27. (a) Earth makes one rotation per day and $1\,d$ is $(24\,\text{h})(3600\,\text{s/h}) = 8.64 \times 10^4\,\text{s}$, so the angular speed of Earth is

$$\omega = \frac{2\pi\,\text{rad}}{8.64 \times 10^4\,\text{s}} = 7.27 \times 10^{-5}\ \text{rad/s}\ .$$

(b) We use $v = \omega r$, where r is the radius of its orbit. A point on Earth at a latitude of 40° moves along a circular path of radius $r = R\cos 40^\circ$, where R is the radius of Earth $(6.37 \times 10^6\,\text{m})$. Therefore, its speed is

$$v = \omega\,(R\cos 40^\circ) = \left(7.27 \times 10^{-5}\,\text{rad/s}\right)\left(6.37 \times 10^6\,\text{m}\right)\cos 40^\circ = 355\ \text{m/s}\ .$$

(c) At the equator (and all other points on Earth) the value of ω is the same $(7.27 \times 10^{-5}\,\text{rad/s})$.

(d) The latitude is 0° and the speed is

$$v = \omega R = \left(7.27 \times 10^{-5}\,\text{rad/s}\right)\left(6.37 \times 10^6\,\text{m}\right) = 463\ \text{m/s}\ .$$