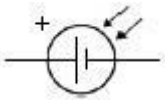
Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

Solar cells produce electricity using light from the Sun.

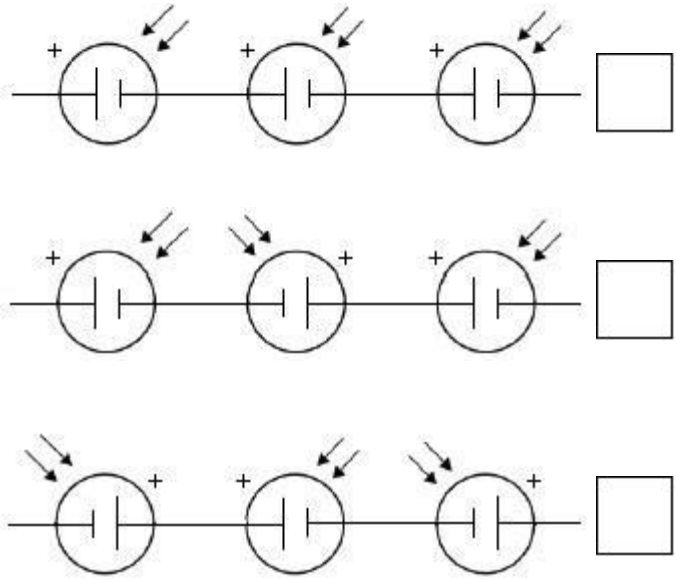
The symbol for a solar cell is: 

A householder has three solar cells.

Each solar cell has an output potential difference of 0.70 V

(a) Which arrangement of three solar cells will give a potential difference of 2.10 V?

Tick **one** box.



(1)

(b) A solar cell has a resistance of 2.5 Ω when the output potential difference is 0.70 V

Calculate the current through the solar cell.

Use the equation:

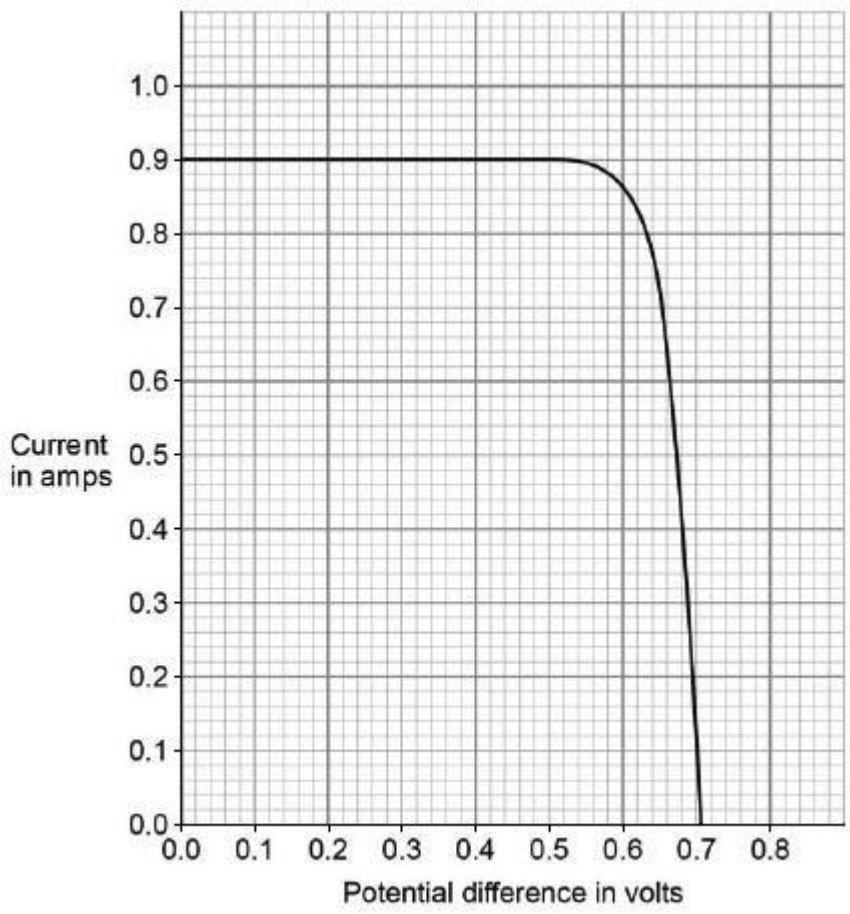
$$\text{current} = \frac{\text{potential difference}}{\text{resistance}}$$

_____

Current = _____ A

(2)

The graph below shows a graph of current against potential difference for a different type of solar cell.



(c) The power output of the solar cell is calculated using the equation.

power = current × potential difference

Which value of potential difference on the graph above gives the maximum power output of the solar cell?

Tick **one** box.

0.1 V ☐ 0.3 V ☐ 0.6 V ☐ 0.7 V ☐

Give the reason for your answer.

_____

_____

_____

(2)

(d) Write down the equation that links efficiency, total power input and useful power output.

_____

_____

(1)

(e) The total power input to the solar cell is 2.4 W when the efficiency is 0.20

Calculate the useful power output of the solar cell.

_____

_____

_____

_____

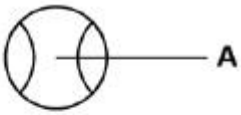
Useful power output = _____ W

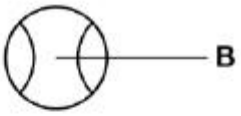
(3)

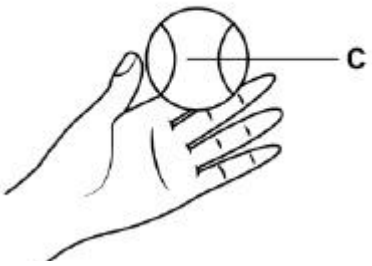
(Total 9 marks)

Q2.

The diagram shows a tennis ball thrown vertically into the air.







At position **C**, the ball has just left the tennis player's hand at a speed of 5.0 m/s

The tennis ball has a mass of 0.058 kg

(a) Write down the equation that links kinetic energy, mass and speed.

_____

(1)

(b) Calculate the kinetic energy of the tennis ball at position **C**.

_____

_____

Kinetic energy = _____ J

(2)

(c) At position **A** the tennis ball is at maximum height.

What is the gravitational potential energy of the tennis ball at position **A**?

Ignore the effect of air resistance.

_____

(1)

At position **B** the tennis ball has 0.38 J of gravitational potential energy.

(d) Write down the equation that links gravitational field strength, gravitational potential energy, height and mass.

_____

(1)

(e) Calculate the height of the tennis ball above the tennis player's hand when at position **B**.

gravitational field strength = 9.8 N/kg

_____

_____

_____

_____

_____

Height = _____ m

(3)

(Total 8 marks)