These notes are posted on my site for the following reasons:

- for students to copy in their own hand-writing
  - in order to complete their class notes
  - if student did not have enough time in class
  - if student was away and missed this section
- for assistants and tutors to follow progress of the concepts taught

Photocopied/printed notes can not be used during the Unit Notebook Check in class.

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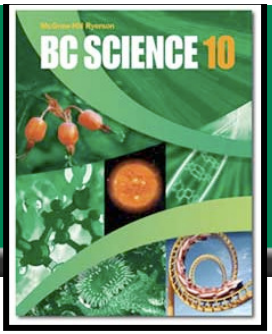
8.1 The Language of Motion

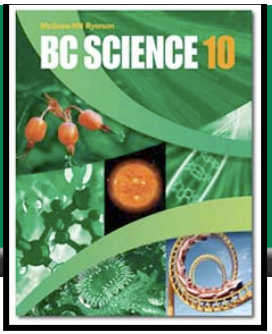


- Many words are used when describing motion.
- Many of these words have specific meanings in science.
- Some common words used to describe motion include:
  - Distance
  - Time
  - Speed
  - Position

•In short sentences, describe the motion of the soccer ball before and after it is kicked?
•What key words did you use when describing this situation?

See pages 344 - 345

Direction Makes a Difference

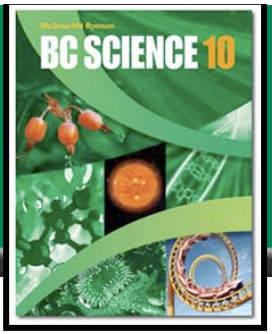


- Quantities that are measured or counted have a magnitude but may also contain a direction.
  - Magnitude refers to the size of a measurement or the amount you are counting.
- Quantities that describe magnitude but do not include direction are called scalar quantities or just scalars.
  - Example: 25 seconds
- Quantities that describe magnitude and also include direction are called vector quantities or just vectors.
  - Example: 5 km North

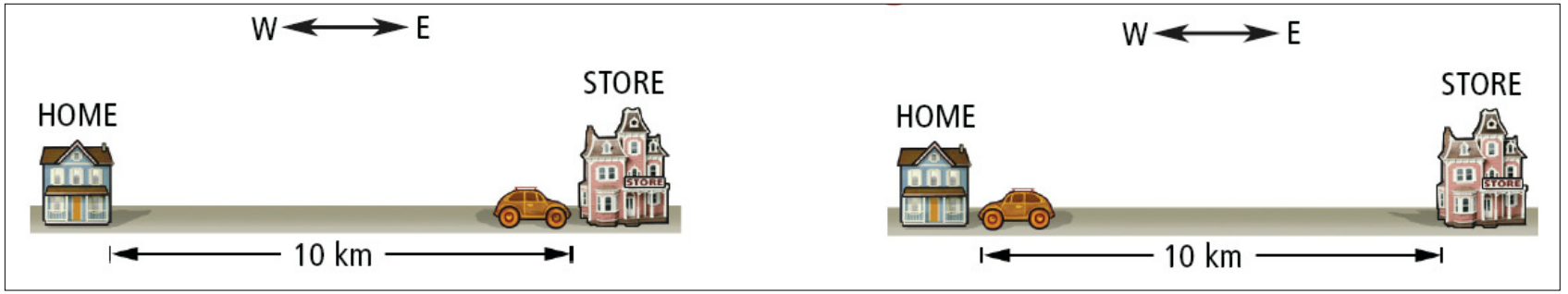
Every time you use a map or give directions, you are using vectors.

See page 346

Distance and Position



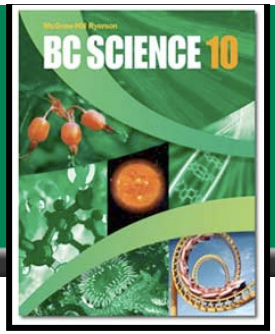
- **Distance (d) is a scalar quantity that describes the length of a path between two points or locations.**
  - **Example: A person ran a distance of 400 m.**
- **Position ($\vec{d}$) is a vector quantity that describes a specific point relative to a reference point.**
  - **Example: The school is 3.0 km East of my house.**
- **The SI unit for both distance and position is metres, m.**



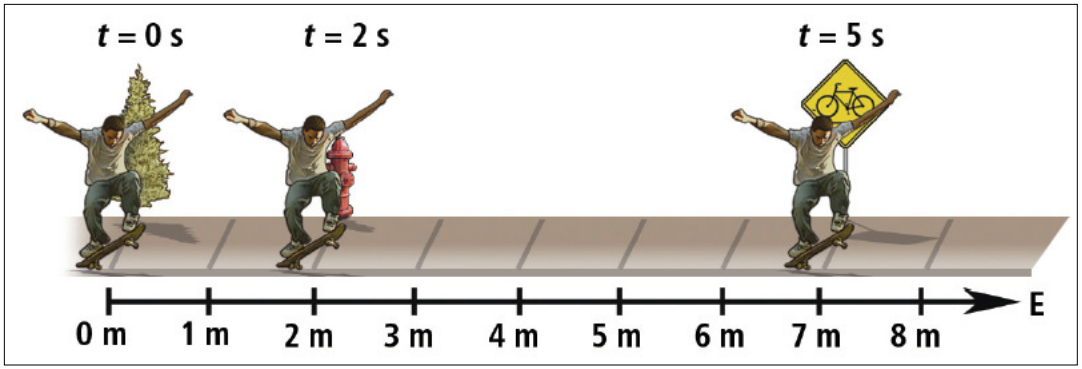
A car leaves home and drives 10 km to the store and then returns home. The car has driven a total distance of 20 km but its final displacement is 0 km.

See pages 346-347

Time Interval and Position



- **Time (t) is a concept that describes when an event occurs.**
  - **Initial time (t_i) is when the event began.**
  - **Final time (t_f) is when the event finished.**
- **Time interval is the difference between the final and initial times.**
- **Time interval is calculated by:** $\Delta t = t_f - t_i$



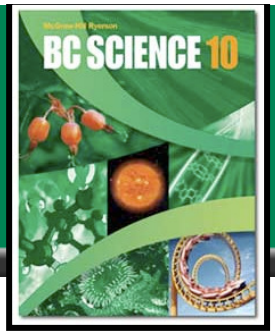
The time interval to move from the fire hydrant to the sign is calculated by:

$$\Delta t = 5\,s - 2\,s = 3\,s$$

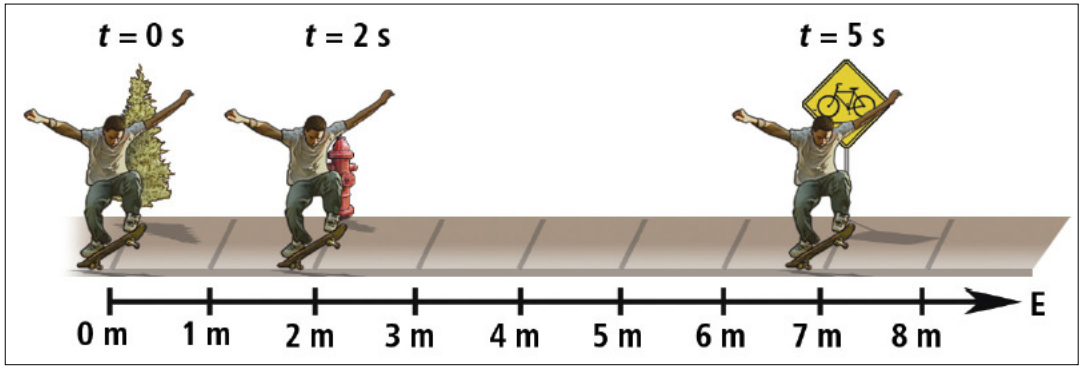
The position of the sign is 7 m east of the tree.

See pages 348

Displacement and Distance



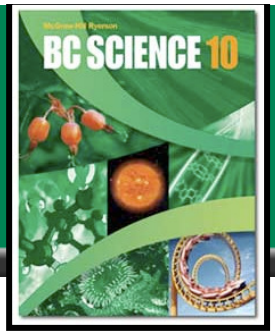
- **Displacement describes the straight-line distance and direction from one point to another.**
  - **Displacement describes how much an object's position has changed.**
- **Displacement is equal to the final position minus the initial position.**
- $$\Delta \vec{d} = \vec{d}_f - \vec{d}_i$$
- **The SI unit for displacement is metres, m.**



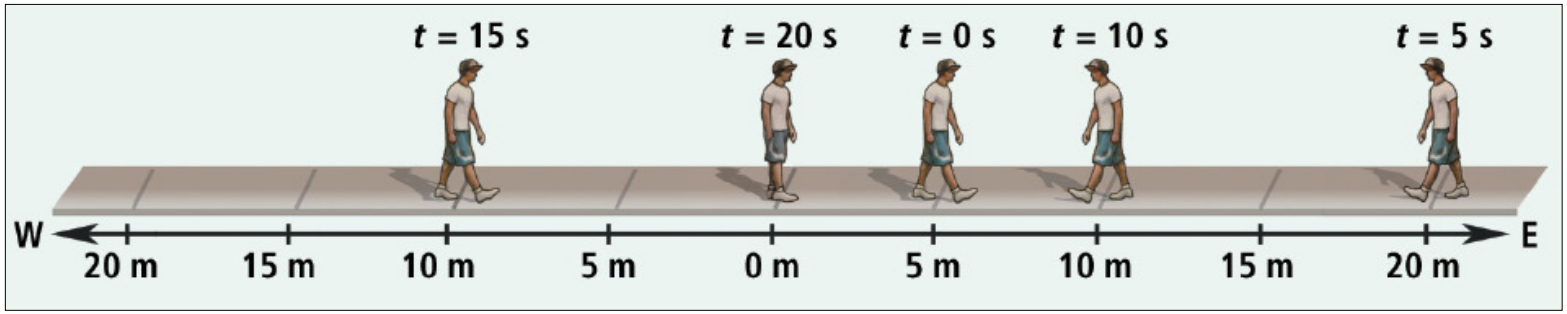
Between 2 s and 5 s, the skateboarder's:
displacement is 5 m [E].
distance travelled is 5 m.

See page 348-348

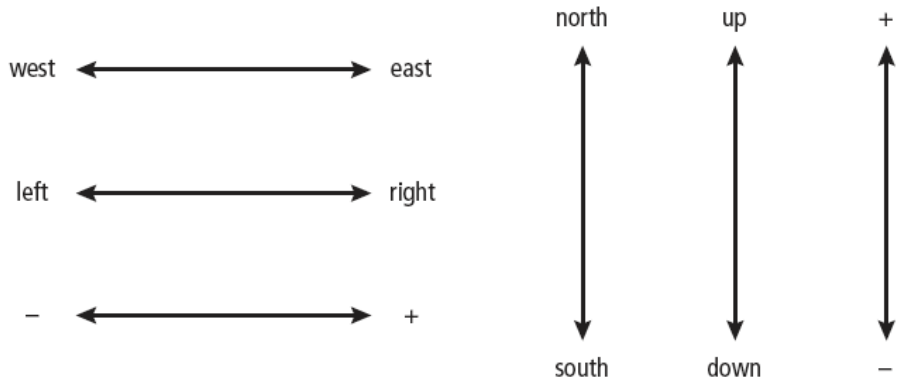
Watch for Signs



When using vector quantities, opposite directions are given opposite signs.



Common sign conventions



Between 0 s and 15 s the person's displacement is

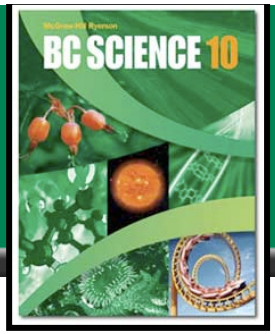
$$\Delta\vec{d} = \vec{d}_f - \vec{d}_i$$

= 10 m [W] – 5 m [E]
= -10 m – 5 m
= -15 m
= 15 m [W]

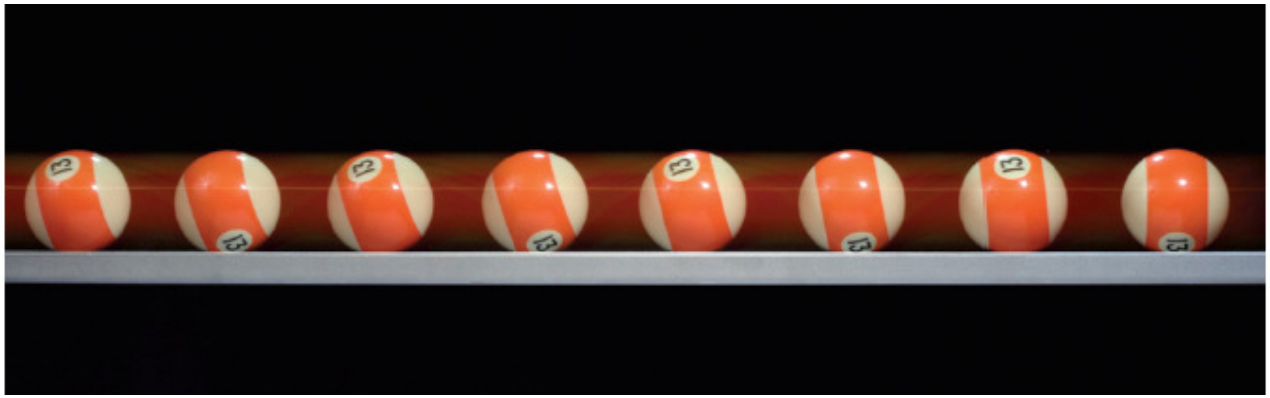
What distance did the person walk in this same time interval?

See page 349

Uniform Motion



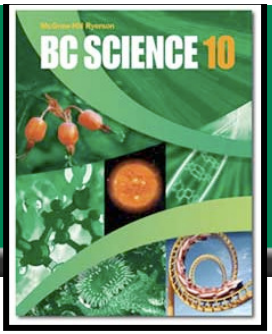
- **Objects in uniform motion travel equal displacements in equal time intervals.**
- **Objects in uniform motion do not speed up, slow down, or change direction.**



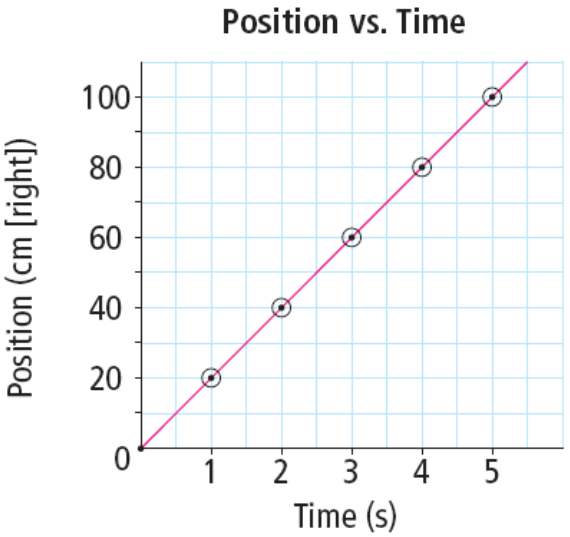
The position of the ball in this photo is shown at equal time intervals. How would you determine if this motion is uniform motion?

See page 350

Graphing Uniform Motion



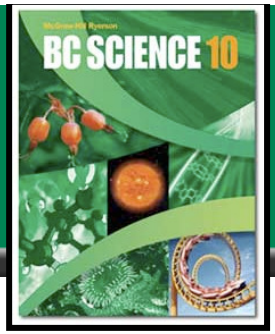
- Motion of an object can be analyzed by drawing a position-time graph.
- A position-time graph plots position data on the vertical axis (y axis) and time data on the horizontal axis (x axis).
- A best-fit line is a smooth curve or straight line that most closely fits the general shape outlined by the points.
- Uniform motion is represented by a straight line on a position-time graph.
  - The straight line passes through all the plotted points.



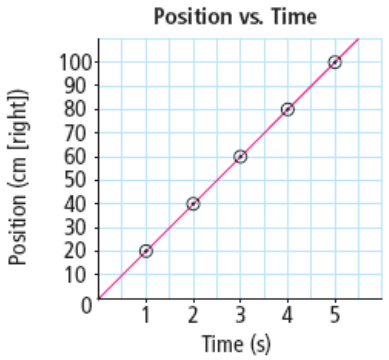
A straight line passing through the plotted data indicates uniform motion.

See pages 351-352

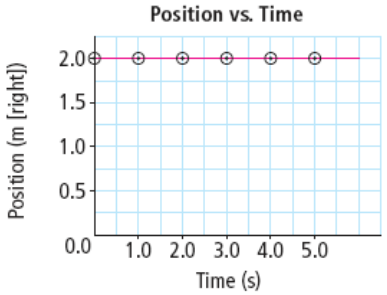
Slope



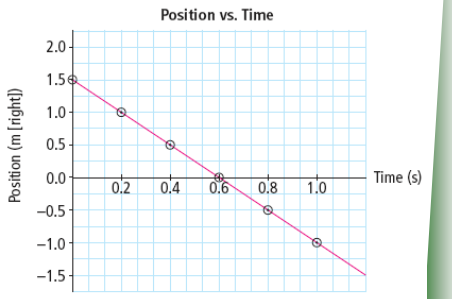
- **The slope of a graph refers to whether a line is horizontal or goes up or down at an angle.**
- **Positive slope**
  - **Slants up to the right.**
  - **Indicates motion in the direction of the positive y axis.**



- **Zero slope**
  - **Horizontal line.**
  - **Indicates that the object is stationary.**



- **Negative slope**
  - **Slants down to the right.**
  - **Indicates motion in the direction of the negative y axis.**



See pages 353-354

Take the Section 8.1 Quiz