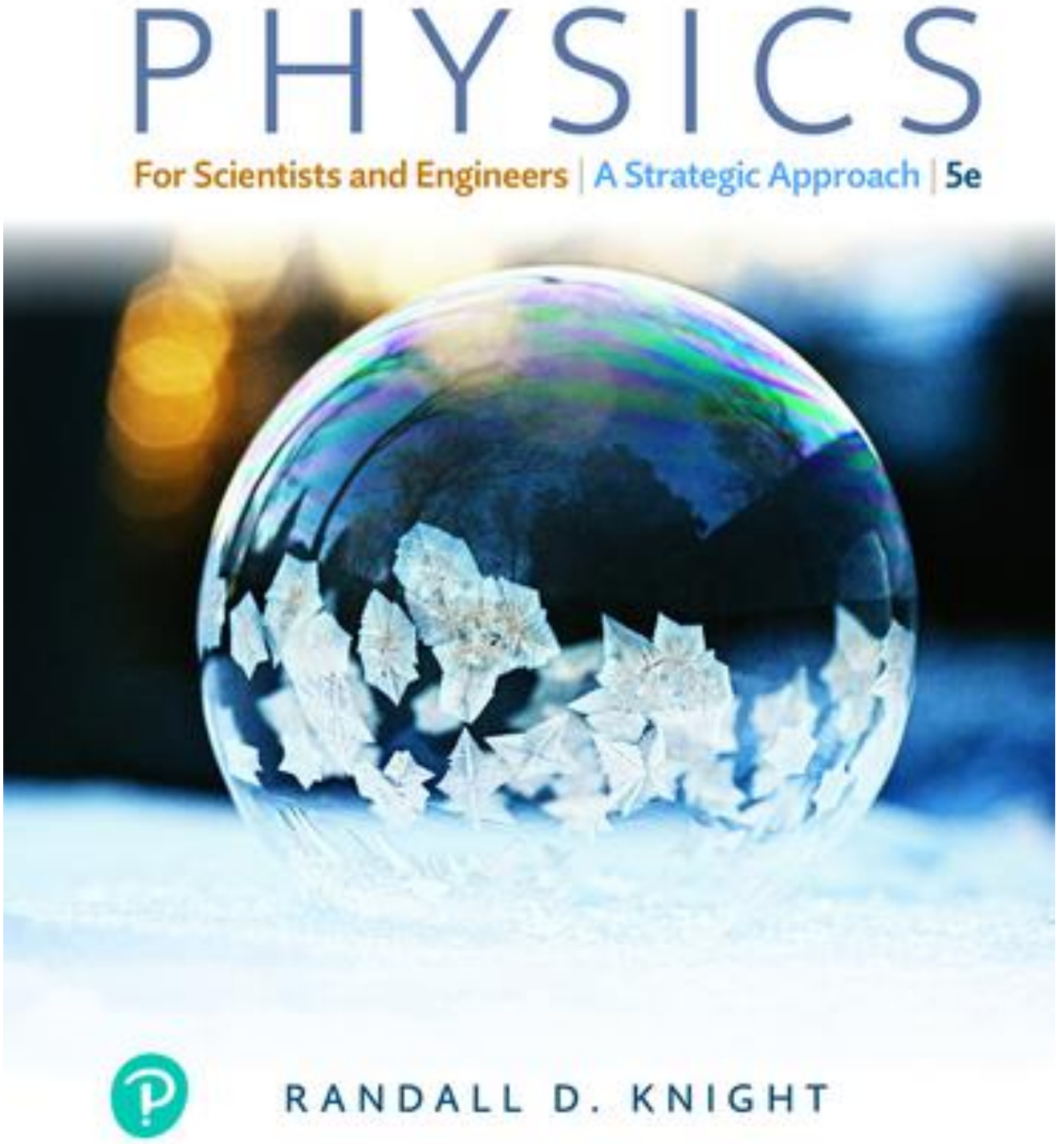
PHY151 Lecture 2



Summary

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

General Strategy

Problem Solving

MODEL Make simplifying assumptions.

VISUALIZE Use:

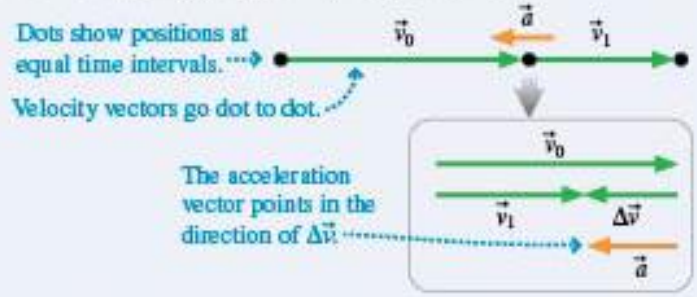
- **Pictorial representation**
- **Graphical representation**

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

REVIEW Does the answer have the proper units and correct significant figures? Does it make sense?

Motion Diagrams

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



▶ These are the *average* velocity and acceleration vectors.

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 $\vec{r}$.

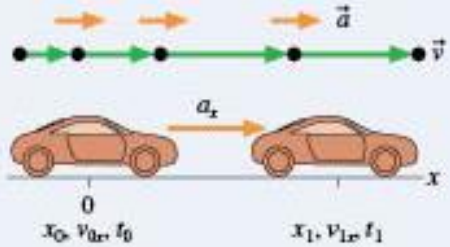
Acceleration is the rate of change of the velocity vector $\vec{v}$.

An object has an acceleration if it

- Changes speed and/or
- Changes direction.

Pictorial Representation

1. Draw a motion diagram.
2. Establish coordinates.
3. Sketch the situation.
4. Define symbols.
5. List knowns.
6. Identify desired unknown.



Known

$x_0 = v_{0x} = t_0 = 0$

$a_x = 2.0\ \text{m/s}^2$ $t_1 = 2.0\ \text{s}$

Find

x_1

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Motion Diagrams

- Help visualize motion.
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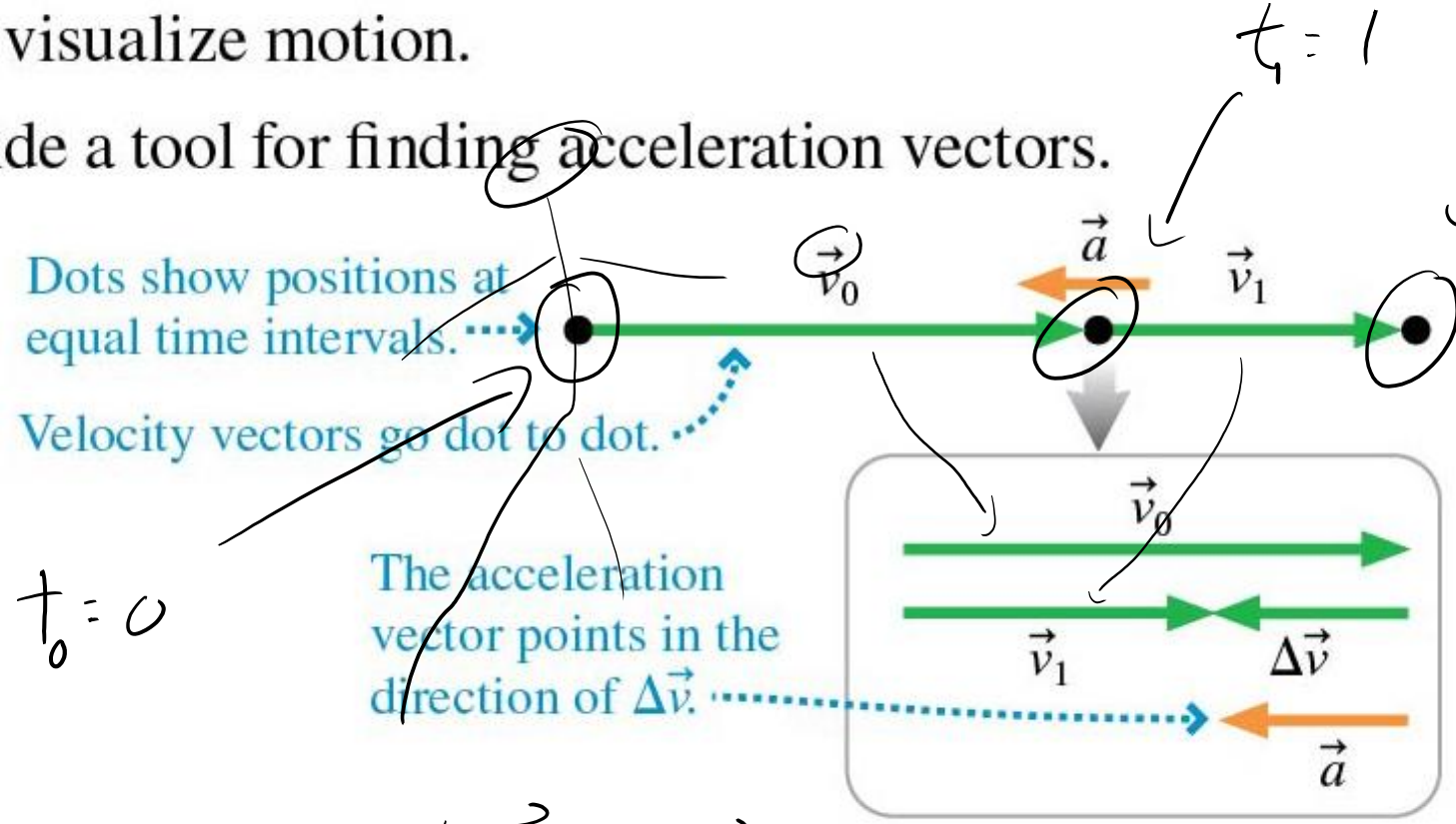

$t_1 = 1$ $t_2 = 2$ $t_0 = 0$

$\Delta\vec{v} = \vec{v}_1 - \vec{v}_0$

▶ These are the *average* velocity and acceleration vectors.

Summary

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$$\vec{v} = \frac{d\vec{r}}{dt} \qquad \vec{a} = \frac{d\vec{v}}{dt}$$

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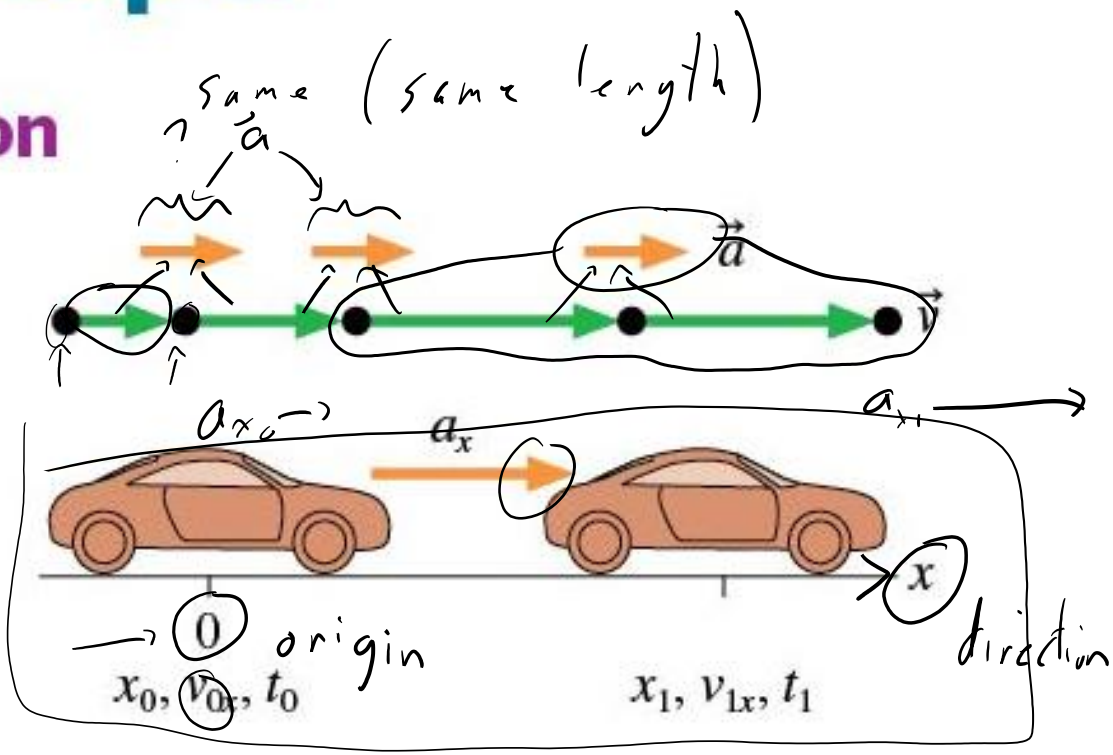

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Find
x_1

You drop a ball from a height of 1.00 m. It bounces up to a height of 0.84 m after 0.89 s. What was the average acceleration of the ball when it was touching the ground?