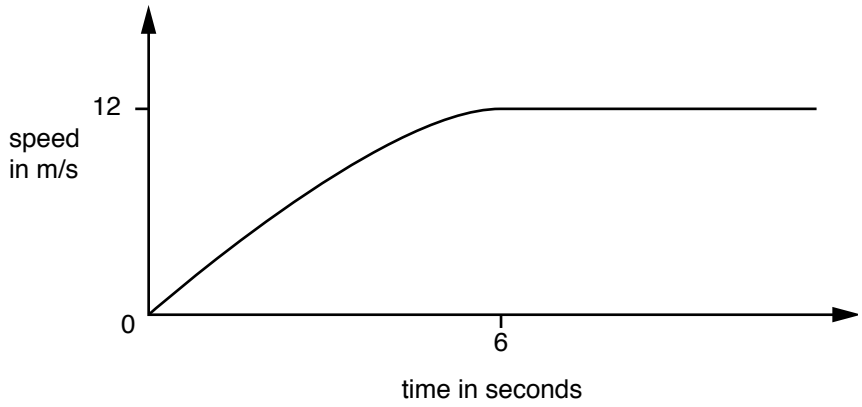
2 A sprinter runs a 100 m race.
The graph shows how his speed changed during the race.



(a) The highest speed of the sprinter was 12 m/s.

Which two of the following statements together explain why the average speed was less than 12 m/s.

Put ticks (✓) in the **two** boxes next to the correct answers.

The sprinter's speed was 12 m/s only for the last part of the race. ☐

The sprinter gets tired at the end of the race. ☐

The sprinter increases his speed at the beginning of the race. ☐

The sprinter moves at a constant speed of 10 m/s. ☐

[2]

(b) Which of the following is the best meaning of instantaneous speed?

Put a tick (✓) in the box next to the correct answer.

A very quick speed. ☐

An average speed over a very short time. ☐

A constant speed. ☐

[1]

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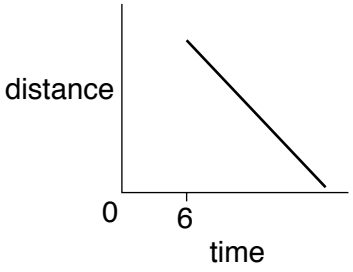
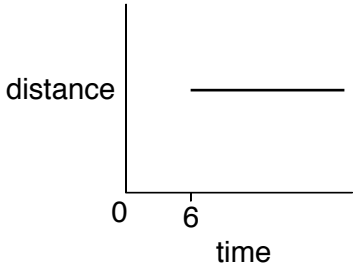
(c) Which of the following graphs **A**, **B**, **C** and **D** could be the distance time graph for the sprinter during the last part of the race?

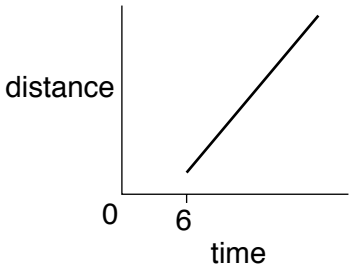
A



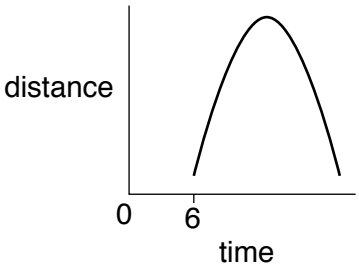
B



C



D



answer ..... **[1]**

[Total: 4]

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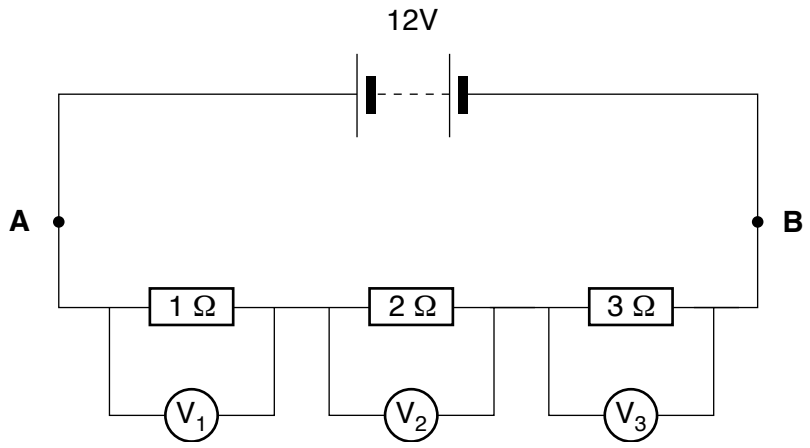
3 Jilly is investigating how resistors affect electric circuits.

(a) She builds a series circuit.



(i) The current at **A** is 2 Amps.

What is the current at **B**?

Put a (ring) around the correct answer.

0 A **2 A** **4 A** **6 A** **12 A**

[1]

(ii) What is the potential difference between **A** and **B**?

Put a (ring) around the correct answer.

4 V **6 V** **12 V** **36 V**

[1]

(iii) Which voltmeter will show the highest voltage?

Put a (ring) around the correct answer.

V_1 **V_2** **V_3**

[1]

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(iv) Jilly makes some notes about voltage.

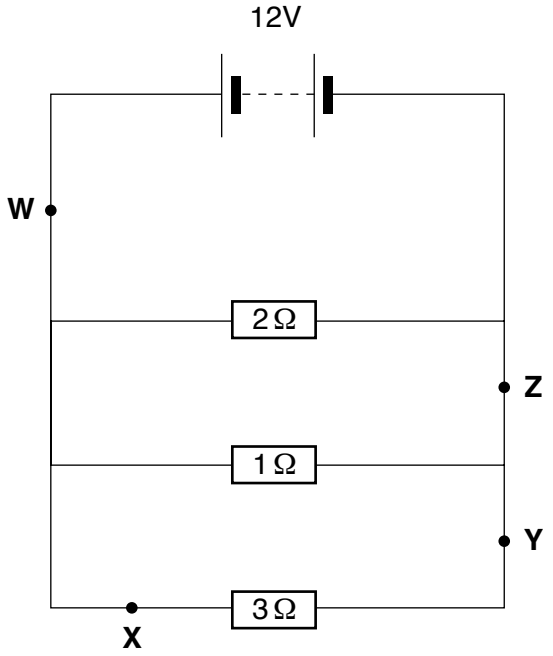
Only two of her notes are correct.

Put ticks (✓) in the **two** boxes next to the correct notes.

The voltage is the flow of charge in the circuit.	☐
The voltage of the battery measures the push it gives charges.	☐
The bigger the voltage across a resistor the more energy is lost by a charge going through it.	☐
The voltage measures the total resistance in the circuit.	☐

[2]

(b) Jilly now builds a parallel circuit.



(i) Where is the current the largest in the parallel circuit, **W**, **X**, **Y or Z**?

Put a (ring) around the correct answer.

W **X** **Y** **Z**

[1]

(ii) Which resistor will have the largest electric current flowing through it?

Put a (ring) around the correct answer.

1 Ω **2 Ω** **3 Ω**

[1]

[Total: 7]

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4 James is building a fire alarm.

He wants his alarm to detect light and heat.

He decides to use an LDR and a thermistor in his circuit.

(a) Complete the sentence by choosing the best words from the list.

decreases

does not change

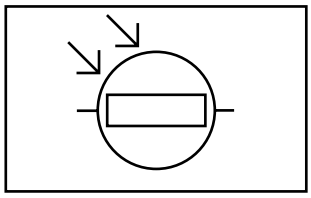
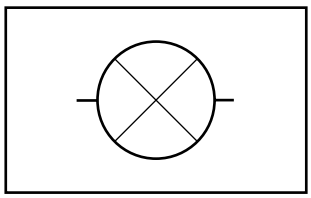
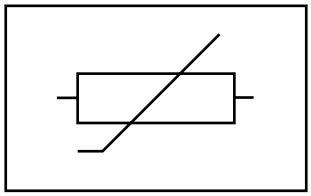
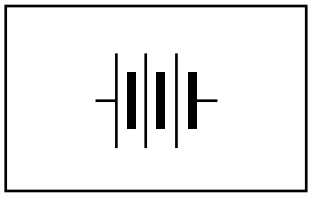
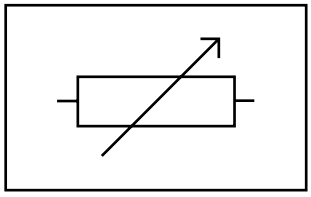
increases

speeds up

stops

The resistance of the thermistor decreases when the temperature ..... **[1]**

(b) Draw a straight line from each **component** to its **circuit symbol**.

component	circuit symbol
thermistor	
LDR	
	
	
	

[2]

[Total: 3]

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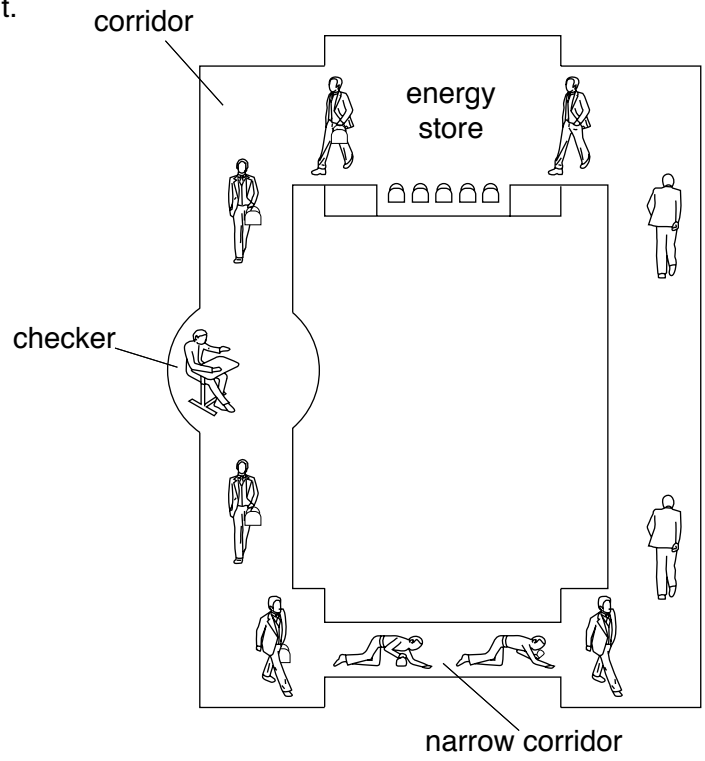
5 Barry suggests a model of an electric circuit.



The **people** pick up bags of sugar from the **energy store**.

The **narrow corridor** is hard to get through. It gets very warm as people struggle through it.

The **checker** uses a stopwatch to measure the rate that the people pass him.

The boxes show parts in the model and parts in an electric circuit.
Draw a straight line from each **part in the model** to the correct **part in an electric circuit**.

part in the model	part in an electric circuit
narrow corridor	electrons
people	resistor
energy store	voltmeter
checker	ammeter
	battery

[4]

[Total: 4]

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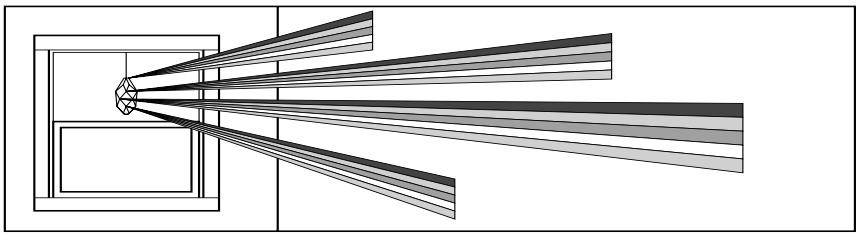
6 Tristram has a crystal hanging on his window.
The crystal produces visible light spectrums on his wall.



(a) A visible light spectrum is made up of different colours of light.

Which of the following are always different for different colours of light?

Put ticks (✓) in the boxes next to the **two** correct answers.

wavelength	☐
speed	☐
frequency	☐
amplitude	☐
intensity	☐

[2]

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(b) Visible light is a type of electromagnetic radiation.

(i) The electromagnetic spectrum includes visible light.

gamma	**A**	ultraviolet	**B**	infrared	**C**	radio

Which letter **A**, **B** or **C** shows the position of visible light? .....

[1]

(ii) Which of the statements about visible light are true?

Put ticks (✓) in the boxes next to the **two** correct statements.

visible light travels at a very high speed ☐

visible light cannot travel through empty space ☐

visible light is not absorbed much by glass ☐

visible light has no photons ☐

[2]

[Total: 5]

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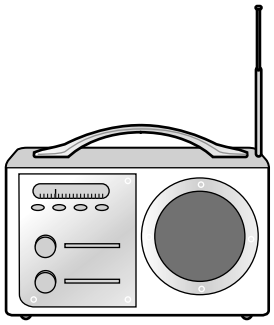
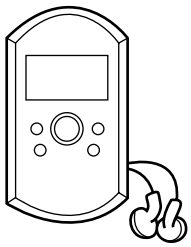
7 Radio programmes in the United Kingdom are now broadcast as both analogue and digital signals.



Analogue radio



Digital radio

(a) For each statement decide whether it applies to **analogue** signals, **digital** signals or **both**.

Put a tick (✓) in the correct box for each statement.

statement	analogue signals	digital signals	both analogue and digital
the signal varies in the same way as the original sound wave			
the signal is a code made up of **1**s and **0**s			
the signal is transmitted as an electromagnetic wave			
the signal is made up of short pulses			

[4]

(b) Complete the sentences by choosing the best word from this list.

aerial **decoder** **receiver**

(i) In an analogue radio a copy of the original sound wave is made by a

..... **[1]**

(ii) In a digital radio a copy of the original sound wave is made by a ..... .

[1]

[Total: 6]

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8 Katie plays a domino game in a lesson about waves.

Each domino has a word and a meaning of a different word.

word
meaning of a different word

Dominos must be put down with the correct word **below** its meaning.

The first one has been done for you.

Frequency x wavelength is speed, so **F** is the domino placed below **A**.

Write the correct letter in the boxes beside the grey dominos.

A	**amplitude** frequency x wavelength			
F	**speed** a wave bounces from a surface		**B**	**diffraction** direction of a wave changes as it enters a different medium
			C	**interference** waves spread out from a narrow gap
			D	**reflection** two waves meet and their effects add together
			E	**refraction** the distance from the height of the wave to the undisturbed position
			F	**speed** a wave bounces from a surface

[4]

[Total: 4]

END OF QUESTION PAPER

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