Circular Motion: Exercises

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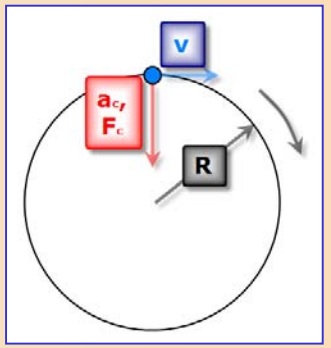
Magnitude	Value
m (mass)	2 kg
R (radius)	50 cm
T (period)	
f (frequency)	
v (linear vel.)	4 m/s
w (angular vel.)	
a_c (centrip. accel.)	
F (centrip. force)	

Fill in the gaps in the table



$v = \omega . R \rightarrow \omega = \frac{4\ m/s}{0.5\ m} = \boxed{8\ rad/s}$

$a_c = \frac{v^2}{R} = \frac{(4\ m/s)^2}{0.5\ m} = \boxed{32\ m/s^2} \rightarrow F = m \times a_c = \boxed{64\ N}$

$\omega = \frac{2\pi}{T} \rightarrow T = \frac{2\pi}{\omega} = \frac{2\pi}{8\ rad/s} = \boxed{0.79\ s}$

$f = \frac{1}{T} = \frac{1}{0.79\ s} = \boxed{1.27\ Hz}$

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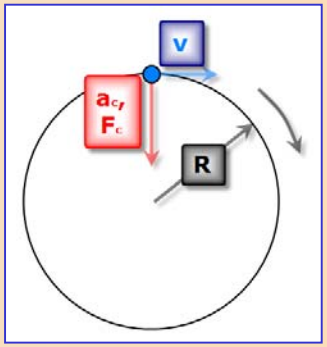
Magnitude	Value
m (mass)	4 kg
R (radius)	1.2 m
T (period)	
f (frequency)	
v (linear vel.)	
w (angular vel.)	
a_c (centrip. accel.)	
F (centrip. force)	10 N

Fill in the gaps in the table



$$F = m \times a \rightarrow a_c = \frac{F}{m} = \frac{10\,N}{4\,Kg} = \boxed{2.5\ m/s^2}$$

$$a_c = \frac{v^2}{R} \rightarrow v = \sqrt{a_c \cdot R} = \sqrt{2.5\ \frac{m}{s^2} \times 1.2\,m} = \boxed{1.73\ m/s}$$

$$v = \omega \cdot R \rightarrow \omega = \frac{v}{R} = \frac{1.73\ m/s}{1.2\ m} = \boxed{1.44\ rad/s}$$

$$\omega = \frac{2\pi}{T} \rightarrow T = \frac{2\pi}{\omega} = \frac{2\pi}{1.44\ rad/s} = \boxed{4.36\ s}$$

$$f = \frac{1}{T} = \frac{1}{4.36\ s} = \boxed{0.23\ Hz}$$

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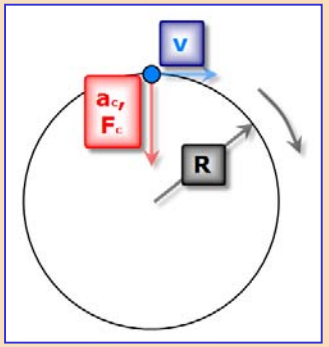
Magnitude	Value
m (mass)	2 kg
R (radius)	0.4 m
T (period)	
f (frequency)	
v (linear vel.)	
w (angular vel.)	1200 rpm
a_c (centrip. accel.)	
F (centrip. force)	

Fill in the gaps in the table



$$\omega = 1200 \frac{rev}{min} \frac{1\,min}{60\,s} \frac{2\pi\,rad}{1\,rev} = 125.7\ rad/s$$

$$v = \omega . R = 125.7 \frac{rad}{s} \times 0.4\ m = \boxed{50.28\ m/s}$$

$$a_c = \frac{v^2}{R} = \frac{(50.28\ m/s)^2}{0.4\ m} = \boxed{6320\ m/s^2}$$

$$F = m \times a = 2\ kg \times 6320\ m/s^2 = \boxed{12\,640\ N}$$

$$\omega = \frac{2\pi}{T} \rightarrow T = \frac{2\pi}{\omega} = \frac{2\pi}{125.7\ rad/s} = \boxed{0.05\ s}$$

$$f = \frac{1}{T} = \frac{1}{0.05\ s} = \boxed{20\ Hz}$$

Circular Motion: Exercises

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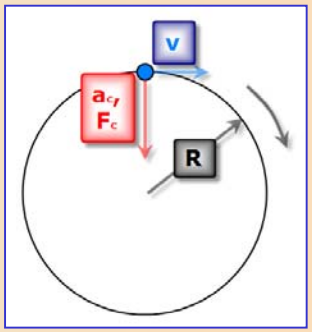
Magnitude	Value
m (mass)	25 kg
R (radius)	2 m
T (period)	
f (frequency)	12 Hz
v (linear vel.)	
w (angular vel.)	
a_c (centrip. accel.)	
F (centrip. force)	

Fill in the gaps in the table



$f = \frac{1}{T} \rightarrow T = \frac{1}{12\,Hz} = \boxed{0.083\ s}$

$\omega = \frac{2\pi}{T} = \frac{2\pi}{0.083\ s} = \boxed{75.7\ rad/s}$

$v = \omega . R = 75.7\ \frac{rad}{s} \times 2m = \boxed{151.4\ m/s}$

$a_c = \frac{v^2}{R} = \frac{(151.4\ m/s)^2}{2\,m} = \boxed{11\,461\ m/s^2}$

$F = m \times a = 25\ Kg \times 11461\ m/s^2 = \boxed{286\,525\ N}$