

Motion

Section 2 Velocity and Momentum

Scan Use the checklist below to preview Section 2 of your book.

- Read all section titles.
- Read all boldfaced words.
- Read all graphs and equations.
- Look at all the pictures and read their captions.

Review Vocabulary

Define speed in a sentence to show its scientific meaning.

speed

Student responses will vary.

New Vocabulary

Use your book to define the words below.

velocity

the speed of an object and the direction of its motion

momentum

the product of an object's mass and velocity

Academic Vocabulary

The words positive and negative are a natural pair. Explain how no number can be both positive and negative. Can any number be neither positive nor negative?

negative

No number can be both positive and negative, because no

positive

number can be both greater than and less than zero. But zero is

neither positive nor negative.

Section 2 Velocity and Momentum (continued)

Main Idea

Velocity

I found this information on page _____.

SE, p. 51
RE, pp. 32–33

Motion of Earth's Crust

I found this information on page _____.

SE, p. 52
RE, p. 33

Details

Critique the phrase “airspeed velocity of a swallow.”

It is redundant. The velocity of a flying object already includes its airspeed.

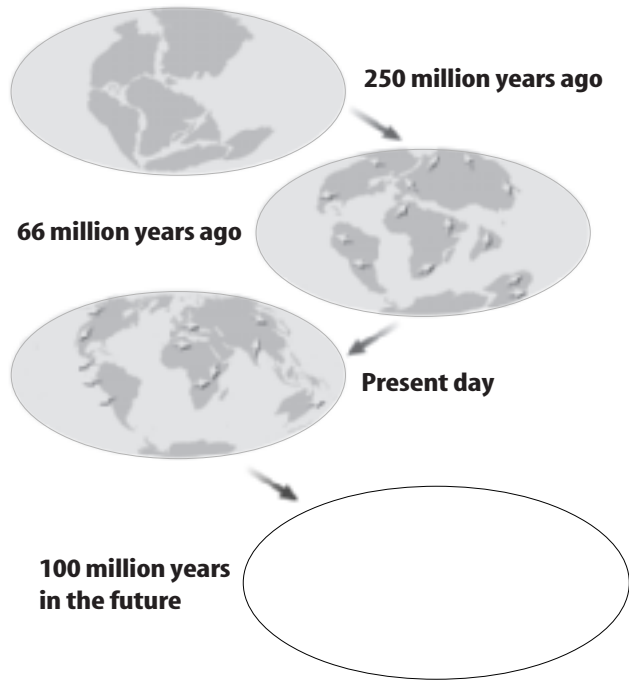
Model a swallow in flight.

- Use an arrow to show the swallow’s velocity.
- Label the arrow to indicate the swallow’s speed.

Accept all reasonable responses.



Draw the shape of the continents as they may appear at 100 million years from the present day.



Section 2 Velocity and Momentum (continued)

Main Idea

Details

Relative Motion

I found this information on page _____.

SE, p. 53
RE, p. 34

You are walking toward the back of a train that is moving forward with a constant velocity. The train's velocity relative to the ground is 30 m/s forward. Your velocity relative to the train is 1.5 m/s backward. How fast are you moving relative to the ground?

$Speed = 30 \text{ m/s} - 1.5 \text{ m/s} = 28.5 \text{ m/s forward}$

Momentum

I found this information on page _____.

SE, pp. 54–55
RE, p. 34

Analyze the property of momentum *in words and with an equation. Include units and identify all variables.*

Words

The momentum of an object is the product of its mass and its velocity.

Equation

$p = mv$
 p is momentum,
 m is the mass of the object in kilograms, v is the velocity of the object in meters per second.
The unit for momentum is $kg \text{ m/s}$.

Predict why momentum is a property of moving objects, but not of stationary objects.

Accept all reasonable responses. A stationary object would have a velocity of zero, so its momentum would also be zero because

$p = mv = m \times 0 = 0.$

CONNECT IT

Use your knowledge of velocity and momentum to describe how they are related.

Momentum is the product of mass and velocity, and therefore, a greater velocity means a greater momentum.