16 An irrigation system uses a pump to move water from a lower level to a higher level. The electricity for the pump is generated using a panel of solar cells.

(a) The panel of solar cells is 1.20 m long and 0.80 m wide. To pump water from the lower level to the higher level the pump needs a minimum power of 140 W.

(i) Calculate the minimum efficiency of the panel of solar cells that will operate the pump.

intensity of sunlight on solar cells = 1040 W m^{-2}

(4)

Minimum efficiency = ...

(ii) Suggest **two** reasons why the value calculated in (i) is the minimum efficiency that will operate the pump.

(2)

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(b) Light from the Sun arriving at the solar cells is unpolarised.

(i) Explain the difference between unpolarised light and plane polarised light.

(3)

(ii) Describe how a student can demonstrate that light from the Sun is unpolarised.

(2)

(Total for Question 16 = 11 marks)