

## Physics    Centripetal and Period Problems    Chapter 10

$$F_c = \frac{mv^2}{r}$$

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

$$T = \frac{1}{f}$$

$$v = \frac{2\pi r}{T}$$

1. A 250 kg motorcycle is driven around a 12 m tall vertical circular track at a constant speed of 11 m/s. (mass of the motorcycle includes the mass of the rider, assume air resistance is negligible) Find the centripetal force on the motorcycle.
2. Marianne puts her favorite Backstreet Boys disc in her CD player. If it spins with a frequency of 1800 revolutions per minute, what is the period of spin of the compact disk?
3. Hamlet, a hamster, runs on his exercise wheel, which turns around once every 0.5 s. What is the frequency of the wheel?
4. A sock is stuck to the inside of the clothes dryer pins around the drum one every 2.0 s at a distance of 0.50 m from the center of the drum. What is the socks linear speed?
5. What is the radius of an automobile tire that turns with a frequency of 11 Hz and has a linear speed of 20.0 m/s?
6. Luigi twirls a round a piece of pizza dough overhead with a frequency of 60 revolutions per minute. A) find the linear speed of a stray piece of pepperoni stuck on the dough 10 cm from the pizza's center. B) In what direction will the pepperoni move if it flies off while the pizza is spinning?
7. Jessica is riding on a merry-go-round on an outer horse that sits at a distance of 8.0 m from the center of the ride. Jessica's sister, Julie, is on an inner horse located 6.0 m from the ride's center. The merry-go-round turns around once every 40.0 s. A) What is Jessica's linear speed? B) What is Julie's linear speed? C) What is the centripetal acceleration of Julie and her horse?
8. A cement mixer of radius 2.5 m turns with a frequency of 0.020 Hz. What is the centripetal acceleration of a small piece of dried cement stuck to the inside wall of the mixer?
9. Roxanne is making a strawberry milkshake in her blender. A tiny, 0.0050 kg strawberry is rapidly spun around the inside of the container with a speed of 14.0 m/s., held by a centripetal force of 10.0 N. What is the radius of the blender at this location?
10. Curtis' favorite disco record has a scratch 12 cm from the center that makes the record skip 45 times each minute. What is the linear speed of the scratch as it turns?
11. Missy's favorite ride at the Topsfield Fair is the rotor, which has a radius of 4.0 m. The ride takes 2.0 s to make one full revolution. A) What is missy's linear speed on the rotor? B) What is Missy's centripetal acceleration on the rotor?
12. A tennis ball is rotating 12 revolutions each second as it flies towards the service line. The ball is 0.065 m in diameter. What is the velocity of the fluff on the outside of the ball? If the ball masses 0.056 kg what is the force with which it hits?