

Centripetal Force

Concepts

- A. In what direction are you accelerating if you are moving in a circle with a constant speed?
- B. If you are accelerating to the left, in what direction is the net force on you? Generalize this statement for any acceleration.
- C. In what direction is the net force on you if you are moving in a circle with a constant speed?
- D. Centripetal Force is just another name for the _____ force acting on something when it is doing what?
- E. If there is no net force on you, can you move in a circle at constant speed? Explain.

Calculations

1. A 1500 kg car is traveling in a circle with a 12 meter radius and a centripetal acceleration of 3 m/s^2 .
 - a. How fast is the car traveling?
 - b. What is the centripetal force on the car?
 - c. Where does the centripetal force come from?
2. A 75 kg person is on a Ferris Wheel of 5 meter radius that is rotating. If the person has a speed of 2 m/s ,
 - a. What is the centripetal acceleration of the person? (Give magnitude and direction.)

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- b. What is the centripetal force on the person? (Give magnitude and direction.)
3. An airplane of mass 15,000 kg is traveling with a speed of 75 m/s. If turns with a radius of 200 meters, what is the centripetal force needed to let the airplane turn?
4. There is a 1700 kg car traveling in a circle with a radius of 15 meters a centripetal force of 5000 N acting on it. How fast is the car going?
5. A 75 kg person is running in a circle. There is a centripetal force of 50 N acting on the person, and they are running at 3 m/s. What is the radius of the circle?
6. An airplane of mass 15,000 kg is traveling with a speed of 75 m/s. It turns with a radius of 2000 meters.
- a. What is the centripetal acceleration of the plane?
- b. What is the centripetal force on the plane?
- c. What is the net force on the plane

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7. A 2500 kg car is driving around a circle with a radius of 15 meters. There is a centripetal force on the car of 10,000 N.
 - a. How fast is the car going?
 - b. What is the net force on the car?
 - c. If there was no friction, what would happen to the car?
8. A 5 kg bag is swung in a circle at a speed of 3 m/s. There is a centripetal force of 20 N acting on the bag.
 - a. What is the radius of the circle?
 - b. What is the centripetal acceleration of the bag?

Answers:

1. a) 6 m/s b) 4500 N c) friction between tires and road
2. a) 0.8 m/s², to the center b) 60 N, to the center 3) 422,000 N 4) 6.64 m/s
5) 13.5 m 6. a) 2.81 m/s² b) 42,200 N c) 42,200 N
7. a) 7.75 m/s b) 10,000 N c) car would fly off tangent with a constant velocity
8. a) 2.25 m b) 4 m/s²