OCR
RECOGNISING ACHIEVEMENT

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GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE PHYSICS A

A332/01

Unit 2: Modules P4 P5 P6 (Foundation Tier)

11LMP06027

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)

Wednesday 25 May 2011
Morning

Duration: 40 minutes

A332 01

Candidate forename		Candidate surname	

Centre number						Candidate number				

MODIFIED LANGUAGE

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. 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.
- Do **not** write in the bar codes.

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.

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 in the direction of the force

change in energy = work done

change in GPE = weight × vertical height difference

$$\text{kinetic energy} = \frac{1}{2} \times \text{mass} \times [\text{velocity}]^2$$

Electric Circuits

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

$$\frac{\text{voltage across primary coil}}{\text{voltage across secondary coil}} = \frac{\text{number of turns in primary coil}}{\text{number of turns in secondary coil}}$$

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

Answer **all** the questions.

1 Draw a straight line between each **key word** and its correct **definition**.

key word	**definition**
electron	negatively charged particle
conductor	a flow of charge
electric current	unit of current
	contains many charges free to move

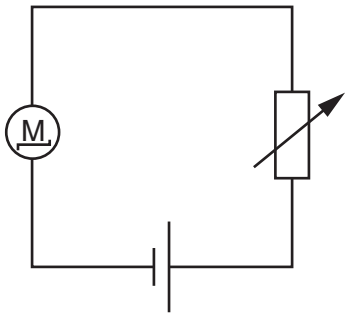
[3]

[Total: 3]

2 This question is about bumper cars on a fairground.

Bumper cars use an electric motor.

Here is a simplified circuit diagram.



(a) What is the name of the component with this symbol?

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

thermistor	☐
fixed resistor	☐
variable resistor	☐
light dependent resistor	☐

[1]

(b) The power supply has a voltage of 100 V and a maximum current of 4 A.

What is the maximum power?

Put a (ring) around the correct answer.

0.04 W **25 W** **96 W** **104 W** **400 W**

[1]

(c) The power supply for the ride is a battery, which is different from the mains power supply.

Read the descriptions in the table.

Each **description** relates to **battery electricity**, **mains electricity**, **both** or **neither**.

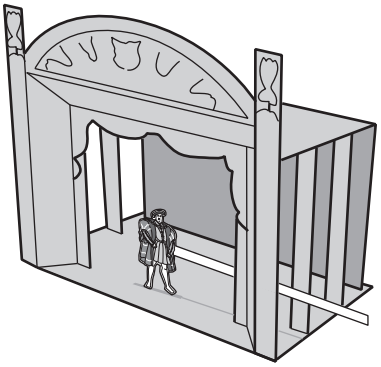
Tick (✓) one box in each row to show which type of electricity each description fits.

description	battery electricity only	mains electricity only	both battery and mains electricity	neither battery nor mains electricity
can be used to produce light				
produced by generators				
alternating current				
direct current				

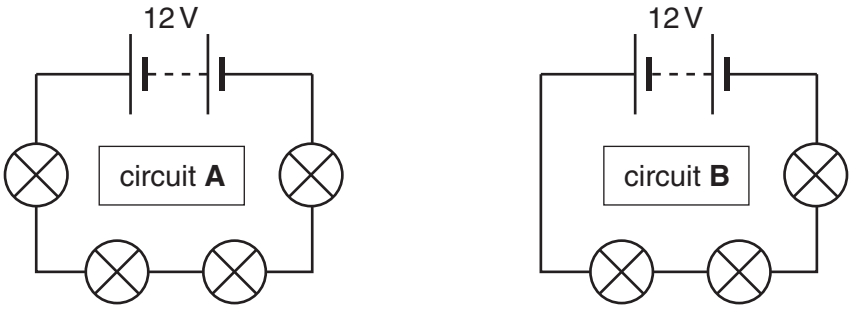
[4]

[Total: 6]

3 Grace is building a set of lights for a model theatre.



She tests two different circuits.



(a) All the lamps are identical.
How do the following compare in circuits **A** and **B**?
Put a tick (✓) in the correct box in each row.

	greater in circuit A	**the same in circuits A and B**	**greater in circuit B**
total resistance of the circuit			
current in the circuit			
voltage across each lamp			

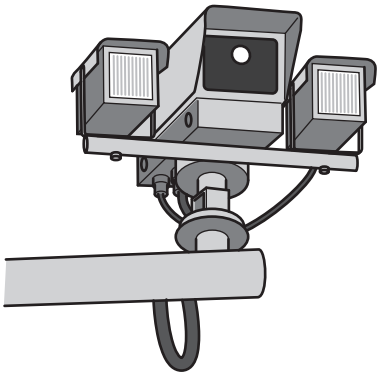
[2]

(b) Grace measures the current in circuit **A** and finds that it is 0.3A.
Calculate the total resistance of the circuit.
State the unit of resistance.

answer = ... unit ..... **[3]**

[Total: 5]

4 This question is about speed cameras.



One system of measuring speed uses two cameras. The distance between the cameras is fixed. The system measures the time a car takes to move between the two cameras.

(a) One car takes 50 s to travel 800 m.
How fast is it going?
Show your working.

answer = ... m/s **[2]**

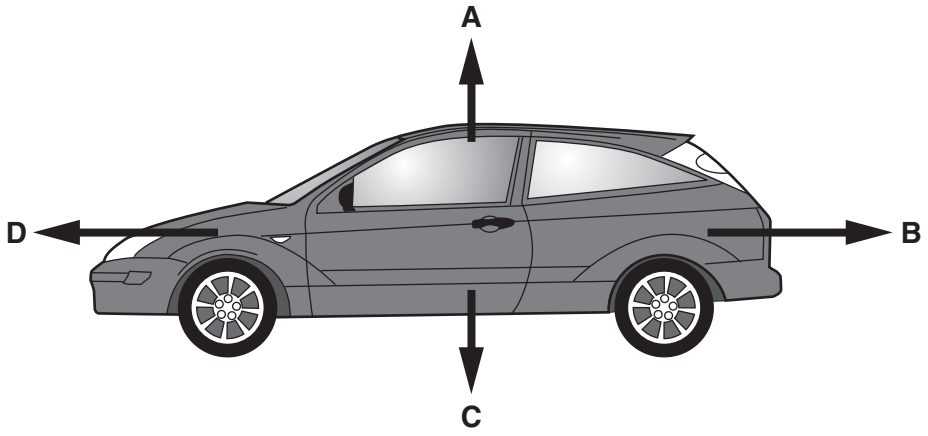
(b) Speed can be described as either "instantaneous" or "average".
Draw **two** straight lines to show the meaning that best matches each phrase.

instantaneous speed	the speed at a particular time
	the speed measured over the total distance
	the speed of the car in a particular direction
average speed	
	how the speed changes when braking

[2]

[Total: 4]

5 **(a)** The diagram has four labelled arrows showing four forces acting on a car.



(i) Write the letter **A**, **B, C** or **D** to show which **arrow** represents each **force**.

force	arrow
weight	
reaction force	
counter forces	
driving force	

[3]

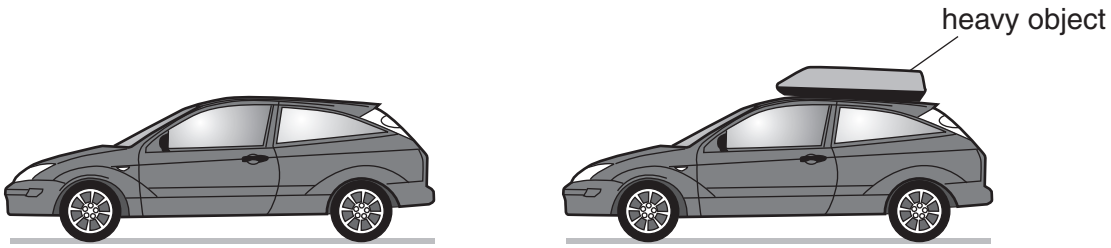
(ii) The car is stationary.
Write down the letters of two forces which are equal in size.

force ..... and ..... **[1]**

(iii) The car is speeding up.
Which two of the forces are **not** equal in size?

force ..... and ..... **[1]**

(b) Two identical cars, **A** and **B**, are driven along a level road.
They travel at the same speed in the same direction.
Car **B** has a heavy object strapped to its roof.



car A **car B**

(i) How will the following quantities compare between the two cars?

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

	greater for car A	**greater for car B**	**the same for both cars**	**cannot tell which car is greater**
the velocity				
the momentum				
the kinetic energy				

[3]

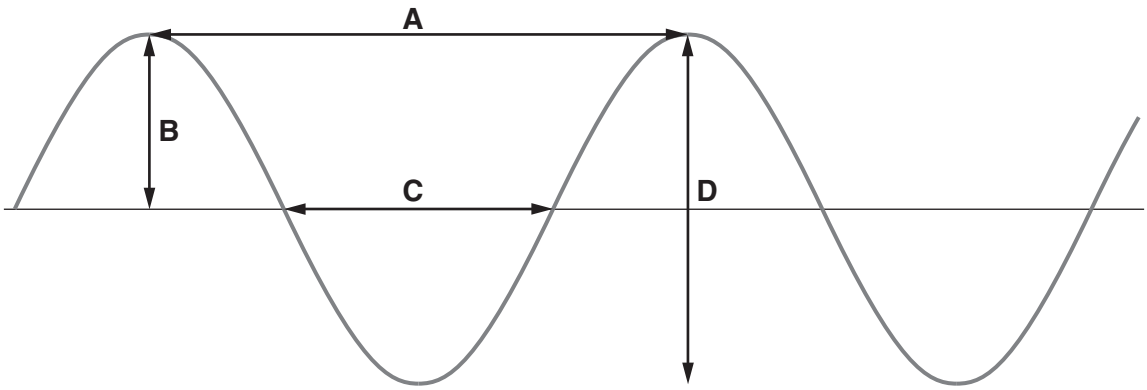
(ii) Car **A** brakes suddenly.
The braking force is 10 000 N.
Car **A** takes 80 m to stop.

What is the work done by the brakes?

work done = ... J **[1]**

[Total: 9]

6 Julie draws the side view of a water wave.



(a) Julie tries to remember the labels for the diagram.
Which arrow fits each label?

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

	arrow				not shown
label	**A**	**B**	**C**	**D**	
wavelength					
frequency					
amplitude					

[3]

(b) Julie copies notes that her teacher has written on the whiteboard, but misses out some words.

Put a (ring) around the correct words.

"The speed of the wave is usually | not affected by / the same as / bigger than / similar to | its frequency and amplitude."

[1]

(c) Julie's notes include the following

"A travelling wave has a frequency of 60 Hz and a wavelength of 3 m."

(i) Calculate the speed of the travelling wave.

speed of wave = ... m/s **[2]**

(ii) The speed of electromagnetic waves is 300 000 000 m/s.
Is the travelling wave an electromagnetic wave?
Explain your answer.

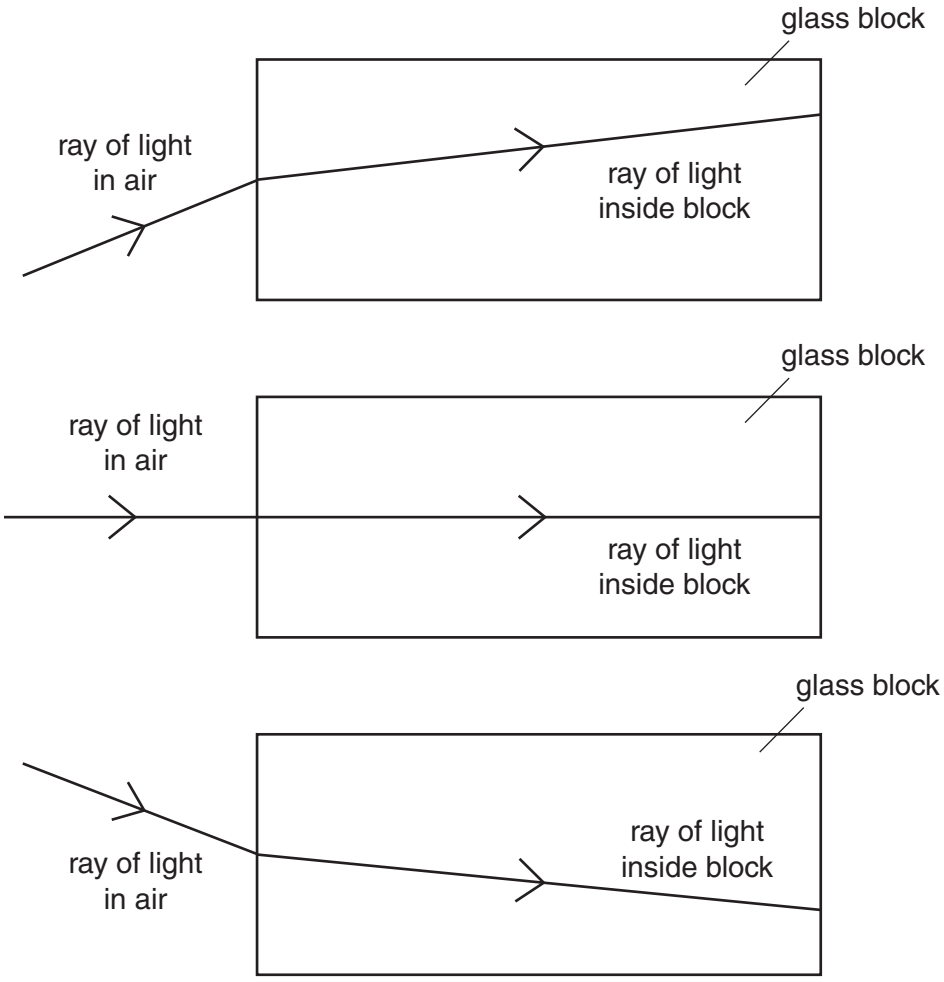
.....

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

[Total: 7]

7 Nahida is investigating waves.

(a) Nahida shines a light into a block of glass.
She draws some diagrams to show her results.



Nahida's teacher gives her some notes to complete.
Complete the sentences using words from this list.

always **never** **sometimes**

The speed of light ..... changes as it travels into the glass block.

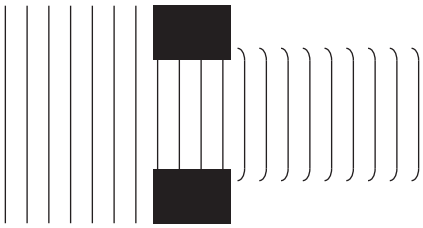
The frequency of light ..... changes as it travels into the glass block.

The wavelength of light ..... changes as it travels into the glass block.

The direction of the ray of light ..... changes as it travels into the glass block.

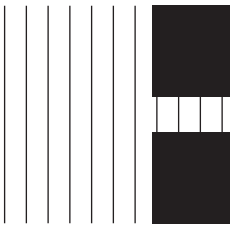
[3]

(b) Nahida then investigates what happens when water waves pass through different size gaps.



wide gap

(i) **Complete the diagram** below to show what happens to the waves as they pass through a narrow gap.



narrow gap

[1]

(ii) What is the scientific name for this effect?

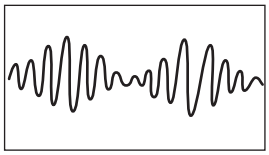
..... **[1]**

[Total: 5]

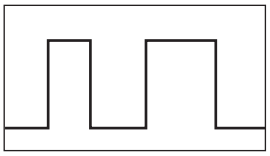
8 Cordless phones have two parts, a handset and a base unit.
These send signals to each other using radio waves.

There are two types of cordless phone.
One phone uses signal **A** and one phone uses signal **B**.

signal **A**



signal **B**



(a) Which words describe the two types of signal?
Choose the option that fits each gap.

an analogue **an amplitude** **a digital** **an interference**

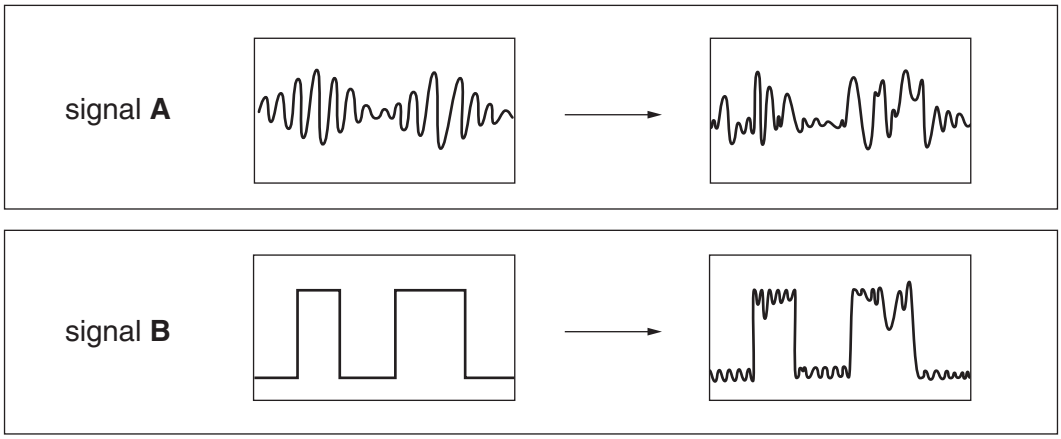
Signal **A** is ..... signal.

Signal **B** is ..... signal.

[1]

(b) Sometimes the radio signal picks up **noise** as it travels.
This reduces the quality of the signal.

The pictures below show this happening to signals **A** and **B**.



Explain why signal **B** can give a clearer sound than signal **A**.

.....

.....

.....

..... **[2]**

[Total: 3]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE