Mathematics of Velocity and Acceleration

Velocity is how quickly something moves (and in what direction) - this is the same as saying how far something moves in a certain amount of time!

$$\text{velocity} = \text{displacement} \div \text{time}$$

$$v = \frac{\Delta x}{\Delta t} = \frac{d}{t}$$

$$\boxed{v = \frac{d}{t}}$$

$$\frac{\text{meters}}{\text{second}} \left(\frac{m}{s}\right) \text{ (includes direction)}$$

Acceleration is how quickly something's velocity is changing (and in what direction):

$$\text{acceleration} = \text{change in velocity} \div \text{time}$$

final velocity

$$a = \frac{\Delta v}{\Delta t} = \frac{v - v_0}{t} \leftarrow \text{initial velocity}$$

$$a = \frac{v - v_0}{t} \qquad \frac{\text{meters}}{\text{second}^2} \left(\frac{m}{s^2}\right) \text{(includes direction)}$$

The Five Steps:

(letters)

1. Identify the variables given in the problem
2. Identify the variable you're trying to find

What's the question asking?

3. Write the equation you will use (pick from an If You Know table)

put numbers in for the letters

4. Substitute and solve

and use your calculator

5. In a box or circle, write the answer - with units (and direction if necessary)

A toad is pushing a derby racer across the hall. At first, the racer is traveling at 0.14 m/s towards the wall. After 1.3 seconds, the racer is traveling at 0.26 m/s towards the wall. What was the racer's acceleration?

#.　① $v_o = 0.14 \frac{m}{s}$ towards wall,　$t = 1.3 s$,

　　　$v = 0.26 \frac{m}{s}$ towards wall

② a

③ $a = \dfrac{v - v_o}{t}$

④ $a = \dfrac{(0.26 - 0.14)}{1.3} = 0.09$

⑤ $\boxed{a = 0.09 \frac{m}{s^2} \text{ towards the wall}}$