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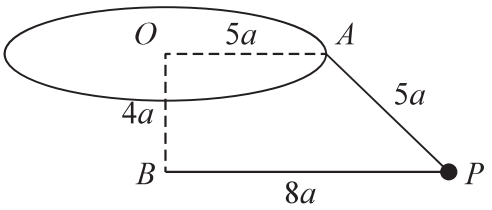


Figure 2

One end of a light inextensible string of length $5a$ is attached to a point A on the circumference of a circular disc of radius $5a$ and centre O. The other end of the string is attached to a particle P of mass m. A second light inextensible string has length $8a$. This string has one end attached to the point B vertically below O, where $OB = 4a$, and the other end attached to P, as shown in Figure 2. The disc rotates in a horizontal plane with constant angular speed. The particle P moves in a horizontal circle centre B with the same constant angular speed as the disc. Both strings are taut and are in a vertical plane through O throughout the motion.

Given that string PB will break if the tension in it exceeds $\frac{5}{4}mg$, find the greatest possible angular speed of P.

(10)

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Q4