17 According to the Football Association (FA) rules, the football used in a professional match should have a circumference of between 68.0 cm and 70.0 cm. The pressure of the air in the football must be between 60 kPa and 110 kPa above atmospheric pressure.

(a) A football was inflated with air at a temperature of 16.0 °C. When inflated, the circumference of the football was 68.5 cm and it contained 2.50×10^{23} molecules of air.

Deduce whether this football met the FA rules.

atmospheric pressure = 105 kPa

(6)

*(b) The pressure inside a football decreases as the temperature of the air inside falls. The volume of the ball remains constant.

Explain why, in terms of the motion of the molecules.

(6)

(Total for Question 17 = 12 marks)

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