Centripetal Acceleration at the Bottom of the Swing

<u>Solution:</u>

The correct answer is c.)

Applying the Principle of Conservation of Energy, the speed of the bob at the bottom of the swing may be found to be $v = \sqrt{2gr}$

$$\Rightarrow \left(\frac{v^2}{r}\right) = \left(\frac{\left(\sqrt{2gr}\right)^2}{r}\right) = 2g$$

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Note that this result could have been directly obtained from the equation for Conservation of Energy:

$$\left(\frac{1}{2}\right)mv^2 = mgr \Rightarrow \left(\frac{v^2}{r}\right) = 2g$$

Interestingly, this value of centripetal acceleration depends neither on the length of the pendulum, nor on its mass. However, this is true only if the bob is released from a *perfectly horizontal* position.