

Surname	Initial(s)
Signature	

Paper Reference(s)

5009 5045

Edexcel GCSE

Science (5009)

Physics (5045)

P1a – Topics 9 and 10

Foundation and Higher Tier

Friday 20 November 2009 – Morning

Time: 20 minutes

Materials required for examination

Multiple Choice Answer Sheet
HB pencil, eraser and calculator

Items included with question papers

Nil

Instructions to Candidates

Use an HB pencil. Do not open this booklet until you are told to do so.
Mark your answers on the separate answer sheet.

Foundation tier candidates: answer questions 1 – 24.

Higher tier candidates: answer questions 17 – 40.

All candidates are to answer questions 17 – 24.

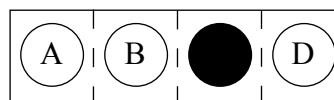
Before the test begins:

Check that the answer sheet is for the correct test and that it contains your candidate details.

How to answer the test:

For each question, choose the right answer, A, B, C or D
and mark it in HB pencil on the answer sheet.

For example, the answer C would be marked as shown.



Mark only **one** answer for each question. If you change your mind about an answer, rub out the first mark **thoroughly**, then mark your new answer.

Do any necessary calculations and rough work in this booklet. You may use a calculator if you wish.

You must not take this booklet or the answer sheet out of the examination room.

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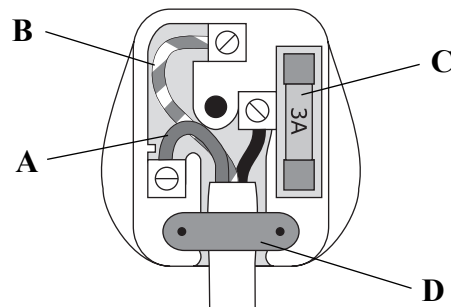
**Questions 1 to 16 must be answered by Foundation tier candidates only.
Higher tier candidates start at question 17.**

Physics in the home

Martin has bought a new television and DVD player.



1. The diagram shows the inside of the mains plug of the DVD player.



Which is the fuse?

2. The wire connected to the metal case of the DVD player is called

- A the earth wire
- B the neutral wire
- C the live wire
- D the fuse wire

3. Martin's new television is more efficient than his old one.
This means that the new television

- A wastes less energy as heat
- B wastes more energy as heat
- C uses a lower voltage
- D does not need a fuse

4. The power rating of Martin's new television is 120 W.
This means that in one second the new television will use

- A 120 J of energy
- B 120 V of energy
- C 120 A of energy
- D 120 Ω of energy

Battery power

5. Which of these does **not** have a battery for power?
- A a washing machine
 - B a mobile phone
 - C an MP3 player
 - D a TV remote control
6. Some people use rechargeable batteries instead of non-rechargeable ones. One advantage of rechargeable batteries is that
- A they never need to be replaced
 - B they supply free energy
 - C they can be used more than once
 - D they never run out of charge
7. The current from a battery is
- A alternating
 - B positive
 - C neutral
 - D direct

Use this information to answer questions 8 to 10.

Remi is choosing a non-rechargeable battery for his camera.
Here is some information about suitable batteries.

type	capacity in mAh	cost in £
Apex	600	4
Bettabat	200	5
Cell4U	2700	7
Durabat	1400	10

8. Which battery will keep his camera working for the longest time?

- A Apex
- B Bettabat
- C Cell4U
- D Durabat

9. Remi's camera will work for 1 hour with a Bettabat battery.
With an Apex battery, it would last

- A 0.3 hours
- B 3 hours
- C 6 hours
- D 12 hours

10. Remi tries each of the batteries listed in the table in his camera.
Which of these is correct?

- A the cheapest battery will last longest
- B the cheapest battery will run out quickest
- C the most expensive battery will last longest
- D there is no pattern linking capacity and cost

Solar power

This information about solar panels is from a website.

A solar panel system can be used to generate electricity for the home.
Prices for these systems vary, depending on the power output.
A system costs about £6000 for each kW of power generated.

11. How much does it cost for a system that can generate 3 kW?
- A about £ 2000
 - B about £ 6000
 - C about £12000
 - D about £18000
12. Which of these is an advantage of using solar panels to generate electricity for the home?
- A They only work in daylight
 - B They are expensive to install
 - C They are shiny and good reflectors of light
 - D They do not produce any harmful gases
13. The useful energy change in the solar panel is
- A light energy → electrical energy
 - B light energy → kinetic energy
 - C electrical energy → light energy
 - D kinetic energy → electrical energy

Generating electricity

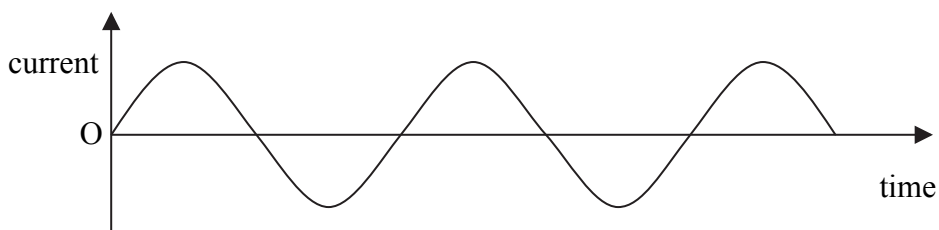
Trevor has a wind-up radio which contains a generator.



One minute of winding will power the radio for 20 minutes.

The electric current to charge the battery in the radio is produced by the generator.

14. The generator produces a current because
- A a chemical reaction takes place in a coil of wire
 - B light energy releases electrons in a coil of wire
 - C a magnet moves near a coil of wire
 - D an insulator rubs against a coil of wire
15. Which of these is a reason for using a wind-up radio instead of a battery-powered radio?
- A Batteries are cheap and easy to replace
 - B Batteries use old fashioned technology
 - C Wind-up radios are more expensive than similar battery-powered radios
 - D Wind-up radios cost nothing to run
16. The graph shows a current in part of the radio.



This type of current is

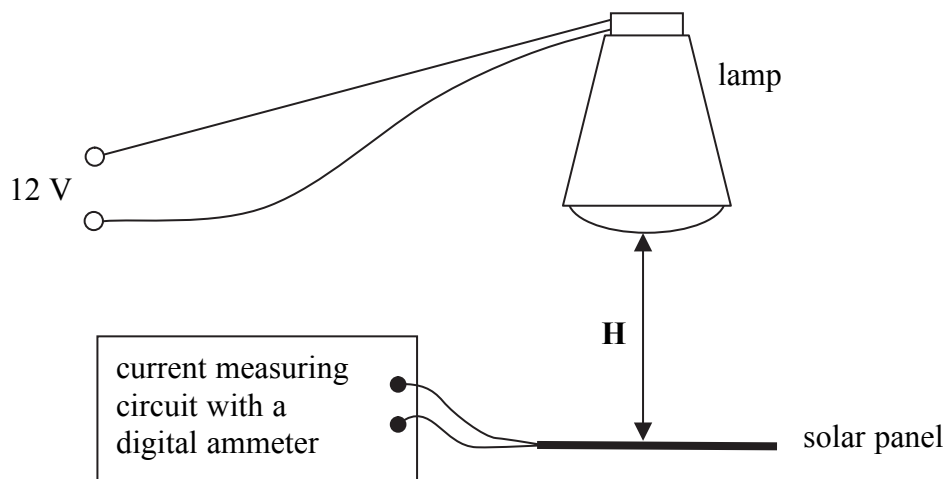
- A indirect
- B alternating
- C direct
- D static

Higher tier candidates start at question 17 and answer questions 17 to 40.
Questions 17 to 24 must be answered by all candidates: Foundation tier and Higher tier.

Investigating solar panels

Use this information to answer questions 17 to 20.

Kelly and her friends investigate how the brightness of light affects the output current from a solar panel.



The students raise or lower the lamp to vary the brightness of light reaching the solar panel. This changes the height **H**.

17. The students discuss their investigation.

We found that increasing height **H** decreases the output current.

Kelly

Increasing height **H** will decrease the output current.

Linda

The digital ammeter shows the output current.

Mark

We should keep the lamp voltage constant during the investigation.

Nadine

Who has made a prediction for the investigation?

- A Kelly
- B Linda
- C Mark
- D Nadine

18. In this investigation, the dependent variable is

- A the height **H**
- B the output current from the solar panel
- C the voltage across the lamp
- D the brightness of the lamp

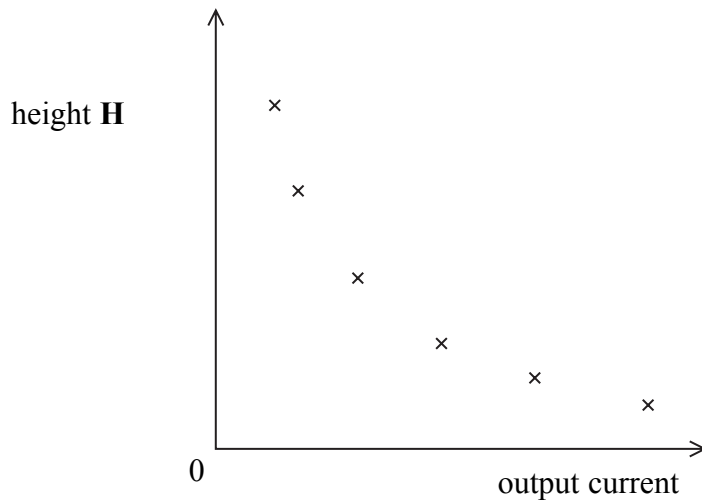
19. These are the students' readings of output current for one value of **H**.

31 mA 34 mA 31 mA 4 mA

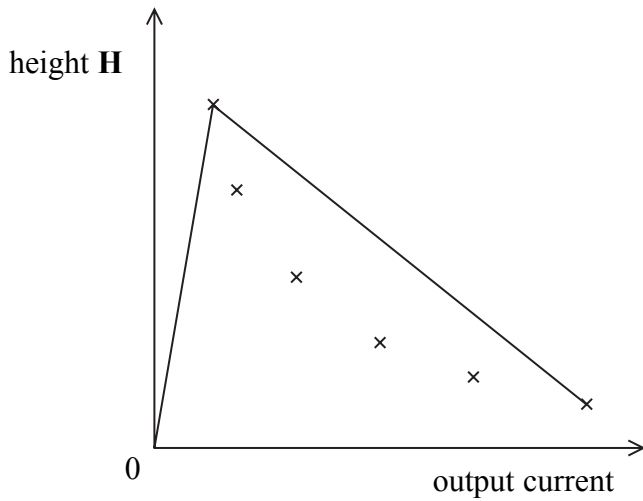
The average current the students should use for their graph is

- A 34 mA
- B 32 mA
- C 25 mA
- D 24 mA

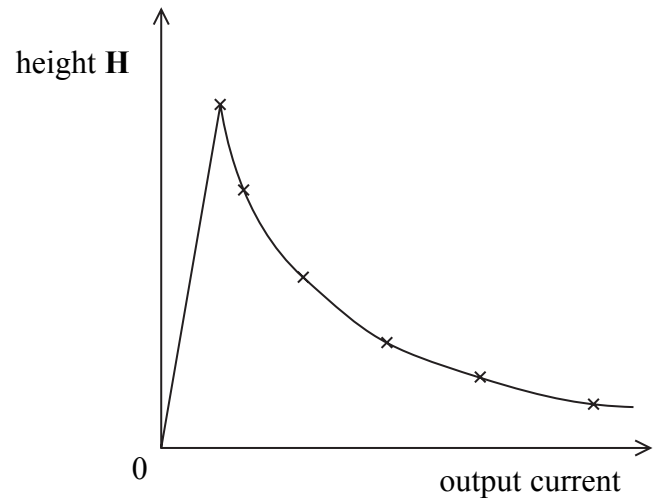
20. Kelly plotted a graph like this



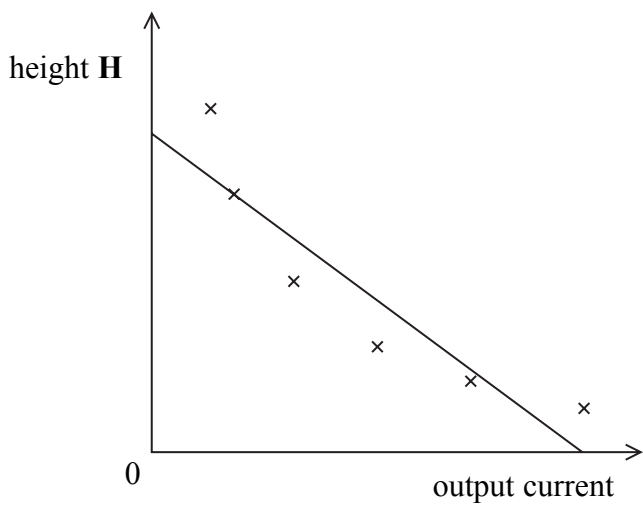
Which of these shows the line of best fit that Kelly should draw?



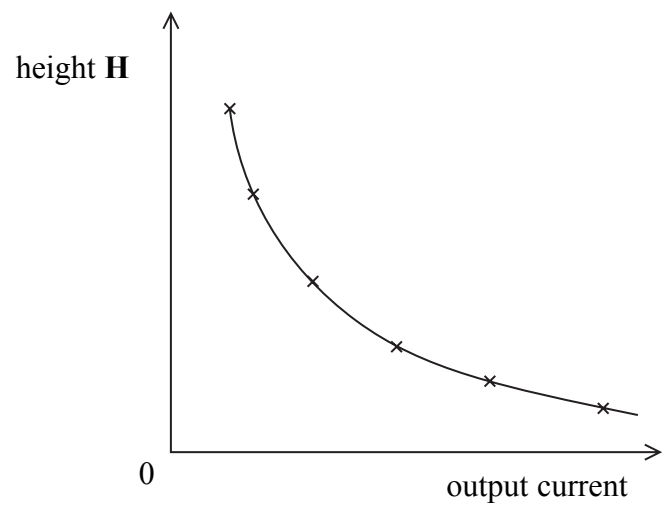
A



B



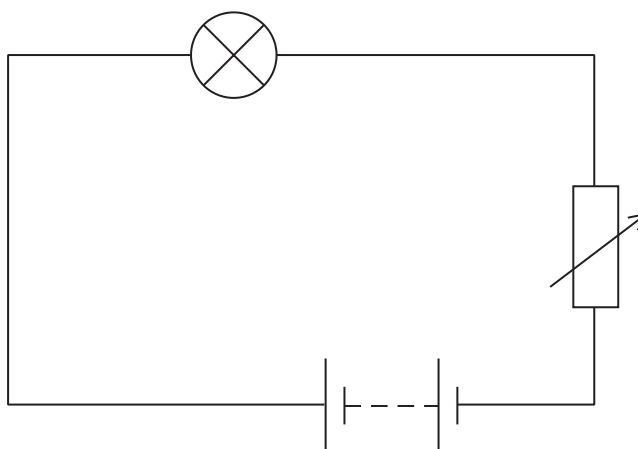
C



D

Electric circuits

Dave investigates the current in a lamp.
Here is part of his circuit.



Dave uses the variable resistor to change the current.

21. Dave wants to measure the current in the lamp.
He should connect

- A a voltmeter in series with the lamp
- B a voltmeter in parallel with the lamp
- C an ammeter in series with the lamp
- D an ammeter in parallel with the lamp

22. Which row of the table is correct for Dave's circuit?

	brightness of the lamp	resistance of the variable resistor	current in the lamp
A	brighter	larger	higher
B	dimmer	larger	lower
C	brighter	smaller	lower
D	dimmer	smaller	higher

23.

$$\text{power} = \text{current} \times \text{voltage}$$

Dave sets the voltage across the lamp to 10 V.

The current in the lamp is 2 A.

What is the power output of the lamp?

- A 0.2 W
- B 5 W
- C 12 W
- D 20 W

24.

$$\text{efficiency} = \frac{\text{useful output}}{\text{total input}} \times 100\%$$

The lamp transfers 100 J of electrical energy into

- 98 J of thermal energy
- 2 J of light energy

What is the efficiency of the lamp?

- A 0.98%
- B 2.00%
- C 49.0%
- D 98.0%

TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

Foundation tier candidates do not answer any more questions after question 24.

**Questions 25 to 40 must be answered by Higher tier candidates only.
Foundation tier candidates do not answer questions 25 to 40.**

Measuring temperature

Alice and Bev investigate the cooling of some liquids.

Instead of using an ordinary thermometer, they use a temperature probe connected to a data logger.

25. Which of these is designed to give large changes in resistance for small changes in temperature?

- A thermistor
- B fixed resistor
- C light dependent resistor
- D filament lamp

26. The students discuss their choice of thermometer.

Readings stored on a data logger will be more reliable than readings from an ordinary thermometer that we write down.

Alice

Using an ordinary thermometer instead of a temperature probe would make our investigation more valid.

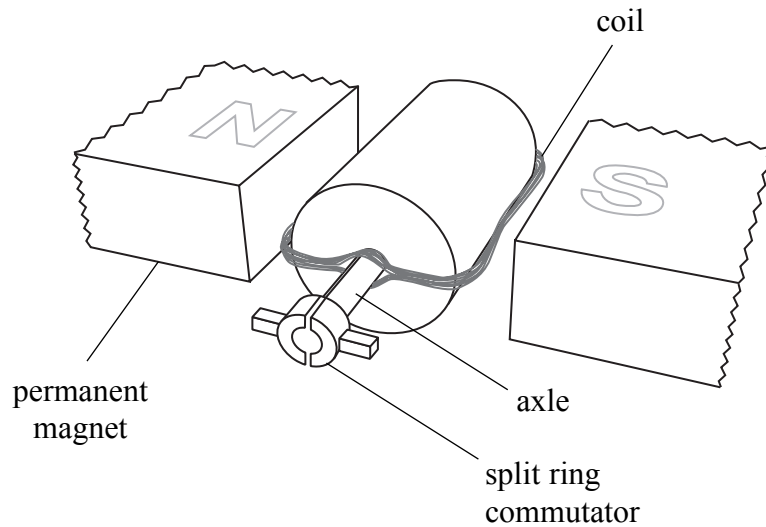
Bev

Who is correct?

- A Alice only
- B Bev only
- C both Alice and Bev
- D neither

Electric motors

Reza researches electric motors.
The diagram shows a simple electric motor.



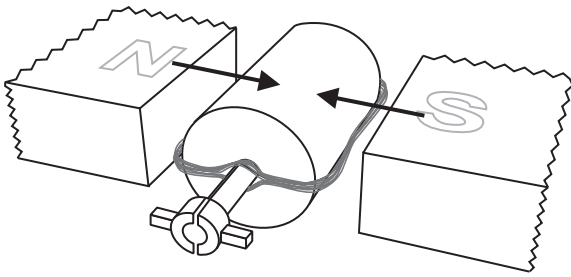
27. Which row of the table is correct for the commutator?

	as the coil spins the commutator	effect on the coil
A	reverses the current in the coil every half turn	keeps the turning effect on the coil in the same direction
B	reverses the poles of the permanent magnet	keeps the turning effect on the coil in the same direction
C	reverses the poles of the permanent magnet	reverses the turning effect on the coil every half turn
D	reverses the current in the coil every half turn	reverses the turning effect on the coil every half turn

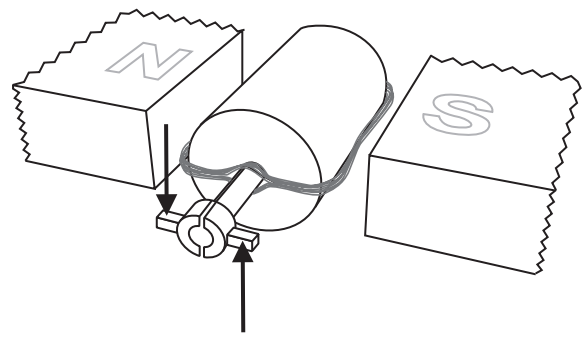
28. Reza wants his motor to go faster.
He makes some changes.
For which row of the table will **both** changes make the motor go faster?

	number of turns on the coil	strength of the magnets
A	decrease	increase
B	decrease	decrease
C	increase	increase
D	increase	decrease

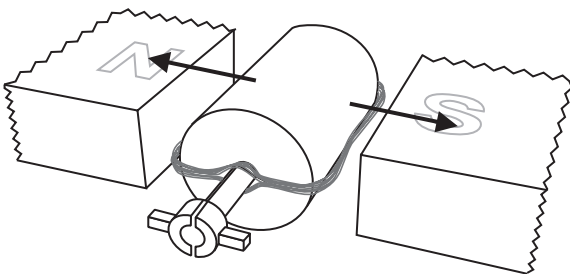
29. Which diagram correctly shows the forces that make a coil of an electric motor spin?



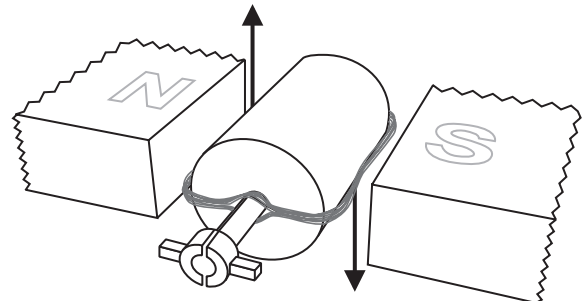
A



B



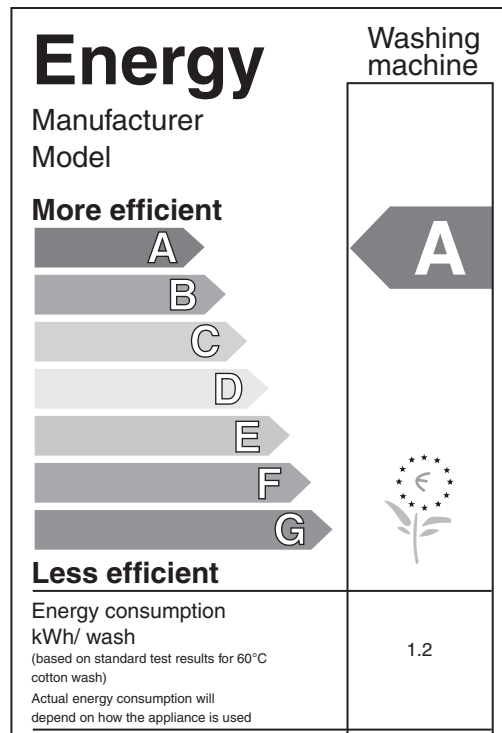
C



D

Domestic electricity

Kallum has bought a new washing machine.
This label gives information about Kallum's new washing machine.



30. Kallum's washing machine is given an A for efficiency.
A machine with G for efficiency

- A uses less energy per wash
- B uses the same energy per wash
- C uses more energy per wash
- D can do two washes for the same energy

31.

$$\text{cost} = \text{power} \times \text{time} \times \text{cost of 1 kWh}$$

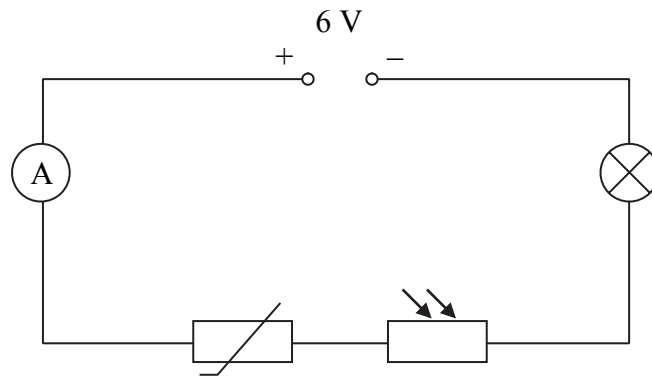
Kallum's washing machine uses 1.2 kWh of electrical energy per wash.
Each 1 kWh of electrical energy costs 10p.
How many washes can be done for £6.00?

- A 12 washes
- B 50 washes
- C 60 washes
- D 72 washes

32. Kallum's washing machine is protected by a residual current circuit breaker (RCCB). An RCCB works by detecting a difference between
- A the voltages in the live and neutral wires
 - B the voltages in the live and earth wires
 - C the currents in the live and neutral wires
 - D the currents in the live and earth wires

Electric circuits

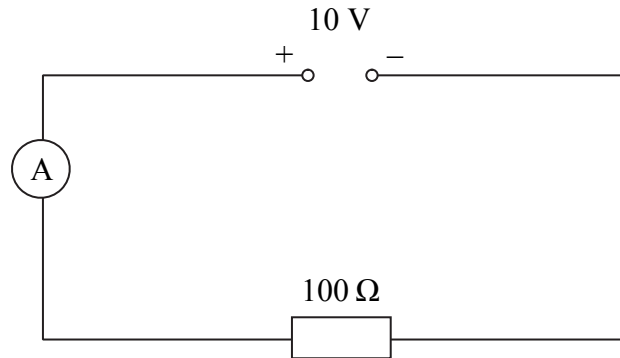
33. Peter sets up this circuit.



Which row of the table will produce the lowest current in the lamp?

	temperature of thermistor ($^{\circ}\text{C}$)	light shining on LDR (units of brightness)
A	100	0
B	0	0
C	100	10
D	0	10

34. Alan measures the current from the battery in this circuit.



The current is 0.1 A.

Alan adds a $1000\ \Omega$ resistor in parallel with the $100\ \Omega$ resistor.

The current from the battery will now be

- A about ten times smaller
- B slightly smaller
- C the same
- D slightly larger

- 35.

$\text{power} = \text{current} \times \text{voltage}$

Jody uses an electric screwdriver.

Its average power is 24 W.

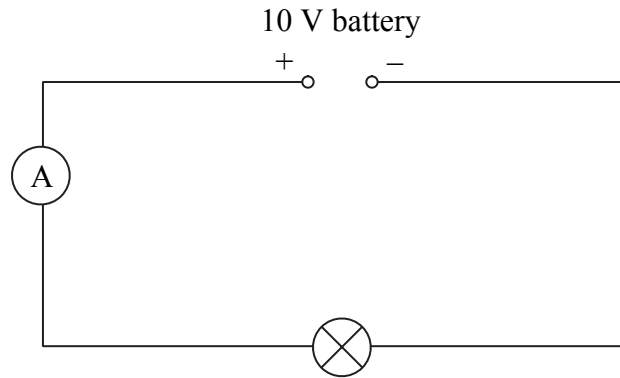
The battery for the screwdriver is labelled

12 V
1.2 amp-hours

How long can a fully charged battery keep the screwdriver working?

- A 14.4 hours
- B 10.0 hours
- C 2.4 hours
- D 0.6 hours

36. Four students discuss this circuit.



The current in the lamp consists of negative charges moving from the negative battery terminal towards the positive battery terminal.

Andy

The current in the lamp is a mixture of positive and negative ions.

Brandon

The current in the lamp consists of negative charges moving towards the positive battery terminal and positive charges moving towards the negative battery terminal.

Charlie

The lamp lights up when two different flows of charges crash into each other.

Denzil

The correct statement is made by

- A Andy
- B Brandon
- C Charlie
- D Denzil

Investigating resistance

Tom and his friends measure the resistances of different lengths of wire.

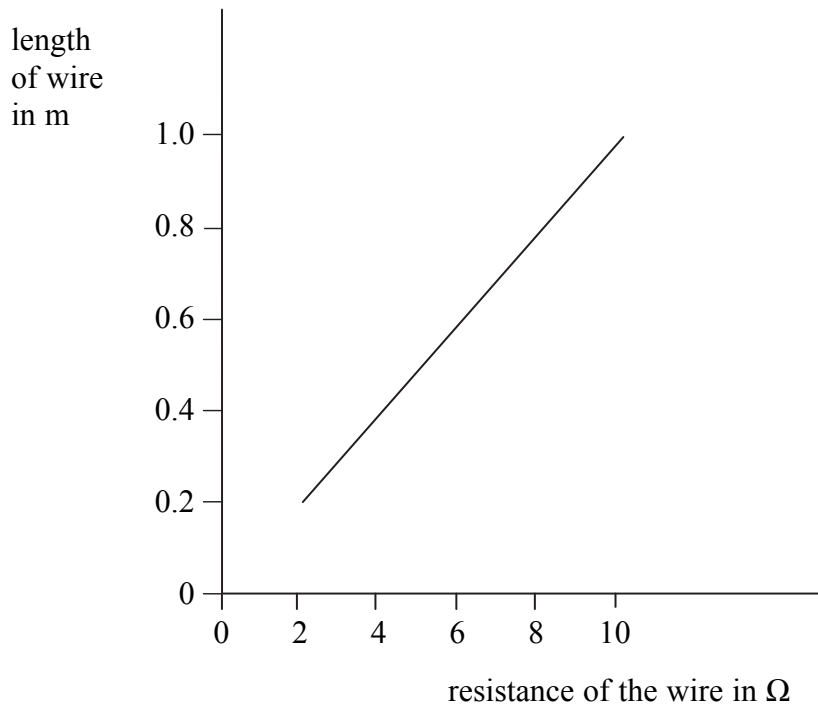
37.

$$V = I \times R$$

Which row of the table gives a correct set of readings for the experiment?

	voltage across the wire (V)	current in the wire (A)	resistance of the wire (Ω)
A	1.2	0.2	6.0
B	1.2	0.2	2.4
C	1.2	0.2	0.24
D	1.2	0.2	0.17

38. The students produced this graph from their readings for a different wire.



The graph shows that

- A** the resistance of the wire halves when its length doubles
- B** the current in the wire is proportional to the voltage across the wire
- C** the resistance of the wire is proportional to its length
- D** a thin wire has more resistance than a thick one

39. Tom and Rick discuss the investigation.

If the temperature of the wire changes, our readings will not be valid.

Tom

If the voltmeter was inaccurate, our readings may not be valid.

Rick

Who is correct?

- A Tom
- B Rick
- C both Tom and Rick
- D neither

40. Tom makes this hypothesis.

'The resistance of a wire depends on the thickness of the wire.'

Which row of the table is correct for a valid test of this hypothesis?

	a control variable	the independent variable	the dependent variable
A	resistance of wire	length of wire	thickness of wire
B	resistance of wire	thickness of wire	length of wire
C	length of wire	resistance of wire	thickness of wire
D	length of wire	thickness of wire	resistance of wire

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

END