

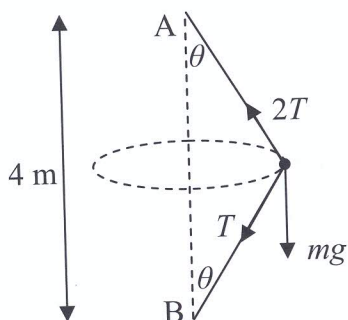
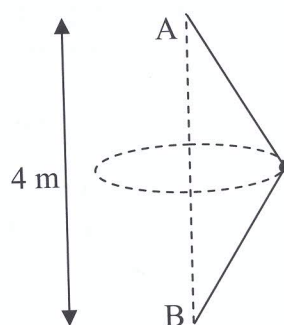
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(b)

A and B are two fixed pegs, A is 4 m vertically above B.

A mass  $m$  kg, connected to A and B by two light inextensible strings of equal length, is describing a horizontal circle with uniform angular velocity  $\omega$ .

For what value of  $\omega$  will the tension in the upper string be double the tension in the lower string?



$$2T \cos \theta - T \cos \theta = mg$$

$$T \cos \theta = mg$$

$$T \left( \frac{2}{\ell} \right) = mg$$

$$T = \frac{mg\ell}{2}$$

$$2T \sin \theta + T \sin \theta = m r \omega^2$$

$$3T \sin \theta = m \ell \sin \theta \omega^2$$

$$3T = m \ell \omega^2$$

$$3 \left( \frac{mg\ell}{2} \right) = m \ell \omega^2$$

$$\Rightarrow \omega = \sqrt{\frac{3g}{2}}$$

