

# AP Physics 1: Rotational Motion

① a. 0.524 rad   b. 1.57 rad   c. 6.283 rad   d. 0.96 rad   e. 17.4 rad   f. 0.28 rad   g. 4.07 rad

② a. 1270°   b. 57°   c. 280°   d. 8.0°   e. 6530°   f. 653°   g. 4.6°

③ a. 0.251 m   b. 0.628 m   c. 2.2 m   d. 6.53 m

④ a. 0.43 m   b. 0.628 m   c. 2.0 m   d. 3.1 m   e. 0.084 m   f. 1.6 m   g. 5.7 m

⑤ a. 1.6 m   b. 2.48 m   c. 0.29 m   d. 0.40 m   e. 0.88 m   f. 40 m   g. 3.0 m

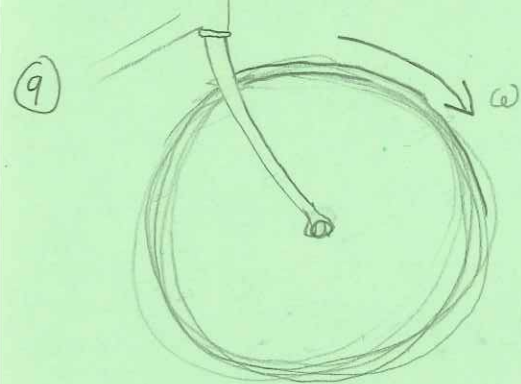
⑥ a. 1.00 rad   b. 2.00 rad   c. 0.88 rad   d. 2.8 rad   e. 13 rad   f. 28 rad   g. 16 rad

⑦ a.  $d = vt = 12 \text{ m}$    b.  $\theta = \frac{d}{r} = 2.4 \text{ rad}$

⑧  $45 \text{ rpm} = \frac{45 \text{ rotations}}{\text{minute}} \times \left( \frac{1 \text{ min}}{60 \text{ s}} \right) = \frac{0.75 \text{ rot}}{\text{s}} = 0.75 \text{ Hz}$

a.  $v = \frac{d}{t} = \frac{2\pi r}{T} = 2\pi r f \Rightarrow v_A = 2\pi r_A f = 0.89535906 \text{ m/s} \Rightarrow \underline{0.90 \text{ m/s}}$   
 $v_B = 2\pi r_B f = 1.319468915 \text{ m/s} \Rightarrow \underline{1.3 \text{ m/s}}$

b.  $\omega_A = \omega_B = \frac{v}{r} = \frac{2\pi r f}{r} = 2\pi f = 4.71238898 \text{ rad/s} \Rightarrow \underline{4.7 \text{ rad/s}}$



$\omega_0 = 16.0 \text{ rad/s}$   
 $\omega = 3.0 \text{ rad/s}$   
 $t = 4.0 \text{ s}$

a.  $\vec{\alpha} = \frac{\Delta \vec{\omega}}{t} = \frac{3.0 \text{ rad/s} - 16.0 \text{ rad/s}}{4.0 \text{ s}} = -3.25 \text{ rad/s}^2$

$\vec{\alpha} = 3.3 \text{ rad/s}^2$  opposite direction of rotation

b.  $a = r\alpha = 1.69 \text{ m/s}^2$

$\vec{a} = 1.7 \text{ m/s}^2$  opposite direction of motion