

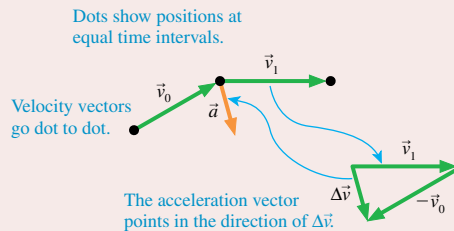
# SUMMARY

The goal of Chapter 1 has been to introduce the fundamental concepts of motion.

## GENERAL STRATEGY

### Motion Diagrams

- Help visualize motion.
- Provide a tool for finding acceleration vectors.



► These are the average velocity and the average acceleration vectors.

### Problem Solving

**MODEL** Make simplifying assumptions.

**VISUALIZE** Use:

- Pictorial representation
- Physical representation
- Graphical representation

**SOLVE** Use a **mathematical representation** to find numerical answers.

**ASSESS** Does the answer have the proper units? Does it make sense?

## IMPORTANT CONCEPTS

The **particle model** represents a moving object as if all its mass were concentrated at a single point.

**Position** locates an object with respect to a chosen coordinate system. Change in position is called **displacement**.

**Velocity** is the rate of change of the position vector  $\vec{r}$ .

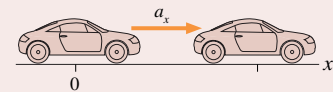
**Acceleration** is the rate of change of the velocity vector  $\vec{v}$ . An object has an acceleration if it

- Changes speed and/or
- Changes direction.

### Pictorial Representation

1 Sketch the situation.

2 Establish coordinates.



3 Define symbols.

$x_0, v_{0x}, t_0$        $x_1, v_{1x}, t_1$

4 List knowns.

Known	
$x_0 = v_{0x} = t_0 = 0$	
$a_x = 2 \text{ m/s}^2$	$t_1 = 2 \text{ s}$
Find	
$x_1$	

5 Identify desired unknown.

## APPLICATIONS

For **motion along a line**:

- Speeding up:  $\vec{v}$  and  $\vec{a}$  point in the same direction.
- Slowing down:  $\vec{v}$  and  $\vec{a}$  point in opposite directions.
- Constant speed:  $\vec{a} = \vec{0}$ .

**Significant figures** are reliably known digits. Three significant figures is the standard for this book. The number of significant figures for:

- **Multiplication, division, powers** is set by the value with the fewest significant figures.
- **Addition, subtraction** is set by the value with the smallest number of decimal places.