12 A portable electric heater with a power of 280 W is used to boil water for a hot drink. The heater is placed into a cup of water.

There is 165 g of water in the cup. The initial temperature of the water is 12.5 °C. Assume that all the energy from the heater is transferred to the water.

(a) The heater is used in London, where the boiling point of water is 100.0 °C.

Show that the time taken for the water to reach a temperature of 100.0 °C is about 220 s.

specific heat capacity of water = 4190 $J\,kg^{-1}\,K^{-1}$

(3)

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(b) The same heater is used in La Paz, the world's highest capital city, where the boiling point of water is 87.7 °C.
The mass and initial temperature of the water are the same as in (a), and the heater is used for the same time.

Calculate the mass of water converted to water vapour as the water boils.

latent heat of vaporisation of water = 2.29×10^6 $J\,kg^{-1}$

(3)

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Mass of water converted to water vapour = ...

(Total for Question 12 = 6 marks)