

Linear Speed

1. Define the following terms.
Linear speed

Rotational speed

Period

Frequency

Hertz

RPM
2. Joanne puts her favorite disc in the CD player. If it spins with a frequency of 1800 rpm.
 - a. What is the frequency of rotation in Hz?

 - b. What is the period of rotation?
3. Hamlet, a hamster, runs on his exercise wheel, which turns around once every 0.5 s.
 - a. What is the frequency in Hz of the wheel?

 - b. How many rpm is that?
4. You are walking in circles with a radius of 150 meters in a big field. It takes you 5 minutes to go around once.
 - a. What is your frequency in rpm?

 - b. What is your frequency in Hz?

 - c. How far do you travel in going around once?

 - d. What is your linear speed?
5. A sock stuck to the inside of the clothes dryer spins around the drum once every 2.0 s at a distance of 0.50 m from the center of the drum.
 - a. What is the sock's linear speed?

 - b. If the drum were twice as wide but continued to turn with the same frequency, would the linear speed be faster than, slower than or the same as your answer to part a?

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6. Charlotte twirls a round piece of pizza dough overhead with a frequency of 60 revolutions per minute.
- Find the linear speed of a piece of pepperoni stuck on the dough 10 cm from the pizza's center.
 - In what direction will the pepperoni move if it flies off while the pizza is spinning? Explain.
7. A car has a linear speed of 12 m/s while it drives around in a circle. The radius of the circle is 50 meters.
- How many seconds will it take the car to go around once?
 - What is the frequency in Hz of the car?
8. A record player works by spinning a record at a constant rate of 33.3 rpm. A needle then floats in a groove that spirals around the record, moving from the edge of the album to the middle of the album. (The needle picks up the vibrations from the groove, and turns it into an electrical signal.)
- How many seconds will it take for one complete rotation?
 - What is the linear speed of a point on the edge of the record with a radius of 15 cm?
 - What is the linear speed of a point in the middle of the record with a radius of 5 cm?
- *9. A CD player works by spinning the CD and having a small laser track a groove etched into the CD. (The laser looks at little pits that are in the groove, and sends a digital signal back to the processor.) The laser always moves with a constant linear speed that depends on the player, but let's say the linear speed is 12 m/s.
- When the laser is on the inside of the CD with a radius of 5 cm, what is the frequency of the spinning CD?
 - When the laser is on the outside of the CD with a radius of 10 cm, what is the frequency of the spinning CD?

Answers: 2. a) 30 Hz b) 0.033 s 3. a) 2 Hz b) 120 rpm 4. a) 0.2 rpm b) 0.003 Hz
 c) 942 m d) 3.1 m/s 5. a) 1.57 m/s b) twice 6. a) 0.628 m/s b) tangent to circle 7. a) 26.2 s
 b) 0.038 Hz 8. a) 1.8 s b) 0.52 m/s c) 0.174 m/s 9. a) 38.2 Hz b) 19.1 Hz