

Name of the Student: _____

Max. Marks : 23 Marks

Time : 23 Minutes

Q1.

The photograph shows a toaster.



The toaster is connected to the mains supply using a three-core cable.

(a) What is the function of the earth wire inside the cable?

Tick (✓) **one** box.

To carry the current from the supply to the toaster

To complete the circuit in the toaster

To melt if a fault occurs inside the toaster

To stop the metal case of the toaster becoming live if a fault occurs

(1)

(b) Complete the sentences.

Choose answers from the box.

blue	brown	orange	white	yellow
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The insulation around the earth wire is green and _____ .

The insulation around the live wire is _____ .

The insulation around the neutral wire is _____ .

(3)

- (c) The toaster is switched on for 120 seconds.

The power of the toaster is 850 watts.

Calculate the energy transferred by the toaster.

Use the equation:

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

$$\text{Energy transferred} = \text{_____} \text{ J}$$

(2)

- (d) Complete the sentences.

Choose answers from the box.

chemical	elastic potential	kinetic	thermal
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When bread is lowered into the toaster, a spring is stretched. The stretched spring stores _____ energy.

After the bread is toasted, the spring makes the toast move upwards. As the speed of the toast increases, the _____ energy of the toast increases.

(2)

- (e) Write the equation which links gravitational field strength, gravitational potential energy, height and mass.

(1)

- (f) The toast was moved upwards by the spring.

The change in gravitational potential energy of the toast was 0.049 J

The mass of the toast was 0.050 kg

gravitational field strength = 9.8 N/kg

Calculate the change in height of the toast.

Change in height = _____ m

(3)

(Total 12 marks)

Q2.

A student investigated how the area of a solar panel affected the output potential difference of the solar panel.

The student placed different sized solar panels under a lamp.

The photograph shows a solar panel under a lamp.



(a) Which variable should be controlled?

Tick (✓) **one** box.

The area of the solar panels

The brightness of the lamp

The output potential difference of the solar panels

(1)

(b) The student measured the output potential difference using a voltmeter.

When the voltmeter was **not** connected, the reading on the voltmeter was 0.7 V

What name is given to this type of error?

Tick (✓) **one** box.

Zero error

Random error

Measurement error

(1)

The table shows the results of the investigation.

Solar panel	Area of solar panel in cm ²	Output potential difference in volts			
		Test 1	Test 2	Test 3	Mean
A	10	2.5	2.4	2.6	2.5
B	20	5.0	5.0	4.9	5.0
C	30	7.5	11.9	7.5	7.5
D	50	12.4	12.6	12.5	12.5

(c) The readings for which solar panel show an anomalous result?

Tick (✓) **one** box.

A B C D

(1)

(d) The student did **not** have a solar panel with an area of 40 cm²

Determine the most likely value for the mean output potential difference of a 40 cm² solar cell.

Mean output potential difference = _____ V

(1)

(e) The total input energy transfer to one of the solar panels was 8.0 joules.

The useful output energy transfer was 0.96 joules.

Calculate the efficiency of the solar panel.

Use the equation:

$$\text{efficiency} = \frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$$

Efficiency = _____

(2)

(f) Solar power is a renewable energy resource.

Complete the sentence.

Choose the answer from the box.

burned	replenished	consumed
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A renewable energy resource is one that is _____ as it is used.

(1)

(g) Some homes have solar panels which generate electricity.

On a sunny day the potential difference across a solar panel is 31 volts.

A charge of 490 coulombs flows through the solar panel.

Calculate the energy transferred by the solar panel.

Use the equation:

$$\text{energy transferred} = \text{charge flow} \times \text{potential difference}$$

Give your answer to 2 significant figures.

Energy transferred = _____ J

(3)

(h) Why do solar panels on homes help reduce the environmental impact of using electrical devices?

Tick (✓) **one** box.

Less electricity is used in the home.

Less fossil fuel is burned.

The electricity from the solar panels is cheaper.

(1)
(Total 11 marks)