

6 Rolling and orbiting satellites – Part 2

—Answers

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Work through these after you have tried the questions yourself.

2.1 $\omega = \frac{v}{r} = \frac{5.0}{0.25} = 20 \text{ rad/s}.$

2.2 the rolling ball puts some of its energy into spinning ($\frac{1}{2}I\omega^2$) as well as moving, so less is available to speed up its centre; the sliding block puts all of it into moving.

2.3 the force of gravity (the planet's gravitational pull).

2.4 the closer satellite moves faster, because $v = \sqrt{GM/r}$ and a smaller r gives a larger speed.

2.5 $v = r\omega = 0.40 \times 15 = 6.0 \text{ m/s}.$