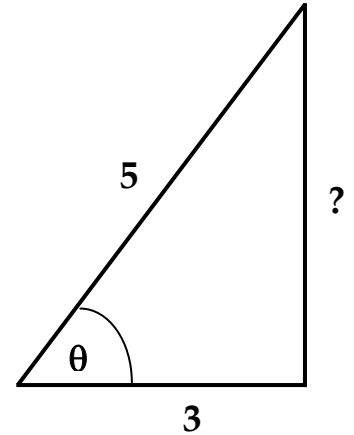


1. The right triangle shown has an unknown side length and an unknown angle θ (labeled).

- a) Determine the unknown side length.
- b) Determine $\cos \theta$ and $\sin \theta$.



2. A 16 foot ladder leans against a building so that the angle between the ladder and the building is 20° .

- a) Convert 20° to radians.

- b) How far away is the base of the ladder from the building?(A good solution will draw a diagram, label known side lengths and angles, and choose useful symbols for unknown sides and angles.)

3. A velocipede travels at a constant angular speed around a circular track at a radius of 3.0 km. The velocipede completes 4 revolutions in 5 hours.

- a) How long did it take to complete 3 revolutions?
- b) How many revolutions did it complete in 3 hours?
- c) Determine the velocipede's linear (tangential) speed.

4. Two forces **P** and **Q** act on an object of mass 5 kg. When both forces are directed to the right, the magnitude of the acceleration of the object is 1.50m/s^2 . However, when the force **P** is directed to the right and the force **Q** is directed to the left, the object has an acceleration of 0.75 m/s^2 . Determine the magnitude of the two forces. (Good solutions will contain or address the following, though not necessarily in this order: a clear free-body force diagram; start with a general form of Newton's second law before plugging in numbers; shows all the algebra moves clearly)

5. You lift a box straight up applying a force of 103 N and the box accelerates upwards at 0.5 m/s^2 . Your goal is to determine the mass of the box.

a) Explain why someone might (mistakenly) calculate the mass of the box to be 206 kg. Explain why this answer doesn't make sense (hint: $1\text{ kg} = 2.2\text{ pounds}$).

b) Determine the mass of the box. (Good solutions will contain or address the following, though not necessarily in this order: a clear free-body force diagram; start with a general form of Newton's second law before plugging in numbers; show all the algebra moves clearly).