Candidate forename		Candidate surname	

Centre number						Candidate number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

GCSE

B652/01

GATEWAY SCIENCE

PHYSICS B

Unit 2 Modules P4 P5 P6 (Foundation Tier)

THURSDAY 2 FEBRUARY 2012: 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

DC (NF/SW) 12MPE01174 57099/1

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. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **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).**

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 total number of marks for this paper is 60.**

EQUATIONS

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

$$v = u + at$$

$$s = \frac{(u + v)}{2} t$$

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

$$\frac{V_p}{V_s} = \frac{N_p}{N_s}$$

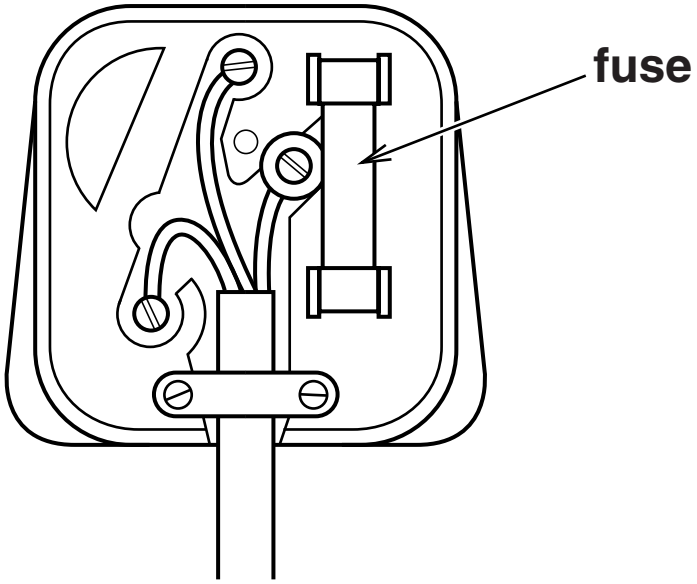
Answer ALL the questions.

SECTION A – MODULE P4

1 Dave has electrical appliances in his home.

(a) He looks at the mains plug for his metal toaster.

Look at the diagram.



(i) Which wire is colour coded BLUE?

Choose from

EARTH

LIVE

NEUTRAL

answer _____ **[1]**

(ii) Which wire is colour coded GREEN AND YELLOW?

Choose from

EARTH

LIVE

NEUTRAL

answer _____ [1]

(iii) What is the job of the FUSE in this mains plug?

_____

_____ [1]

(b) Dave has a games console. It is double insulated.

It has only two wires.

Which TWO wires are connected to the games console?

Choose from

LIVE AND EARTH

NEUTRAL AND EARTH

LIVE AND NEUTRAL

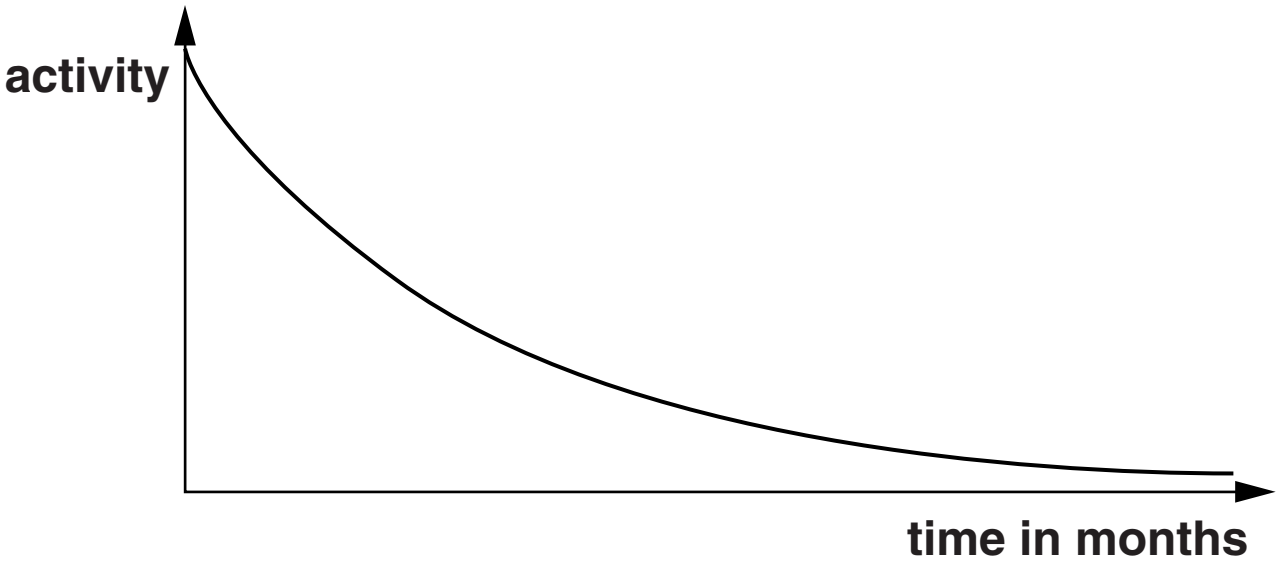
answer _____ [1]

[Total: 4]

2 Nuclear radiation is used in hospitals.

(a) A radiographer measures the activity of the radioactive source every month.

Look at the graph of her results.



(i) Complete the sentences.

Time is measured in months.

Activity is measured in

_____ per second. [1]

(ii) Describe what happens to the activity of this source.

_____

_____ [1]

(b) Doctors can use nuclear radiation to help patients.

Explain how the doctor can treat patients using nuclear radiation.

In your answer write about

- **what can be treated**
- **how the treatment works.**

_____

_____

_____

_____

_____ **[2]**

(c) Some hospital equipment is exposed to a high dose of gamma radiation before it is used.

Explain why.

_____

_____ **[1]**

[Total: 5]

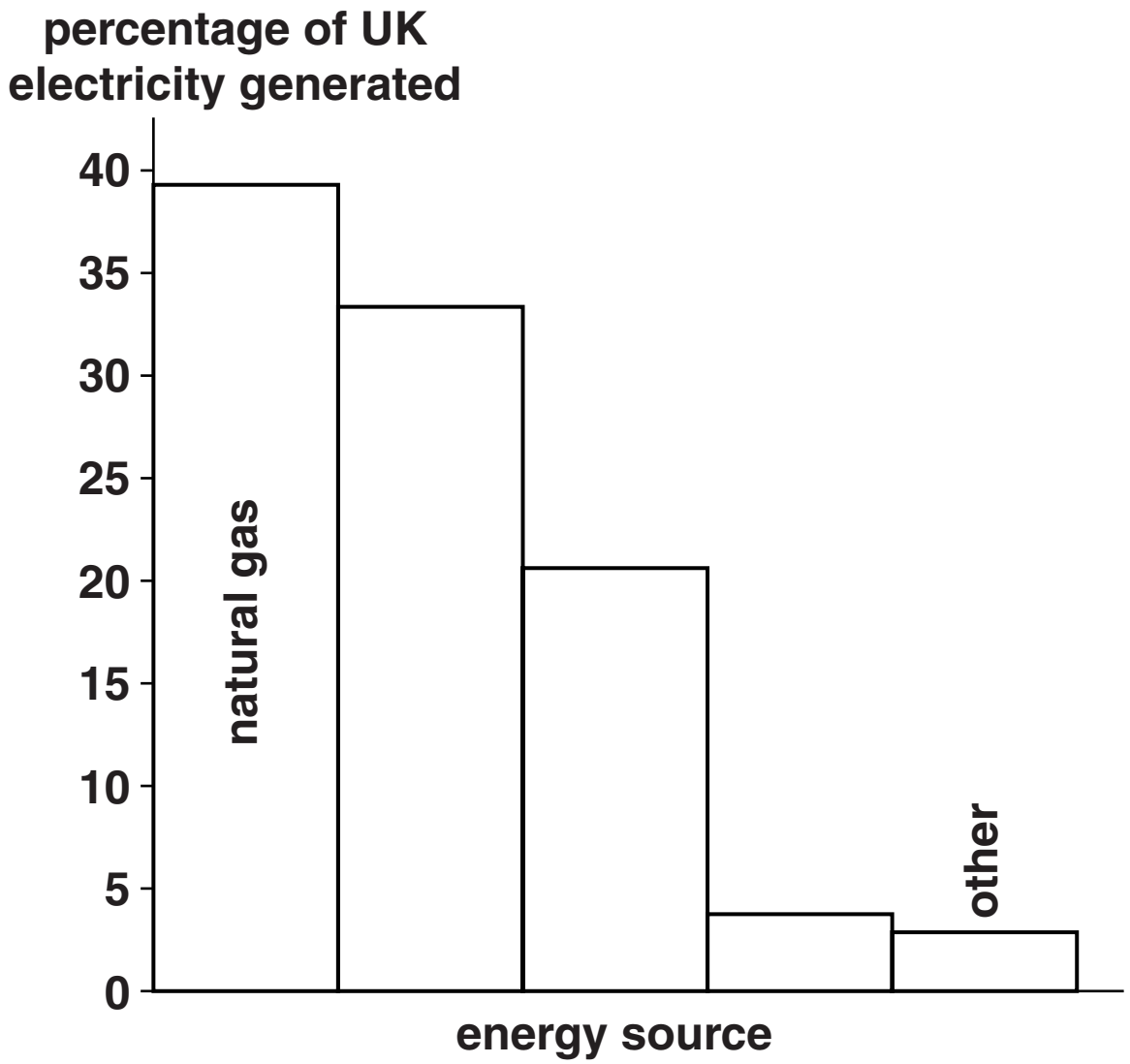
3 Several energy sources are used to generate electricity in the UK.

Look at the table.

ENERGY SOURCE	PERCENTAGE OF UK ELECTRICITY GENERATED
coal	33.4
natural gas	39.3
nuclear	20.6
renewable	3.8
other	2.9

(a) Complete the labels on the bar graph.

Two have been done for you.



[1]

(b) NUCLEAR power stations use a fuel to produce energy.

(i) Write down the name of the nuclear fuel.

_____ **[1]**

(ii) The fuel releases heat during a nuclear reaction.

Write down the name of this reaction and describe what the heat is used for.

_____

_____

_____ **[2]**

(c) Scientists working in the nuclear industry make materials radioactive.

How do they do this?

_____

_____ **[1]**

[Total: 5]

4 ULTRASOUND is used in hospitals.

Ultrasound has a very high frequency.

(a) What does FREQUENCY mean?

_____

_____ **[1]**

(b) Write down one USE for ultrasound in hospitals.

_____

_____ **[1]**

[Total: 2]

5 Static electricity has many uses.

(a) One use of static electricity is in defibrillators.

The paddles of the defibrillator are charged.

(i) Describe how the doctor restarts the patient's heart.

In your answer write about

- **what the doctor does with the charged paddles**
- **how she makes sure charge reaches the heart.**

_____

_____

_____ **[2]**

(ii) What happens to the heart when the charge passes through it?

_____ **[1]**

(b) Static electricity can be DANGEROUS.

Describe ONE SITUATION where static electricity is dangerous.

_____

_____ **[1]**

[Total: 4]

SECTION B – MODULE P5

6 Natural satellites and artificial satellites orbit the Earth.

(a) The Earth has only one NATURAL satellite.

Write down its name.

_____ **[1]**

(b) Artificial satellites are built by people.

They are held in orbit around the Earth by a FORCE.

(i) Write down the NAME of this force.

_____ **[1]**

(ii) Write down one USE of an artificial satellite.

_____ **[1]**

[Total: 3]

7 Radio waves and microwaves are used in communications.

Radio waves carry signals from a transmitter to a radio receiver.

Look at the diagram opposite.

(a) The mountain is between the transmitter and the radio receiver.

(i) The radio waves from the transmitter reach the radio receiver.

Suggest TWO ways the radio waves get to the receiver.

_____

_____

_____

_____ **[2]**

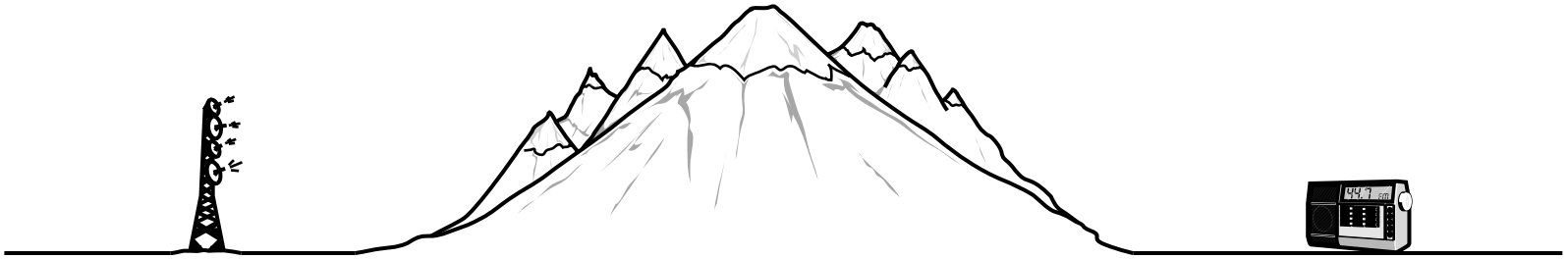
(ii) Which part of the radio receives the radio signals?

_____ **[1]**

(iii) Satellite TV signals are sent by transmitters.

What is needed to collect and receive these satellite signals?

_____ **[1]**



transmitter mountain radio receiver

(b) Microwaves have a wavelength of about 0.5 cm.

How is the WAVELENGTH of radio waves DIFFERENT?

_____ **[1]**

[Total: 5]

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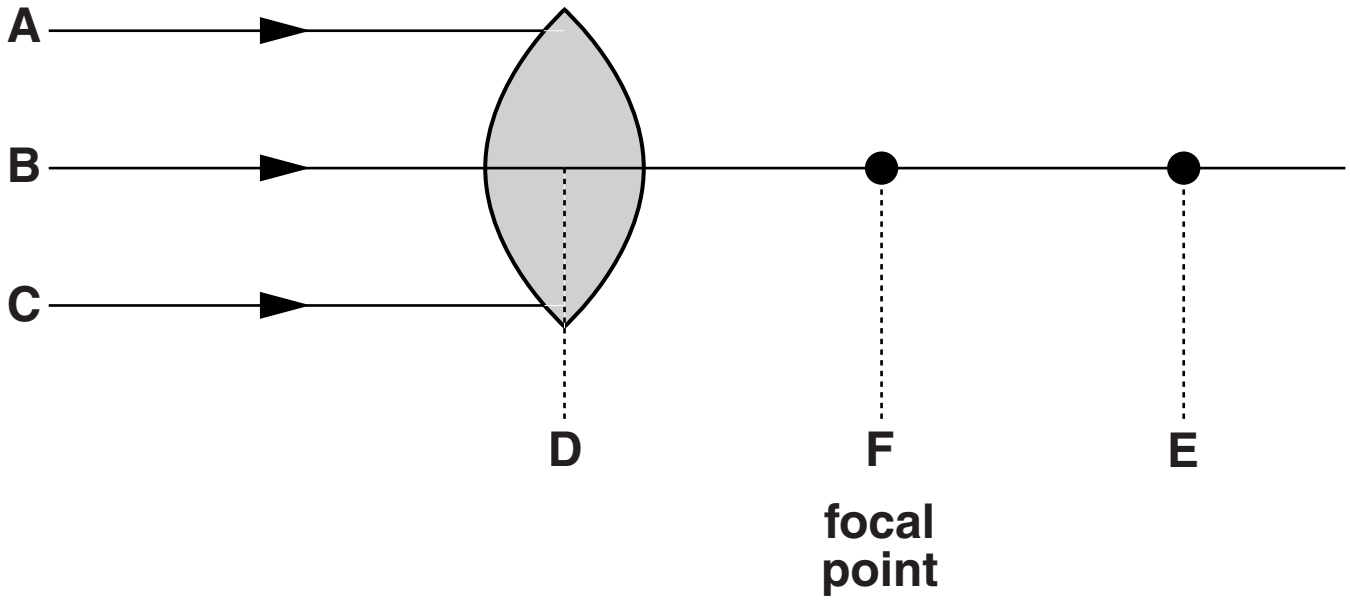
8 Look at the diagram of a convex (converging) lens.

Three rays of light, A, B and C, pass through the lens.

(a) (i) Complete the ray diagram. One ray has been done for you.



[1]

(ii) Complete the sentence.

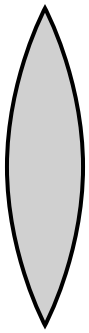
The FOCAL LENGTH of this lens is the distance

between letter _____ and letter

_____ .

[1]

(iii) This fat lens is replaced by a THINNER convex lens.



What, if anything, will happen to the focal length?

_____ **[1]**

(b) Convex lenses are useful.

Write about one use for a convex lens.

In your answer

- **name the device that uses the convex lens**
- **name the type of image made**
- **describe where the image is produced.**

_____

_____

_____

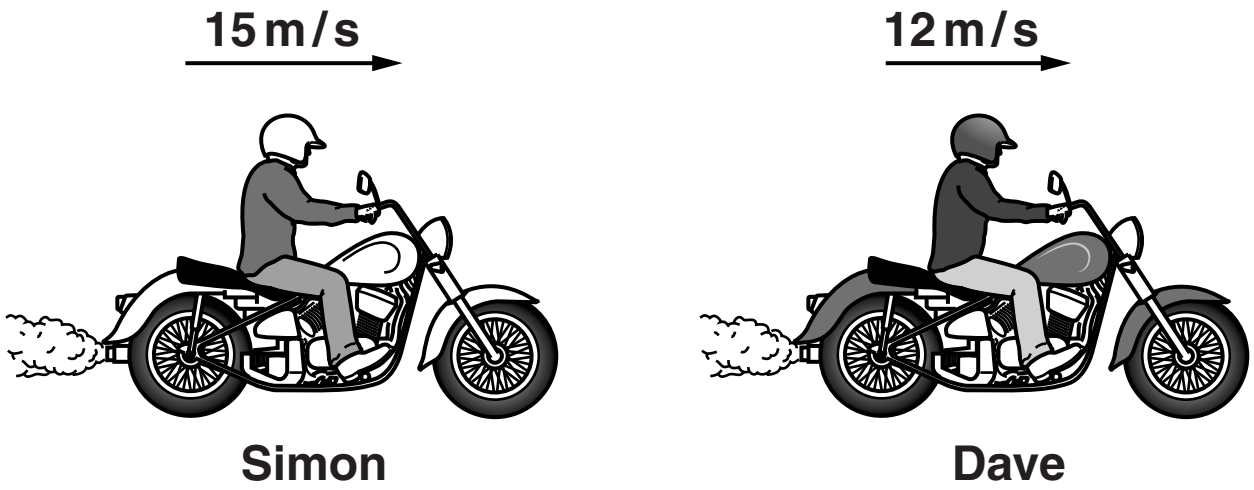
_____ **[2]**

[Total: 5]

9 Simon and Dave are riding bikes.

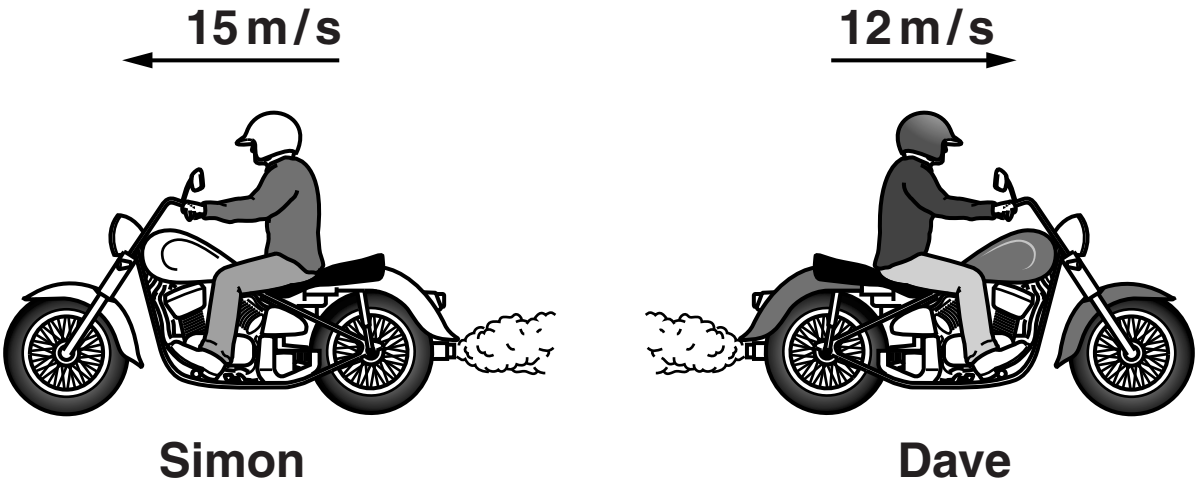
They are moving in the SAME direction.

Look at the diagram.



(a) Simon turns his bike around and moves in the opposite direction.

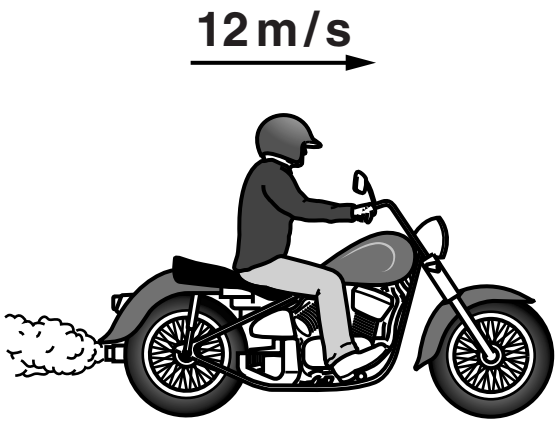
Look at the diagram.



What happens to the RELATIVE speed of the bikes?

_____ **[1]**

(b) Look at the diagram of Dave riding his bike.



Dave has a mass of 80 kg and his bike has a mass of 220 kg.

His speed is 12 m/s.

Calculate the MOMENTUM of Dave and his bike.

The equations on page 3 may help you.

_____

_____

answer _____ kg m/s [2]

(c) Dave's initial speed is 12 m/s.

He accelerates at 0.5 m/s^2 for 5 s.

Calculate Dave's FINAL speed.

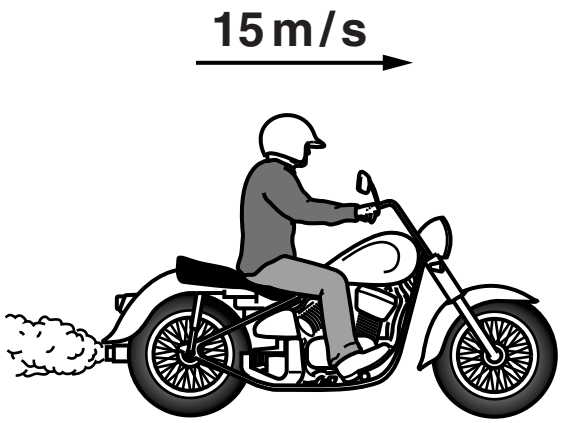
The equations on page 3 may help you.

_____

_____

answer _____ m/s [2]

(d) Look at the diagram of Simon riding his bike.



Simon ACCELERATES from 15 m/s to 33 m/s.

This takes 12 s.

Calculate the DISTANCE travelled during this acceleration.

The equations on page 3 may help you.

_____

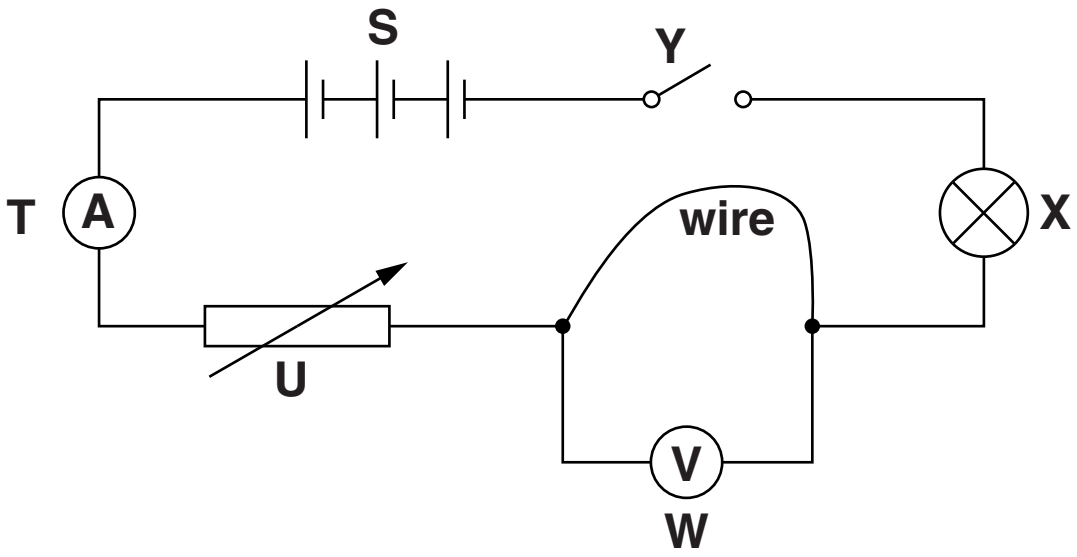
_____

answer _____ m [2]

[Total: 7]

SECTION C – MODULE P6

10 Asif sets up a circuit.



(a) (i) Which circuit symbol represents a SWITCH?

Choose from

S

T

U

W

X

Y

answer _____ [1]

(ii) Which circuit symbol represents a VARIABLE RESISTOR?

Choose from

S

T

U

W

X

Y

answer _____ **[1]**

(b) When the circuit is complete Asif writes down two measurements

- **current through the wire = 0.4 A**
- **voltage across the wire = 8V.**

Calculate the RESISTANCE of the wire.

The equations on page 3 may help you.

_____

_____

_____

_____

answer _____ Ω **[2]**

(c) Asif put a DIFFERENT piece of wire in the circuit.

The new wire has a resistance of 30 Ω.

After the circuit has been complete for several minutes the wire becomes hot.

What could the resistance be when the wire is hot?

Choose from

15

25

30

35

answer _____ Ω **[1]**

[Total: 5]

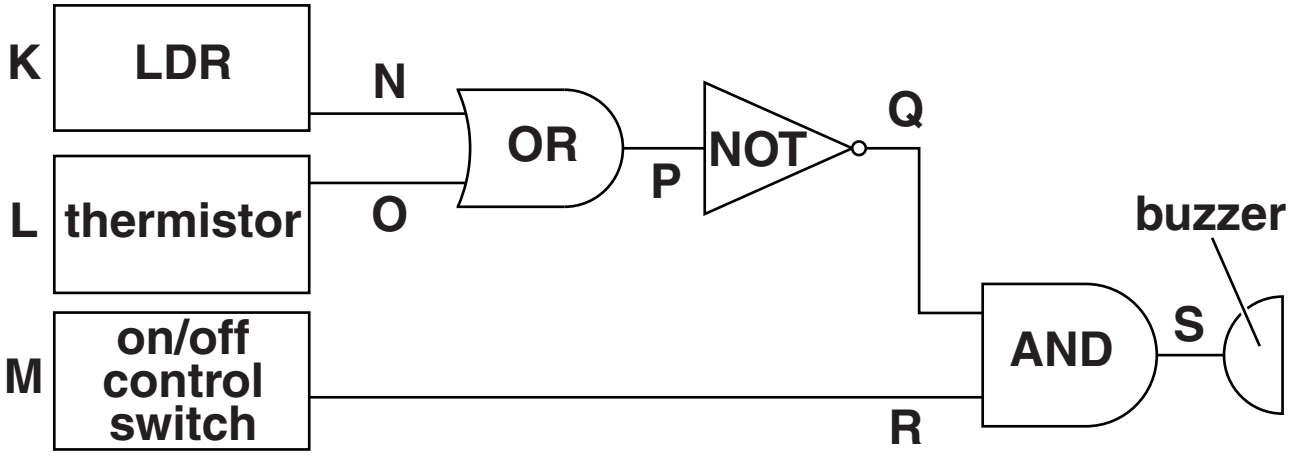
11 Georgina grows tomatoes in large greenhouses.

She wants to protect the tomatoes.

She designs an electronic system with three logic gates.

A buzzer sounds if it gets too COLD during the NIGHT.

Look at the diagram of the electronic system.



(a) (i) Which letter shows the output of the WHOLE system?

answer _____ [1]

(ii) What do the LDR and thermistor respond to?

Complete the sentences.

The LDR responds to a change in

_____ .

The THERMISTOR responds to a change in

_____ . [2]

(b) (i) Complete the sentence about the INPUT SIGNAL to logic gates.

The input signal to a logic gate is a high or a

low _____ . **[1]**

(ii) Truth tables describe how logic gates work.

Complete the sentences to describe the truth table for a NOT gate.

When the input is _____ the

output is _____ .

When the input is _____ the

output is _____ . **[2]**

(c) (i) Georgina adds another component to the system.

This keeps the buzzer sounding once it is triggered.

Write down the NAME of this component.

_____ [1]

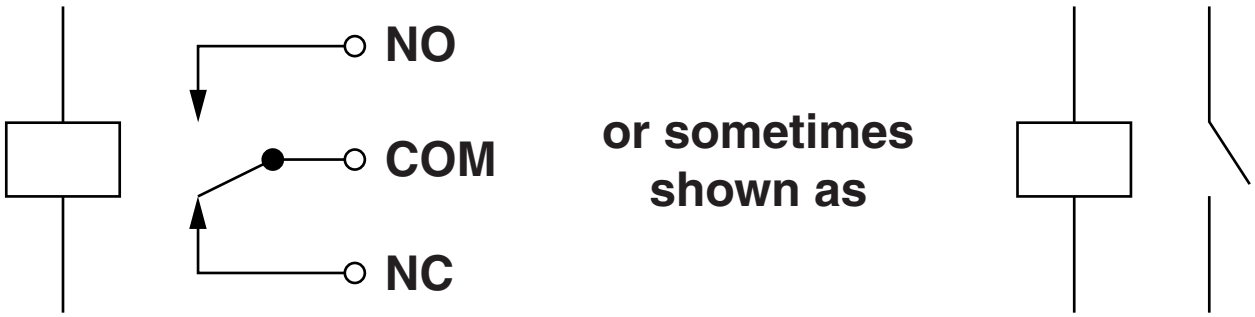
(ii) Georgina thinks that the system can be improved further.

A heater can be turned on automatically instead of sounding the buzzer.

The heater runs on mains electricity.

Another component is needed to link the logic circuit and the mains circuit.

Here are two different symbols for the same component.



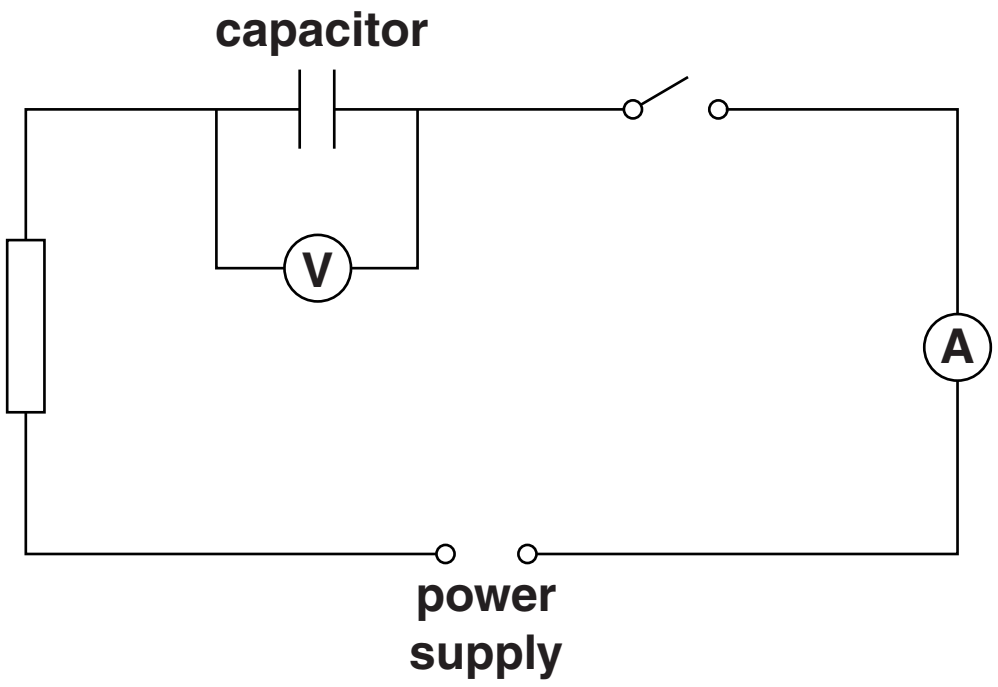
Write down the NAME of this component.

_____ **[1]**

[Total: 8]

12 Jonas sets up a circuit to investigate a CAPACITOR.

Look at the circuit.



Describe what happens when the circuit is switched on.

In your answer include ideas about

- **charge**
- **voltage.**

_____

_____

_____

_____ **[3]**

[Total: 3]

13 This question is about transformers and electric motors.

(a) Transformers are used in many everyday appliances.

There are three types of transformer

- **step up**
- **isolating**
- **step down.**

(i) Which type is used in a bathroom shaver socket?

answer _____ [1]

(ii) Explain how this type of transformer makes the circuit safer.

_____

_____ [1]

(b) Electric motors are used in many household appliances, such as washing machines.

(i) Write down the name of one OTHER appliance in the home that has an electric motor in it.

_____ [1]

(ii) Electric motors spin when SUPPLIED with an electric current.

If the motor is made to spin it PRODUCES an electric current.

Complete the sentence.

The motor is now working in reverse and is

acting as a _____ . [1]

[Total: 4]

END OF QUESTION PAPER

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