$$(3)\ 40\ ms^{-2}$$

Solution

Equations:

$$C = 2\pi R$$

$$v = v_0 + at$$

$$S = v_0 t + \frac{at^2}{2}$$

, where v – tangential velocity, v_0 – initial tangential velocity, R – radius of circle, a – tangential acceleration, S – length of path.

Assume initial tangential velocity $v_0 = 0$.

Two rotations $\equiv (S_2 = 2C = 4\pi R)$

$$v = at$$

$$S = \frac{at^2}{2}$$

We know v_2 and R from task, $\pi \approx \frac{22}{7}$.

$$t_2 = \frac{v_2}{a}$$

$$S_2 = \frac{a\left(\frac{v_2}{a}\right)^2}{2} = \frac{v_2^2}{2a} = 4\pi R$$

$$a = \frac{v_2^2}{8\pi R} \approx \frac{v_2^2}{8\left(\frac{22}{7}\right)R}$$

$$a = \frac{80^2}{8\left(\frac{22}{7}\right)\left(\frac{20}{\frac{22}{7}}\right)} = \frac{6400}{160} = 40\ \left(\frac{m}{s^2}\right)$$