

- 6 The Parker Solar Probe is a spacecraft that was launched in 2018 on a mission to explore the Sun.

The spacecraft is partly covered in tiles.

These tiles are filled with a solid containing small pockets of trapped air.

The outer surface of the tiles is painted white.

These tiles protect the electric circuits in the spacecraft from extreme temperatures.

- (a) The diagram shows one of these tiles in cross-section.



- (i) Explain why the outer surface of the tile is painted white.

(2)

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- (ii) Explain how the small pockets of trapped air help to reduce thermal energy transfer from the outer surface to the inner surface of the tile.

(2)

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- (b) The electric circuits inside the spacecraft are cooled by 4.5 kg of water.

The initial temperature of the water is 35 °C.

The thermal store of the water increases by 210 kJ.

Calculate the final temperature of the water.

[specific heat capacity of water = 4200 J/kg °C]

(4)

final temperature = °C

(Total for Question 6 = 8 marks)

