4. A van is moving east at 80 km/h according to the odometer when the driver sees a problem ahead and slows down to a speed of 50 km/h in 5.0 s.
   a. Calculate the acceleration of the van in km/h/s and in m/s². In your own words, describe the meaning of both answers.
   \[ \begin{align*}
   \frac{\Delta v}{\Delta t} &= \frac{50 \text{ km/h} - 80 \text{ km/h}}{5.0 \text{ s}} \\
   &= \frac{-30 \text{ km/h}}{5.0 \text{ s}} \\
   &= -6 \text{ km/h/s} \\
   &= -6 \text{ km/h/s} \ [\text{E}] \\
   &= -6 \text{ km/h/s} \ [\text{W}]
   \end{align*} \]
   This means every second the car is changing by 6 km/h [W].
   b. Why is there a negative sign in the answer?
   Since East is positive, and it is slowing, acceleration is in the opposite direction.

5. A sprinter on a school track team has a velocity of 6.0 m/s [S] at \( t = 3.0 \) s. Five seconds later he is moving north with a speed of 4.0 m/s. Calculate the sprinter’s average acceleration.
   \[ \begin{align*}
   \frac{\Delta v}{\Delta t} &= \frac{v_f - v_i}{\Delta t} \\
   &= \frac{4.0 \text{ m/s} - (-6.0 \text{ m/s})}{5.0 \text{ s}} \\
   &= \frac{10 \text{ m/s}}{5.0 \text{ s}} \\
   &= 2.0 \text{ m/s}^2 \ [\text{N}]
   \end{align*} \]
   The average acceleration is 2.0 m/s² [N].

**Acceleration Practice:**

1. A cyclist accelerates from 5.0 m/s [S] to 15 m/s [S] in 4.0 s. What is his acceleration?

2. A jet plane accelerates from rest to 750 km/h in 2.2 min. What is its average acceleration?

3. A runner accelerates from 0.52 m/s to 0.78 m/s in 0.50 s. What is her acceleration?

4. A driver entering the outskirts of a city takes her foot off of the accelerator so that her car slows down from 90 km/h to 50 km/h in 10 s. Find the car’s average acceleration.

5. A boy rolls a ball up a hill giving it a velocity of 4.5 m/s [N]. Five seconds later the ball is rolling down the hill with a velocity of 1.5 m/s [S]. What is the ball’s acceleration?

**Answers:**

1) 2.5 m/s² [S]  2) 340 km/h/min  3) 0.52 m/s²  4) -4.0 km/h/s  5) 1.2 m/s² [S]