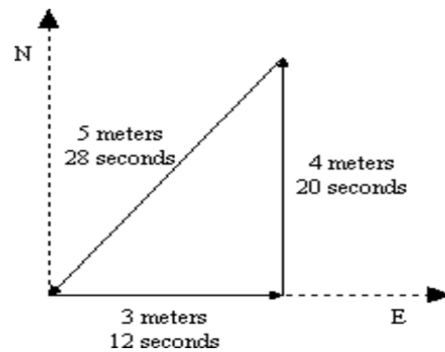


Average speed, average velocity, and instantaneous velocity

Calculating average speed from distance traveled and time

We define the average speed, v_{av} , as the total distance traveled divided by the time required to travel that distance. The unit of speed is the meter per second (m/s) or the kilometer per hour (km/h) [and, in America's customary system of measurement, the foot per second (ft/s) or the mile per hour (mi/h)]. If an object travels 50 meters in 10 seconds, it has an average speed of 50 meters/10 seconds, or 5 meters per second. If an object travels a distance of 100 kilometers in the course of an hour, it has an average speed of 100 kilometers per hour. If an object travels 45 miles in the course of an hour, it has an average speed of 45 miles per hour.



Suppose a pig arises from a mud puddle and waddles 3.0 meters eastward in a straight line, then 4.0 meters northward in a straight line, then 5.0 meters in a straight line back to the original spot from which he started (see the picture above). Suppose also that the 3-meter walk took 12 seconds, the 4-meter walk 20 seconds, and the 5-meter walk 28 seconds. During the first part of the walk, the average speed is 3.0 meters/12 seconds, or