An object has a uniform circular motion along a path of radius 4 cm. The centripetal acceleration on the object is 8 m /s^2. What is the frequency of motion? What is the time period of motion?

Given:

Radius of the circular path: r = 4 cm = 0.04 m

Centripetal acceleration on the object: a = 8 m / s^2

Determine: Frequency of circular motion: f

$$\omega = 2\pi f \text{ ----------(1)}$$

Rearranging (1)

$$f = \omega / 2\pi \text{ ----------(2)}$$

Also:

Centripetal acceleration:

$$a = \omega^2 \times r \text{ ----------(3)}$$

Rearranging (3):

$$\omega = \text{sqrt}\,(a / r) \text{ ----------(4)}$$

Substituting for "a" and "r" in (4):

$$\omega = \text{sqrt}\,(8 / 0.04) = 14.14 \text{ rad / sec}$$

Substituting for ω in (2):

$$\mathbf{f = 14.14 / (2 \times 3.14) = 2.2 \text{ rev / sec}}$$

Time period of motion:

$$\mathbf{T = 1 / f = 1 / 2.2 = 0.45 \text{ sec}}$$