1 **(a)** Derive the SI base unit of force.

SI base unit of force = ... [1]

(b) A spherical ball of radius r experiences a resistive force F due to the air as it moves through the air at speed v. The resistive force F is given by the expression

$$F = crv,$$

where c is a constant.

Derive the SI base unit of the constant c.

SI base unit of c = ... [1]

(c) The ball is dropped from rest through a height of 4.5 m.

(i) Assuming air resistance to be negligible, calculate the final speed of the ball.

speed = ... $m\,s^{-1}$ [2]

(ii) The ball has mass 15 g and radius 1.2 cm.

The numerical value of the constant c in the equation in **(b)** is equal to 3.2×10^{-4} when measured using the SI system of units.

Show quantitatively whether the assumption made in **(i)** is justified.

[3]