P5 level Assessed task 2

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

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

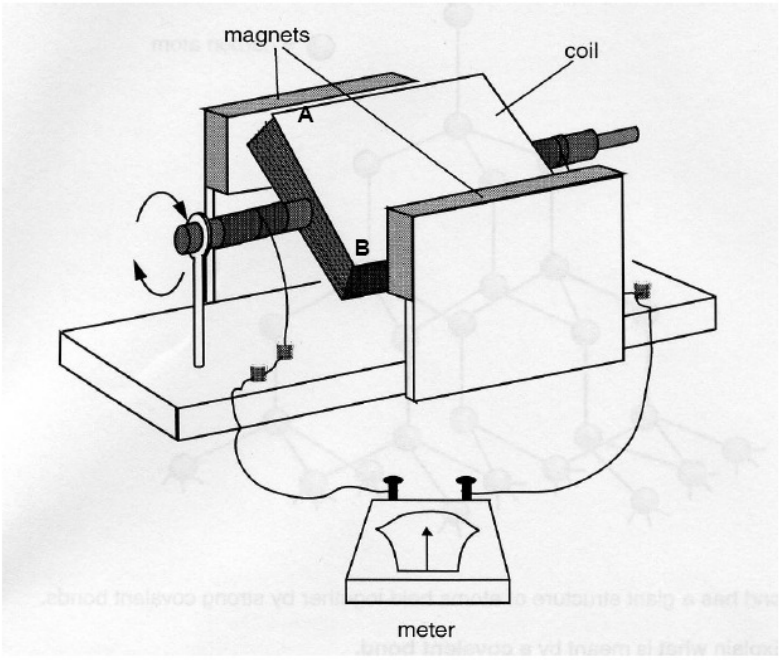
power = potential difference × current

energy transferred = power × time

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

7. Mike builds a simple electrical generator.

The meter needle flicks backwards and forwards as the motor spins.



(a) Write three things that could be increased so that the size of the induced voltage in the coil will be increased.

1. Increase the.....

2. Increase the.....

3. Increase the.....

[3]

(b) The meter measures a very small electric current.

(i) What is the name of the type of electric current produced by the generator?

.....[1]

(ii) When side **A** of the coil moves down it produces a positive current in the meter.

Which of the following statements are correct?

Put a tick (✓) in the correct boxes.

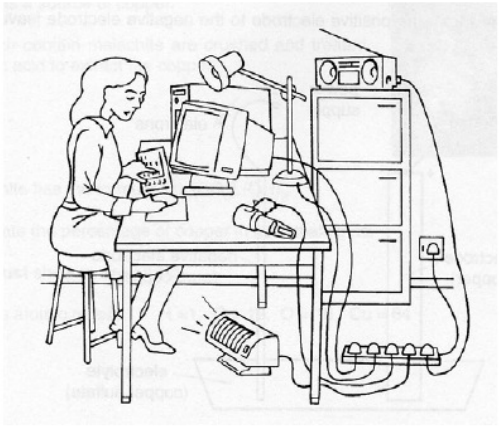
When side **A** moves horizontally it produces a positive current in the meter.	☐
When side **B** moves horizontally it does not produce a current in the meter.	☐
When side **A** of the coil moves down it produces a negative current in the meter.	☐
When side **B** of the coil moves down it does not produce a current in the meter.	☐
When side **B** of the coil moves up it produces a positive current in the meter.	☐
When side **A** of the coil moves up it produces a negative current in the meter.	☐

[3]

[Total: 7]

8. Anya is working on her computer.

She has several electrical devices plugged in to one multisocket.



(a) The table below shows the power rating of each device.

Device	**Power rating**
Heater	2000 W
Computer system	300 W
Lamp	60 W
Stereo system	30 W
Total	2390 W

The total energy transferred by all these devices is 5.78 KW/h.

(i) Write down the equation needed to calculate the time Anya works for.

.....[1]

(ii) Which of the following calculations will give the time Anya was working for?

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

Time = 5.78 x 2390 ☐

Time = 2390 ÷ 5.78 ☐

Time = 5.78 x 2390 ☐

Time = 2390 ÷ 5780 ☐

Time = 5780 ÷ 2390 ☐

[1]

(iii) After a coffee break Anya works for another two and a quarter hours.

Electricity costs 6p per kilowatt hour.

Calculate the cost of running all the devices for two and a quarter hours.

Cost = ...[1]

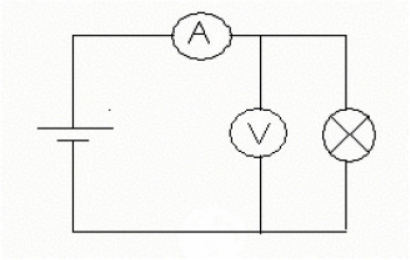
(b) The multisocket has a fuse rated at 13 A. The electricity supply is 230 V.

Calculate the power that would be being transferred from the supply if 13 A was passing through the fuse.

9. Anna's dad builds a tree house.

Anna wants a light inside the tree house.

(a) Anna connects this circuit.



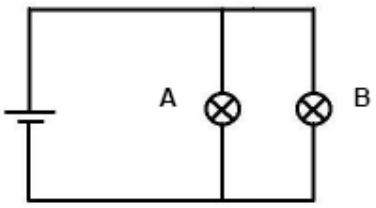
The reading on the voltmeter is 12 V, the ammeter reads 0.4 A.

Calculate the resistance of the lamp.

Use the correct equation from the front of this exam paper.

Resistance ..... Ohms [1]

She adds a second lamp in parallel with the first lamp.



The two lamps glow equally brightly.

Which of the following statements are correct?

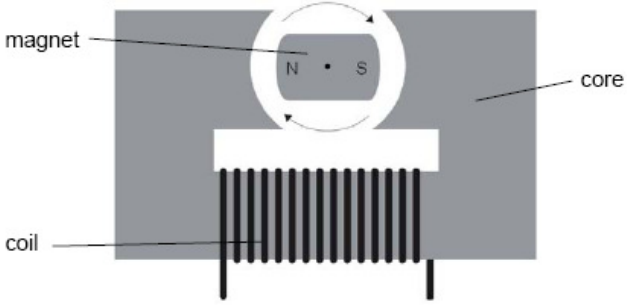
Put a tick (✓) in the correct boxes.

The lamps have different resistances.	☐
The current through each lamp is the same as if it were the only lamp present.	☐
The potential difference across each lamp is different.	☐
An extra battery in parallel will increase the current through the lamps.	☐
An extra battery in series will increase the voltage across the lamps.	☐

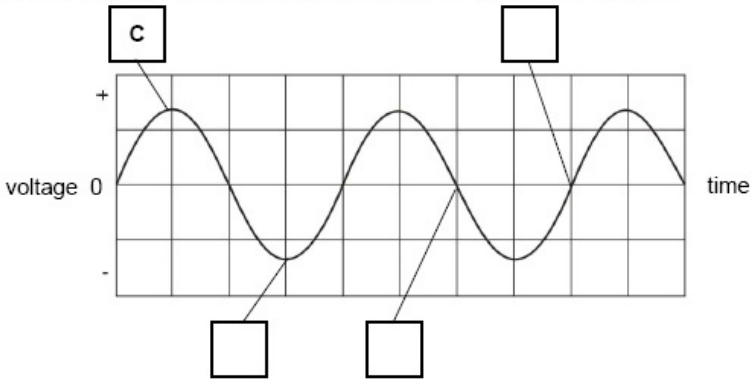
[2]

[Total: 3]

7 This question is about generating mains electricity by rotating magnets.



(a) Here is a voltage-time graph for the coil when the magnet is rotating.



Add these labels to the graph. One has been done for you.

A lowest magnetic field in the coil

B highest magnetic field in the coil

C increasing magnetic field in the coil

D decreasing magnetic field in the coil

[2]

(b) How could you make the output voltage smaller?

Which of the statements **A**, **B**, **C** or **D** is correct?

A use a stronger magnet

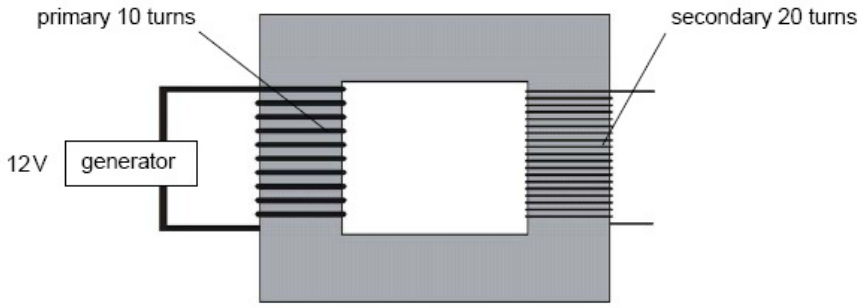
B rotate the magnet faster

C have more turns of wire in the coil

D use copper instead of iron for the core

answer ..... [1]

(c) The output of the generator is connected to a transformer.



The primary coil has 10 turns and is connected to the generator.
The secondary coil has 20 turns.

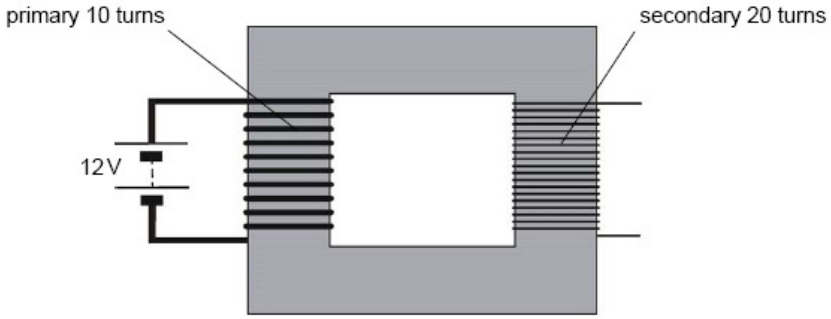
What is the voltage across the secondary coil when the generator voltage is 12V?

Put a ring around the correct answer.

0V **6V** **12V** **24V**

[1]

(d) The generator is replaced with a 12V battery.



What is the voltage across the secondary coil now?

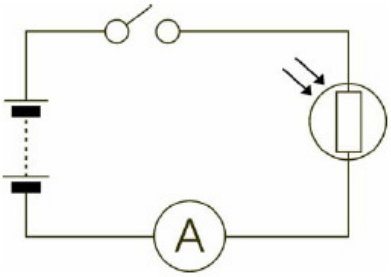
Put a ring around the correct answer.

0V **6V** **12V** **24V**

[1]

[Total: 5]

8 Ann builds this electric circuit.



(a) Add a **voltmeter** to the circuit to measure the battery voltage.

Use the correct symbol.

[1]

(b) Here are some statements about Ann's circuit.

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

The battery is a source of direct current.	☐
There is only a voltage across the battery when the switch is closed.	☐
The ammeter measures the energy of the charge moving in the circuit.	☐
The current in the circuit depends on the amount of light shining on the LDR.	☐

[2]

(c) Ann closes the switch.

The current in the circuit = 0.12 A.
The voltage across the LDR = 9 V.

Here are some calculations for the resistance of the LDR.

Put a (ring) around the correct calculation.

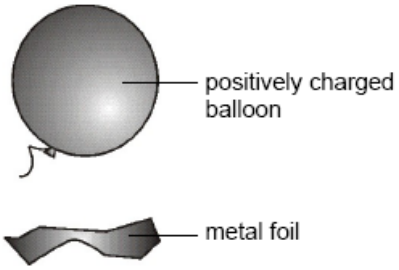
$\frac{9}{0.12} = 75\,\Omega$ $\qquad$ $9 \times 0.12 = 1.1\,\Omega$ $\qquad$ $\frac{0.12}{9}$ $0.013\,\Omega$

[1]

[Total: 4]

(b) Dan now holds the positively charged balloon above a thin piece of metal foil.

The foil moves up and sticks to the balloon.



The sentences explain why this happens. They are in the wrong order.

A Electrons move to the top of the foil.

B The foil moves up towards the balloon.

C Electrons in the foil are attracted to the balloon.

D The top of the foil becomes negatively charged.

E The force between the foil and the balloon is now more than the weight of the foil.

Fill in the boxes to show the correct order. The first one has been done for you.

C				

[3]

[Total: 5]