

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**

A332/01

**TWENTY FIRST CENTURY SCIENCE
PHYSICS A**

Unit 2: Modules P4 P5 P6 (Foundation Tier)

WEDNESDAY 25 MAY 2011: Morning

DURATION: 40 minutes

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.**
- **The total number of marks for this paper is 42.**
- **A list of physics equations is printed on pages four and five.**

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TWENTY FIRST CENTURY SCIENCE EQUATIONS

USEFUL RELATIONSHIPS

EXPLAINING MOTION

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

$$\text{momentum} = \text{mass} \times \text{velocity}$$

$$\text{change of momentum} = \frac{\text{resultant force}}{\text{force}} \times \text{time for which it acts}$$

$$\text{work done by a force} = \text{force} \times \frac{\text{distance moved in the direction of the force}}{\text{of the force}}$$

$$\text{change in energy} = \text{work done}$$

$$\text{change in GPE} = \text{weight} \times \text{vertical height difference}$$

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

ELECTRIC CIRCUITS

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

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

$$\text{energy transferred} = \text{power} \times \text{time}$$

$$\text{power} = \text{potential difference} \times \text{current}$$

$$\text{efficiency} = \frac{\text{energy usefully transferred}}{\text{total energy supplied}} \times 100\%$$

THE WAVE MODEL OF RADIATION

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

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**

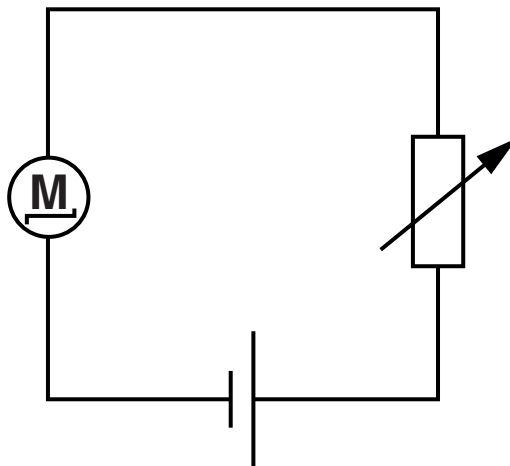
[3]

[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 100V and a maximum current of 4 A.

What is the maximum power?

Put a **ring** around the correct answer.

0.04W

25W

96W

104W

400W

[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 opposite.

Each DESCRIPTION relates to BATTERY ELECTRICITY, MAINS ELECTRICITY, BOTH or NEITHER.

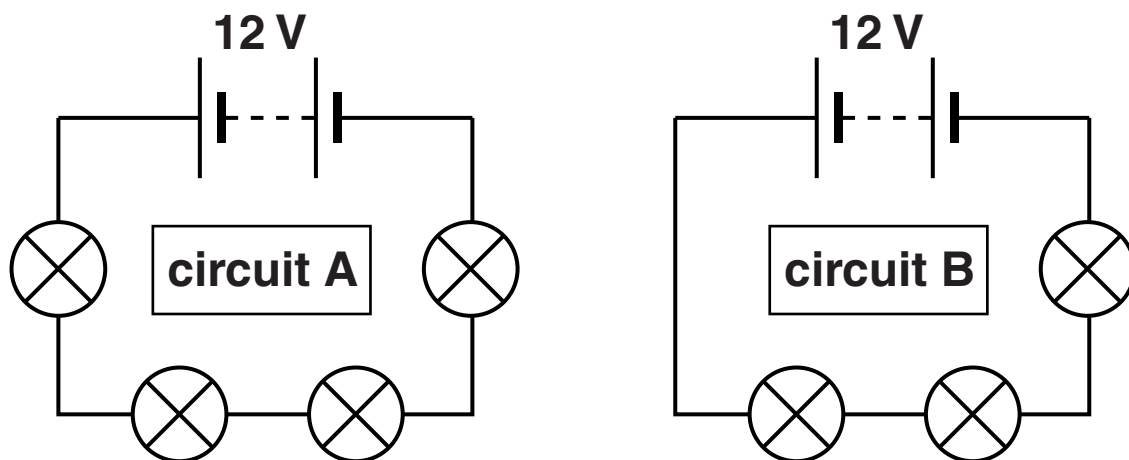
Tick (✓) one box in each row to show which type of electricity each description fits.

[Total: 6]

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				

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 0.3 A.
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 placed a known distance apart. It times how long 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**

average speed

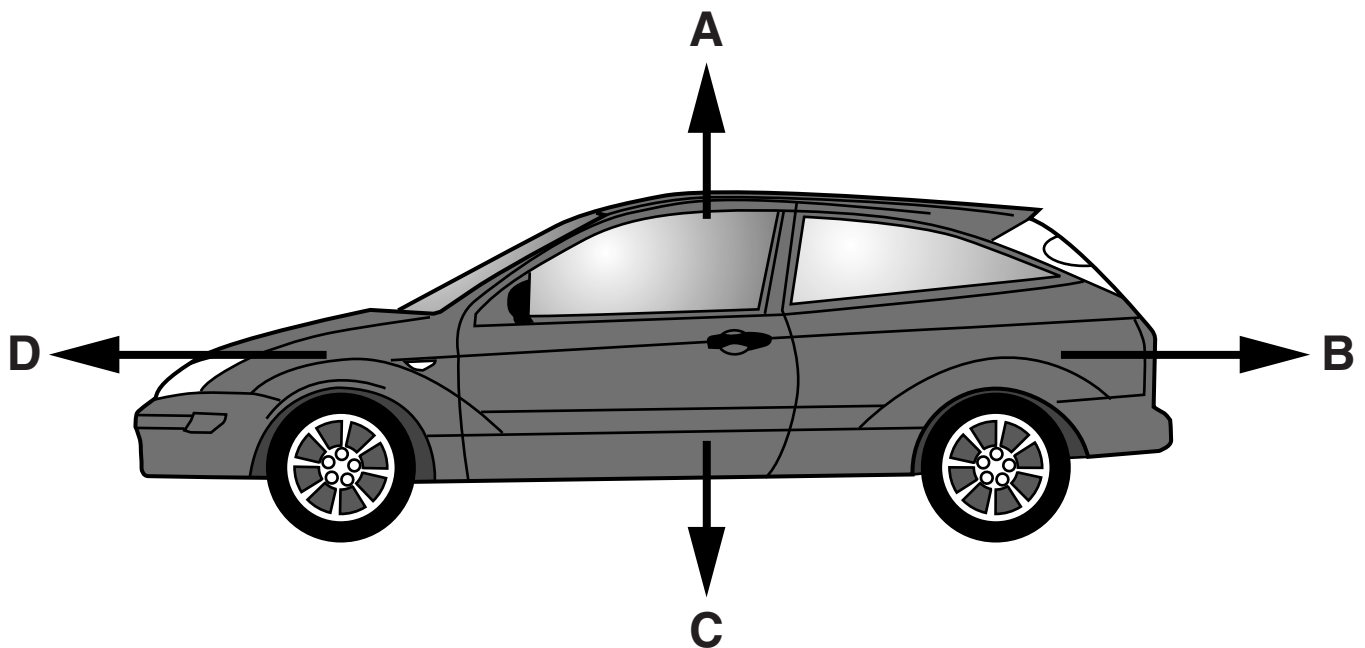
**the speed of the car in a
particular direction**

**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]

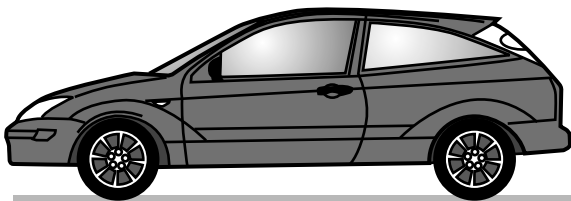
**(iii) The car is speeding up.
Which two of the forces are not equal in size?**

force _____ and _____ [1]

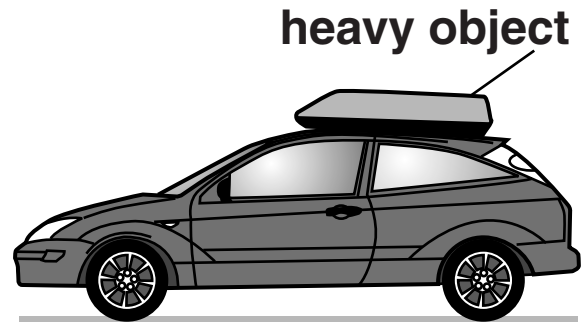
(b) Two identical cars, A and B, are driven along a level road.

They travel at the same speed in the same direction.

Car B has a heavy object which is 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]

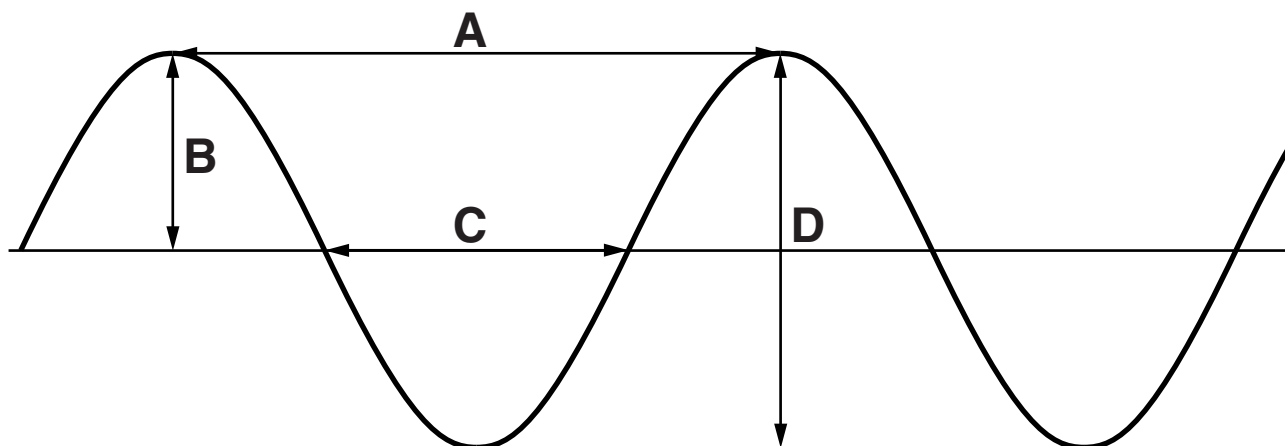
- (ii) Car A brakes suddenly.
The braking force is 10000 N.
Car A takes 80m to stop.

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 which labels should be added to the diagram.
Which arrow fits each label?

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

LABEL	ARROW				NOT SHOWN
	A	B	C	D	
wavelength					
frequency					
amplitude					

[3]

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

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 60Hz and a wavelength of 3m."

(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.**

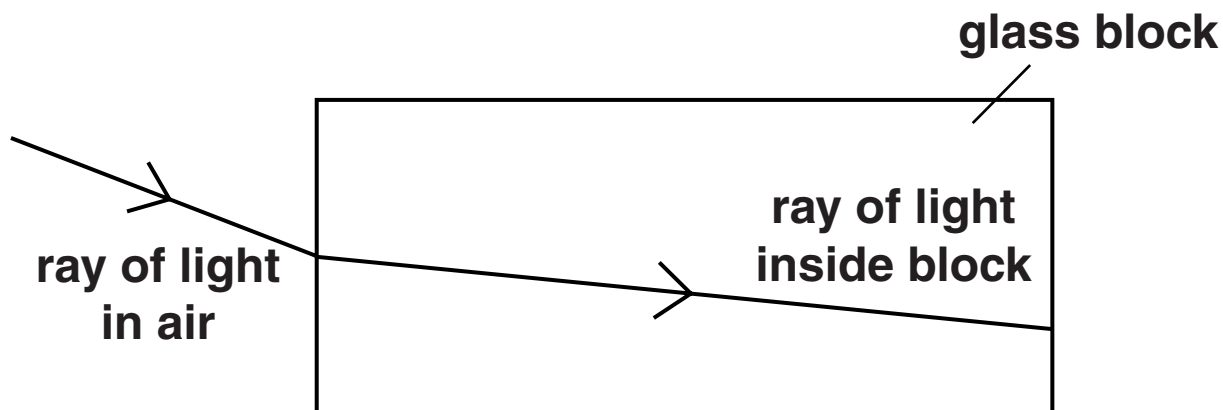
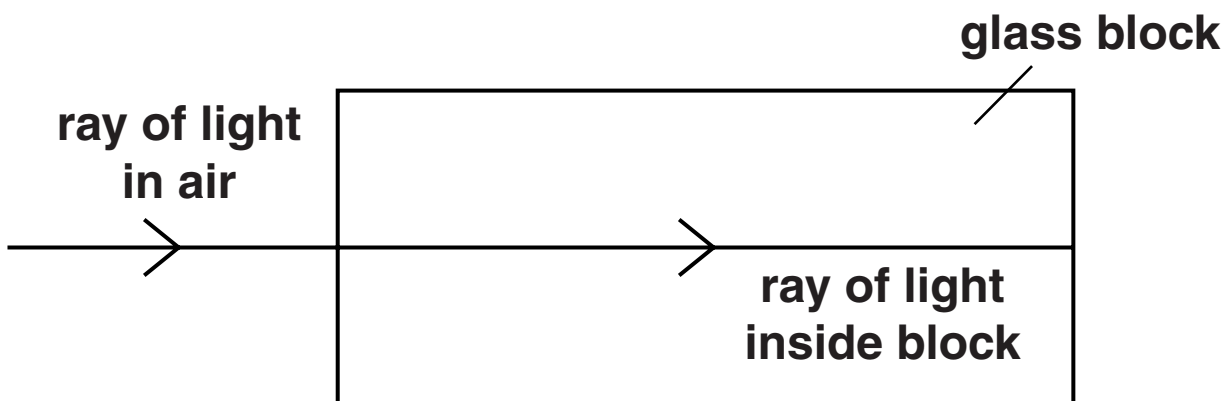
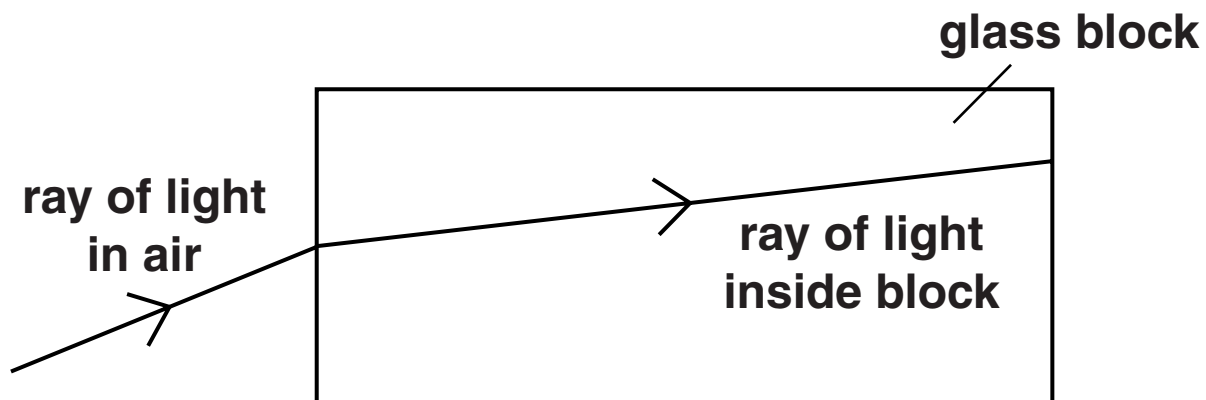
_____ **[1]**

[Total: 7]

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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.**

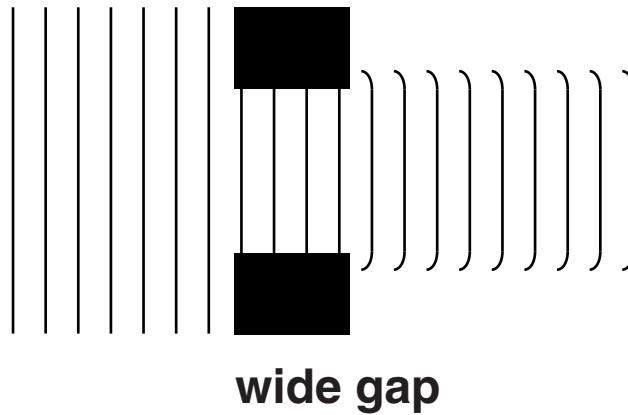
**The frequency of light _____
changes as it travels into the glass block.**

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

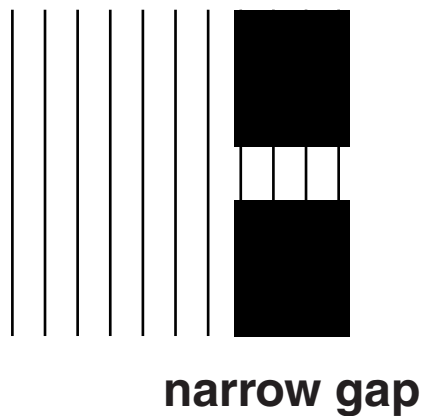
**The direction of the ray of light _____
changes as it travels into the glass block.**

[3]

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



- (i) **COMPLETE THE DIAGRAM** below to show what happens to the waves as they pass through a narrow gap.



[1]

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

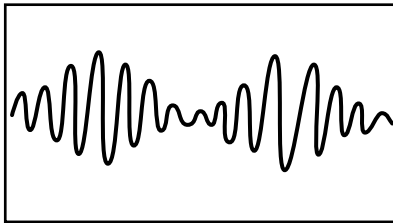
_____ **[1]**

[Total: 5]

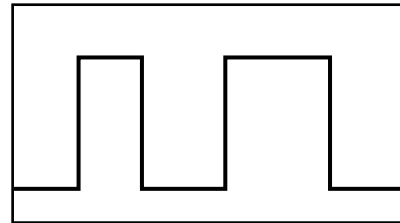
- 8 **Cordless phones have two parts, a handset and a base unit.
These send signals to each other using radio waves.**

**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

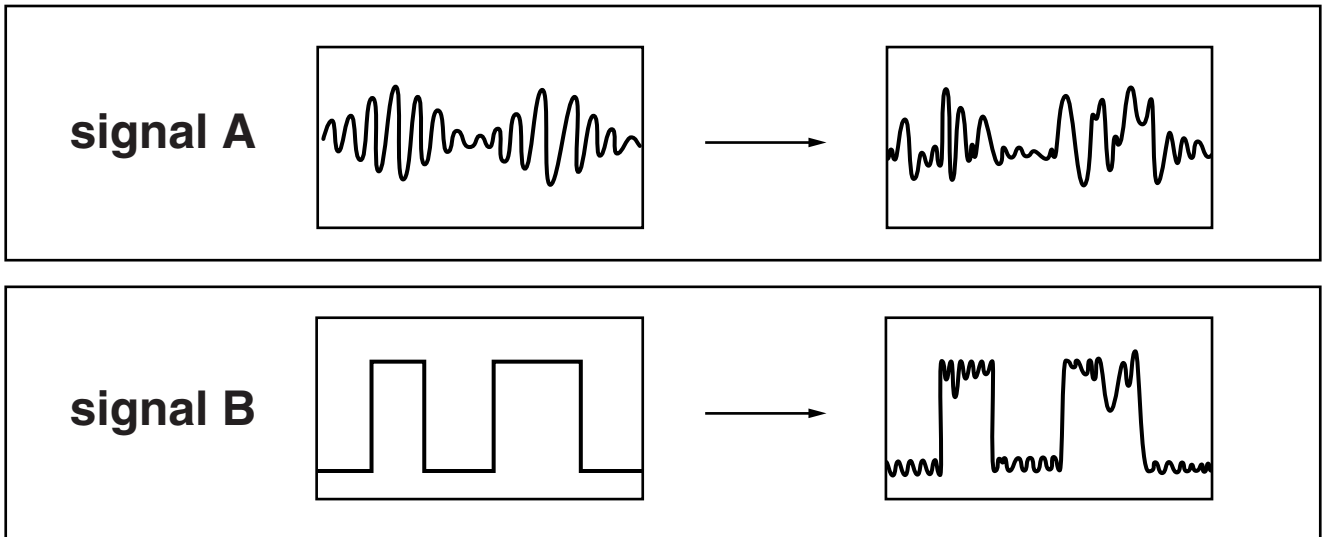
**Signal A is _____
signal.**

**Signal B is _____
signal.**

[1]

- (b) Sometimes NOISE is picked up by the radio signal 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

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