45. (a) If r is the radius of the orbit then the magnitude of the gravitational force acting on the satellite is given by GMm/r^2, where M is the mass of Earth and m is the mass of the satellite. The magnitude of the acceleration of the satellite is given by v^2/r, where v is its speed. Newton's second law yields $GMm/r^2 = mv^2/r$. Since the radius of Earth is 6.37×10^6 m the orbit radius is $r = 6.37 \times 10^6\,\text{m} + 160 \times 10^3\,\text{m} = 6.53 \times 10^6\,\text{m}$. The solution for v is

$$v = \sqrt{\frac{GM}{r}} = \sqrt{\frac{(6.67 \times 10^{-11}\,\text{m}^3/\text{s}^2 \cdot \text{kg})(5.98 \times 10^{24}\,\text{kg})}{6.53 \times 10^6\,\text{m}}} = 7.82 \times 10^3\ \text{m/s}\ .$$

(b) Since the circumference of the circular orbit is $2\pi r$, the period is

$$T = \frac{2\pi r}{v} = \frac{2\pi(6.53 \times 10^6\,\text{m})}{7.82 \times 10^3\,\text{m/s}} = 5.25 \times 10^3\ \text{s}\ .$$

This is equivalent to 87.4 min.