Centripetal Acceleration at the Bottom of the Swing

Solution:
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 \( v = \sqrt{2gr} \)

\[
\Rightarrow \left( \frac{v^2}{r} \right) = \left( \frac{(\sqrt{2gr})^2}{r} \right) = 2g
\]
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Note that this result could have been directly obtained from the equation for Conservation of Energy:

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

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.