Buoyancy
Student Activity Book
Answer Key

Page 3 Getting Started

Answers will vary depending on a student's knowledge of vocabulary. A sample chart is shown below.

	I know this word	I have heard of this word	I don't know this word	I think it means
Sink	X			Drop to the bottom
Float	X			Sit on top of the water
Mass		X		
Surface area			X	
Displacement			X	

Page 5 Facts and Questions

Below are samples of possible facts and questions. Accept all reasonable responses

Section [1]

Fact
Jake threw a tennis ball into the pond.
Sparky ran into the water.
The ball was floating on the surface.
Sparky returned to Jake with the ball in his mouth.

Question
Why did Jake throw the tennis ball?
How does Sparky find the ball?
Why was the ball floating?

Section [2]

Fact
Shawna threw a lacrosse ball into the water.
Sparky ran into the water.
Sparky could not find the ball.

Question
Why did Shawna throw the lacrosse ball into the water.
How did Sparky try to find the ball?
Why could Sparky not find the ball?

Section [3]

Fact
Jake doesn't see the lacrosse ball anywhere.
Two balls look exactly alike but act differently in the water.

Question
Why doesn't Jake see the lacrosse ball?
Why would one ball sink and the other float when they both look exactly alike?

NS 2/23/11

Buoyancy
Student Activity Book
Answer Key (continued)

Page 6 Making Predictions
Acceptable responses include but are limited to the following.

Properties of Balls

Clay	Rubber	Styrofoam
Green Doesn't bounce Surface smooth sticky No seam	Red Bounces Surface very smooth Has a seam	White Doesn't bounce Surface smooth has pattern Has a seam

*Accept all drawings that show the balls in or on top of the water.
Correct predictions would show the clay ball at the bottom, the rubber floating on the top but partially submerged, and the Styrofoam ball floating on top of the water.

Page 7 Think about Sinking
Volume of Objects
Volume will vary depending on the actual objects used by the students. This is particularly true for the clay and the rock samples. More important that the answer is for students to demonstrate the technique they used to determine volume.
Sample chart shown below.

Object	Volume
Clay	62 mL
Rock	34 mL
Golf Ball	42 mL
Plastic Cube	15 mL

Page 9 Facts and Questions
Below are samples of possible facts and questions. Accept all reasonable responses.
Section [1]
Fact Sara cannot swim by herself.
The water wings are filled with air.
Sara floats easier with water wings.

Question How do the water wings help Sara float?

Section [2]
Fact Joe stretched out and lay on his back.
Joe was floating.

Question Why did stretching out help Joe to float?

NS 2/23/11

Buoyancy
Student Activity Book
Answer Key (continued)

Section [3]

Fact Jake curled himself up in a ball.
Jake went under water.

Question Why did curling up like a ball help Jake go under water?

Page 10 Make It Float

I think objects can float if they stay on or near the top of the water.

In the 1st drawing a ball of clay should be at the bottom of the container.

In the 2nd drawing a flattened piece of clay should be at the top of the water.

Did the mass of clay change? no
Did the color of the clay change? no
Did the shape of the clay change? yes

To make the clay float flatten out the clay until it is a large thin piece. (This gives the clay greater surface area)

Page 12 Displacement

2. The water level goes up.
3. Rise
4. Answers may vary somewhat but "height of water with weight" should be higher than "height of water without weight".

Height of water without weight	Height of water with weight	Difference in height of water
3 cm	4 cm	1 cm

5. The boat with more children should sit lower in the water.

Page 13 Carrying Cargo

Drawings will vary as will the number of weights each boat can carry.

Predict the total mass that the boat can hold.
If, for example a boat held 15 weights, and each weight is 6 grams then the boat held.

15 x 6 grams = 90 grams

Buoyancy
Student Activity Book
Answer Key (continued)

Page 15 Boat Materials
Possible materials for making a boat: wood, aluminum, steel, fiberglass.

Below are possible answers. Student answers will vary particularly for the aluminum boat. Careful placement of weights results in higher numbers.
Plastic cup 23 weights
Styrofoam cup 40 weights
Aluminum cup 17 weights

Drawings of the aluminum boat will vary but, as a general theme, the boats should have flat broad bases.

Page 16 Salt in the Water
Compare sink/float properties of fresh and salt water.
1. Spoon sank to the bottom.
2. Spoon started to sink then bounced back up.
3. Hexagonal weight sank in fresh water; floated in salt water.

*Results of My Boat Test
I found that the boat carried more weights in the salt water than in the fresh water.

Page 17 What's the Big Idea?
Below is a possible sample. Accept all reasonable responses.

	The Big Idea!
Sink	Completely under water
Float	Part or all of object at the top of the water
Mass	Amount of material in an object
Surface area	Space on the outside of an object
Displacement	One object moves to make room for another