2.

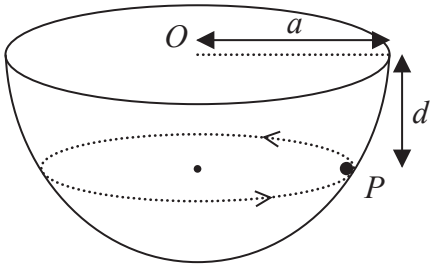


Figure 2

A thin hemispherical shell, with centre O and radius a, is fixed with its open end uppermost and horizontal.

A particle P of mass m moves in a horizontal circle on the smooth inner surface of the shell. The vertical distance of P below the level of O is d, as shown in Figure 2.

(a) Find, in terms of m, g, d and a, the magnitude of the force exerted on P by the inner surface of the hemisphere.

(3)

The particle moves with constant speed v.

(b) Find v in terms of g, a and d.

(5)

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Question 2 continued

(Total for Question 2 is 8 marks)