

When a compact disk with a diameter of 12.0 cm is rotating at $5.25 \frac{\text{rad}}{\text{s}}$

- 1) What is the linear speed?
- 2) Centripetal acceleration at outer rim?
- 3) Linear speed and centripetal acceleration $\frac{1}{2}$ way between outer rim and axis of rotation.

1. $r = 6.0 \text{E} - 2 \text{ m}$

$$\omega = 5.25 \frac{\text{rad}}{\text{s}}$$

$$v = r\omega = (6.0 \text{E} - 2 \text{ m}) 5.25 \frac{\text{rad}}{\text{s}}$$
$$= 3.15 \text{E} - 1 \text{ m/s}$$

0.315 m/s

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2)

$$a_c = \frac{v^2}{r}$$

$$v = r\omega$$

$$a_c = \frac{r^2 \omega^2}{r} = r\omega^2 = (6.0 \times 10^{-2} \text{ m}) \left(\frac{5.25 \text{ rad}}{5} \right)^2$$
$$= 1.65 \text{ m/s}^2$$

3)

$$v = r\omega$$

$$\text{new } r = \frac{1}{2} r_{\text{original}}$$

$$a_c = r\omega^2$$

$$v = \frac{0.315 \text{ m/s}}{2} = \boxed{0.158 \text{ m/s}}$$

$$a_c = \frac{1.65 \text{ m/s}^2}{2} = \boxed{0.825 \text{ m/s}^2}$$