1. The speed limit on some interstate highways is roughly 105 km/h. (For each answer, enter a number.)

(a)

What is this in meters per second?  
29.2 m/s

(b)

How many miles per hour is this?  
65.2  mi/h

2. (a)     A car speedometer has a 6% uncertainty. What is the range of possible speeds (in km/h) when it reads 33 km/h? (There are two answers. Enter the lowest value first and the highest value second. For each answer, enter a number.)  
lowest     31.02 km/h  
highest     34.98 km/h  
  
(b)     Convert this to miles per hour. (There are two answers. Enter the lowest value first and the highest value second. For each answer, enter a number.)  
lowest     19.23 mi/h  
highest     21.69  mi/h

3. Find the following for path A in the figure below. (For each answer, enter a number.)

Chart

Description automatically generated

Four paths are above a number line labeled "displacement x (m)". The number line starts at 0 on the left and ends at 12 on the right. The right side of the number line ends in an arrow that points to the right. The four arrows are as follows.

* Path A starts at 0, extends to the right, and ends at about 7 in a rightward-pointing arrow.
* Path B starts at 12, extends to the left, and ends at about 7 in a leftward-pointing arrow.
* Path C starts at 2, extends to the right until about 10, then curves back to head to the left until it reaches about 8, then curves back again to head to the right until it reaches about 10, where it ends in a rightward-pointing arrow.
* Path D starts at about 9, extends to the left until about 3, then curves back to head to the right until it reaches about 5, where it ends in a rightward-pointing arrow.

#### 4. (a)

the distance traveled (in m)  
8 m

#### (b)

the magnitude of the displacement (in m) from start to finish  
8 m

#### (c)

the displacement (in m) from start to finish  
8 m

A truck travels due east for a distance of 1.7 km, turns around and goes due west for 7.4 km, and finally turns around again and travels 2.9 km due east.  
  
(a) What is the total distance (in km) that the truck travels? (Enter a number.)  
12 km  
  
(b) What are the magnitude (in km) and direction of the truck's displacement? (Enter a number.)  
magnitude     2.8  km  
  
direction

eastwest    neither

5. Soccer fields vary in size. A large soccer field is 105 meters long and 95 meters wide. What are its dimensions in feet? (Assume that 1 meter equals 3.281 feet. For each answer, enter a number.)

length in feet344.5  ft

width in feet311.7  ft

What are its dimensions in inches? (For each answer, enter a number.)

length in inches4134  in

width in inches3740.4  in

6. A helicopter blade spins at exactly 95 revolutions per minute. Its tip is 4.00 m from the center of rotation. (For each answer, enter a number.)

#### (a)

Calculate the average speed (in m/s) of the blade tip in the helicopter's frame of reference.  
39.9  m/s

#### (b)

What is its average velocity (in m/s) over one revolution?  
0  m/s

7. A student drove to the university from her home and noted that the odometer reading of her car increased by 13.0 km. The trip took 16.0 min. (For each answer, enter a number.)

#### (a)

What was her average speed in km/h?  
48.75  km/h

#### (b)

If the straight-line distance from her home to the university is 10.3 km in a direction 25.0° south of east, what was her average velocity in km/h?  
38.6  km/h

#### (c)

If she returned home by the same path 7 h 30 min after she left, what were her average speed and velocity in km/h for the entire trip?

average speed(c) average speed3.47  km/h

average velocity(c) average velocity0  km/h

8. A plane lands on a runway with a speed of 115 m/s, moving east, and it slows to a stop in 15.0 s. What is the magnitude (in m/s2) and direction of the plane's average acceleration during this time interval?

magnitude (Enter a number.)  
7.67  m/s2

direction

due westdue east

9. A cheetah can accelerate from rest to a speed of 22.0 m/s in 6.75 s. What is its acceleration (in m/s2)? (Enter a number.)  
3.26  m/s2

10. A commuter backs her car out of her garage with a constant acceleration of 1.40 m/s2. (For each answer, enter a number.)

#### (a)

How long in seconds does it take her to reach a speed of 1.70 m/s?  
1.21  s

#### (b)

If she then brakes to a stop in 0.8 s, what is her (constant) deceleration in m/s2?  
-2.13  m/s2