2.

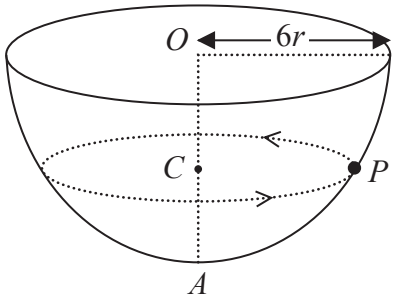


Figure 1

A hemispherical bowl of internal radius $6r$ is fixed with its circular rim horizontal. The centre of the circular rim is O and the point A on the surface of the bowl is vertically below O. A particle P moves in a horizontal circle, with centre C, on the smooth inner surface of the bowl. The particle moves with constant angular speed $\sqrt{\frac{g}{4r}}$. The point C lies on OA, as shown in Figure 1.

Find, in terms of r, the distance OC

(9)

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Question 2 continued

(Total for Question 2 is 9 marks)