

- (b) A rigid body is spinning with an angular speed of 60π radians per second (1800 rpm). The axis of rotation lies in the direction of the vector $2\mathbf{i} + 2\mathbf{j} - \mathbf{k}$. A small particle on the spinning body with mass of one kilogram passes through the point P with position vector $\mathbf{r} = x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$ measured in metres relative to the origin. The origin lies on the axis of rotation.
- Explain why the angular velocity (in units of radians per second) of the spinning rigid body is given by the vector $20\pi (2\mathbf{i} + 2\mathbf{j} - \mathbf{k})$.
 - What is the velocity (vector) of the particle as it passes through the point P ?
 - Find an expression for the kinetic energy E of the particle, given in terms of its mass m and its speed v by $E = 0.5mv^2$.