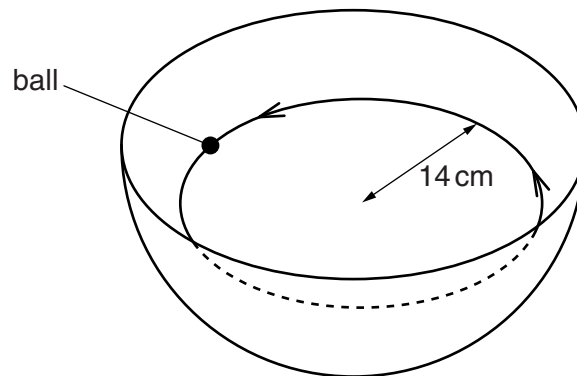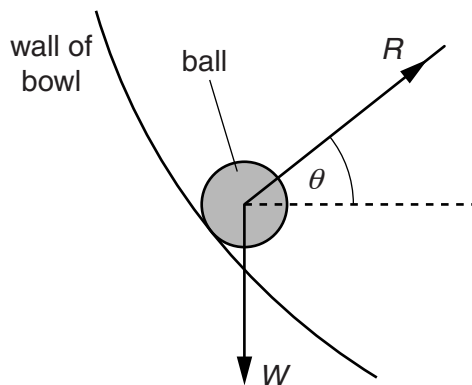**2** A large bowl is made from part of a hollow sphere.

A small spherical ball is placed inside the bowl and is given a horizontal speed. The ball follows a horizontal circular path of constant radius, as shown in Fig. 2.1.

Fig. 2.1

The forces acting on the ball are its weight W and the normal reaction force R of the bowl on the ball, as shown in Fig. 2.2.

Fig. 2.2

The normal reaction force R is at an angle θ to the horizontal.

(a) (i) By resolving the reaction force R into two perpendicular components, show that the resultant force F acting on the ball is given by the expression

$$W = F \tan \theta.$$

[2]

   (ii) State the significance of the force *F* for the motion of the ball in the bowl.

   ....

   .... [1]

(b) The ball moves in a circular path of radius 14 cm. For this radius, the angle θ is 28°.

   Calculate the speed of the ball.

   speed = ... m s^{-1} [3]

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