Front

Deep-Sea Dilemma

STEM

Problem: Time to go swimming! Before jumping into the water, you decide to gather toys for a game of underwater rescue. Experiment and discover which of these objects **sink**, and which of these objects **float**.

Focus:

I wonder — Does each object in this set sink or float?

I predict — On the Prediction Sheet, write down which items you think will sink and which items will float.

Materials Needed:

Submarine

Ring

Hexagon

Raft

Plastic Star

Star Sponge

Red Ball

Blue Ball

Prediction Sheet
Will It Sink or Float? Sheet

Card 1

Experiment

1. Place the raft in the water. Observe whether it sinks or floats. Continue testing other objects from the set, one at a time, and record the results on the Prediction Sheet.
2. Gather three other items, not in the set, to see if they sink or float. Before placing these objects in the water, make a prediction on the *Will It Sink or Float?* Sheet, based on what you learned in the previous step. Then, test each item and record results on the same sheet.

Conclusion:

I observed

Did all the objects sink or float?

Science Connection: Sort the Sink or Float Sorting Cards into two categories: objects you predict will sink, and objects you predict will float. After sorting, test each object shown on the cards to see if it sinks or floats. Were your predictions right?

Front

Skimming the Surface

STEM

Problem: You can only carry one ball to the beach. You want the ball that **floats**, so you can roll it across the water to your friends. Can you find the ball that floats?

Focus:

I wonder

Which ball will **sink**?
Which ball will float?

I predict

Draw your prediction on the Prediction Sheet.

Materials Needed:

Red Ball

Blue Ball

Prediction Sheet

Observation Sheet

Card 2

Experiment

1. Drop the blue ball in the water. Draw a picture of what you observe on the Observation Sheet. Did the blue ball sink or float? Why do you think so?
2. Drop the red ball in the water. Draw a picture of what you observe on the Observation Sheet. Did the red ball sink or float? Why do you think so?

Conclusion:

I observed

Which ball sank? Which ball floated?

Science and Engineering Connection: How can you get the ball that sank to float? How can you get the ball that floated to sink? Use other materials around you to solve these problems.

Front

Set Sail

STEM

Problem: You are at the boat launch because today is race day! However, when you place your boat in the water, you notice that it tips from side to side. Can your boat continue to **float**, even on its side?

Focus:

I wonder

Does an object's ability to float depend on how you place it in the water?

I predict

On the Prediction Sheet, draw the position in which you would place the raft to make it float.

Materials Needed:

Raft

Prediction Sheet

Observation Sheet

Card 3

Back

Experiment

1. Hold your hand above the water and drop the raft. Does the raft float or sink in the water? Try dropping the raft in the water in different ways to get it to sink. Draw how you dropped the raft in the water on the Observation Sheet.
2. Now, try putting the raft in the water so that it floats. How did you get it to float? Draw how you put the raft in the water on the Observation Sheet.

Conclusion:

I observed

Does an object sink or float because of how you place it in the water?

Science Connection: What other items can you find that both float and sink depending on how you place them in the water? Try a few.

Front

Super Submarine

STEM

Problem: Real-life submarines can go underwater or stay on the surface. Do you think the Super Submarine in this set can do the same? If so, how can you get it to **float** first, and then **sink**?

Focus:

I wonder

Are you able to make a floating object sink?

I predict

State your prediction to the *I wonder* question.

Materials Needed:

Submarine

Red ball

Rings

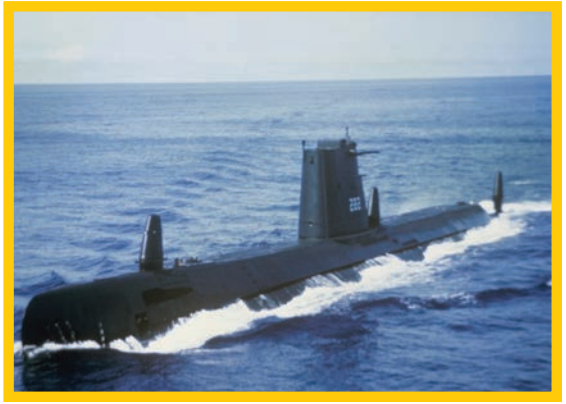
Hexagons

Card 4

Back

Experiment

1. Place the submarine in the water. Does the submarine float? Why do you think so?
2. Now, remove the top from the submarine; set it aside. Hold the bottom of the submarine in one hand.
3. Add the hexagons, rings, and red ball to the bottom, place the top back on, and set the submarine back in the water. Does the submarine sink? If not, try adding different quantities of the objects. Is there anything else you can do to make the submarine sink? Keep trying until the submarine is completely underwater!



Conclusion:

I observed

How was the Super Submarine able to float at first, and then sink?

Science and Technology Connection: Take a picture of the submarine floating. Then, carefully take a picture of the submarine after you made it sink using the objects. Find other ways to make the submarine sink, by increasing its **density**, and take pictures of your success. Discuss which picture shows the easiest way to make the submarine sink.

Front

The Sea Inside

STEM

Problem: The Super Submarine is diving underwater for a top-secret mission...but the crew didn't close the hatch in time, and water is pouring in! Will the water inside the submarine make it **sink**, or will it stay afloat?

Focus:

I wonder

Can a submarine float when filled with both water and **buoyant** objects?

I predict

Draw a line on the Prediction Sheet. Draw the submarine on top of or below the line to show your prediction to the *I wonder* question.

Materials Needed:

Submarine

5 Rings

Blue Ball

Prediction Sheet

Card 5

Back

Experiment

1. Remove the top from the submarine; set it aside. Hold the bottom of the submarine in one hand.
2. Put the blue ball and all 5 rings in the bottom of the submarine. Place the top back on and set the submarine in the water. Does it float?
3. Next, remove the objects and fill the submarine with just water through the hatch (top hole), without lifting the submarine from the water. Does the submarine sink or float now?
4. What happens if you place both the buoyant objects and water in the submarine? Try it! Was your prediction correct?

Conclusion:

I observed

Did the submarine float when filled with both water and buoyant objects?

Science Connection: Using other pieces from the set, try to get the submarine to sink with both objects and water.

Front

Dive for Treasure!

STEM

Problem: The Super Submarine is preparing to search for sunken treasure on the ocean floor. Which weights will help the submarine **sink**, so it can dive down to the bottom?

Focus:

I wonder — Will the rings or hexagons make the submarine sink?

I predict — Draw your prediction on the Prediction Sheet.

Materials Needed:

Submarine

Rings

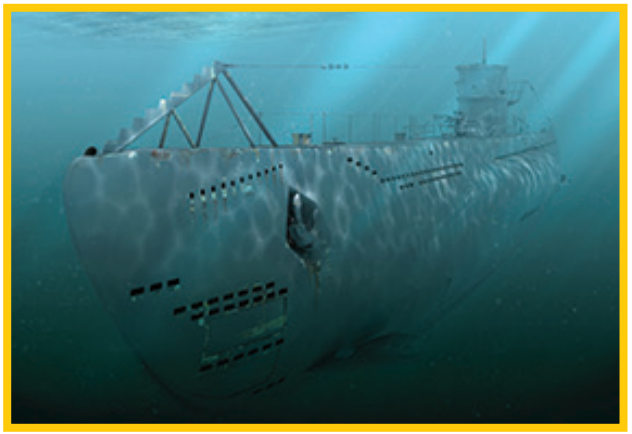
Hexagons

Prediction Sheet

Card 6

Experiment

1. Remove the top from the submarine; set it aside. Hold the bottom of the submarine in one hand.
2. Put 5 rings in the bottom of the submarine, place the top back on, and set the submarine in the water. Does the submarine **float** or sink? Why do you think this happened?
3. Remove the top again. Take out the 5 rings. This time, add 5 hexagons to the bottom, place the top back on, and put the submarine in the water. Did the submarine float or sink? Why do you think this happened?



Conclusion:

I observed

Why did the submarine sink with one kind of object and not the other?

Math Connection: What combination of rings and hexagons can you use to make the submarine sink, by increasing its **density**? How many of each did you use? Graph your results.

Engineering Connection: Build a raft or boat that can hold the same number of hexagons (5).

Front

Raft Tipping

STEM

Problem: After a day in the sun, the star wants to go for a little dip in the pool to cool off. How can you get the raft to tip so the star can take a dip?

Focus:

? I wonder — How can I get an object to tip?

I predict — Write your prediction on the Prediction Sheet.

Materials Needed:

Hexagons

Plastic Star

Raft

Prediction Sheet
Observation Sheet

Card 7

Back

Experiment

1. Place the raft in water.
2. Try placing the plastic star and some of the hexagons together in the center of the raft. Does the raft tip?
3. Try placing the star and hexagons in other spots on the raft. Draw a picture on the Observation Sheet of the different areas on the raft where you placed the objects.
4. Where did you place the objects on the raft when it tipped? Circle that picture on the Observation Sheet.

Conclusion:

I observed

Where should the weights be placed on the raft so it tips easily?

Engineering Connection: Can you place three of the hexagons on the raft without it tipping or sinking?

Art Connection: What does it mean to tip? Draw a picture of a raft or boat tipping.

Front

Below Sea Level

STEM

Problem: The captains of the submarine and the raft are racing to see which one can **sink** faster. How can you help sink each vessel in this race to the bottom?

Focus:

I wonder

Will the submarine or the raft sink more quickly?

I predict

State your prediction to the *I wonder* question.

Materials Needed:

Hexagons

Rings

Red Ball

Raft

Stopwatch
(not included)

Submarine

Data Sheet

Card 8

Back

Experiment

1. Get a stopwatch ready to time your experiment.
2. Begin your stopwatch. One at a time, place the red ball, rings, and hexagons on the raft until it sinks. Time how long it took the raft to sink. Then, record on your Data Sheet:
   - **a.** the end time shown on the stopwatch;
   - **b.** the number of objects it took to sink the raft.
3. Now, try the same experiment with the submarine. Place objects in the submarine without adding the top back on. Time how quickly the submarine sinks. Then, record the same data from before (time, number of objects) on your Data Sheet.
4. Which vessel sank first? Did you have to do anything different to get the submarine to sink?

Conclusion:

I observed

Which vessel sank faster?
Why do you think this happened?

Math Connection: How much faster did one sink compared to the other? Try the experiment again. Can you make one sink even faster than in the previous experiment? How much faster can you get the raft or submarine to sink?

Front

Sub-merged

STEM

Problem: You want to find out how much it "costs" to **sink** the raft. Can you sink the raft by filling it with pennies?

Focus:

I wonder — How many pennies will it take to sink the raft?

I predict — Write your prediction on the Prediction Sheet.

Materials Needed:

Raft

Pennies (not included)

Prediction Sheet

Observation Sheet

Card 9

Experiment

1. Start placing 10 pennies in the raft, counting each penny, one by one. Does the raft still float? Keep adding and counting pennies until the raft sinks.
2. How many pennies did it take to sink the raft? Record your results on the Observation Sheet. Were you close to your prediction? What was the difference between your prediction and how many pennies it actually took to sink the raft?
3. Try this experiment again with the bottom of the submarine. Predict how many pennies it will take to sink the submarine. Were you close to your prediction? Was it easier to sink the raft or the submarine? Why do you think so?

Conclusion:

I observed

How many pennies did it take to sink the raft?

Math Connection: Try this experiment again with another coin. Did you need more or less of this coin, compared to the pennies, to sink the raft?

Engineering Connection: Using only a square piece of foil, design a boat that will hold the most pennies. Think about how to shape the foil to hold pennies: for instance, should it be flat, rounded, have sides, be deep, or be shallow? How many pennies did your custom boat hold?

Front

Soak, Float, Repeat

STEM

Problem: The star-shaped sponge lives deep down in the water. On sunny days, it rises to the water's surface to dry off in the sunshine. Today, it is having difficulty **floating**. Can you help the star float to the water's surface once again?

Focus:

I wonder

How can you make the sponge float again after it sinks?

I predict

Write your prediction on the Prediction Sheet.

Materials Needed:

Yellow Sponge

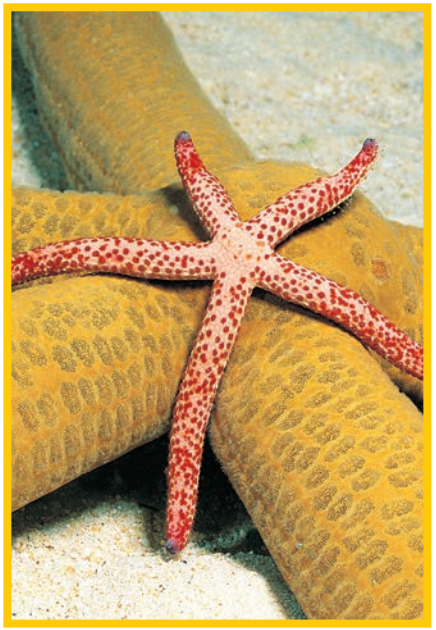
Prediction Sheet

Observation Sheet

Card 10

Experiment

1. Place the dry sponge in water. Draw a picture of your observations on the Observation Sheet.
2. Brainstorm ideas for how you can make the sponge sink to the bottom. What do you have to do to make it sink? Try your ideas. Which one worked? Draw a picture of how you made the sponge sink on the Observation Sheet.
3. After the sponge sinks, take it out of the water. Try making the sponge float again! What can you do to make it float after it has sunk? Why do you think you have to do this?
4. What properties does the sponge have that allow it to both sink and float? To answer this question, consider what the sponge is made of: how do you think this affects its **buoyancy** and **density**?



Conclusion:

I observed

How did you make the sponge float again after it sunk?

Technology Connection: What tools can you use to help dry a sponge?

Science Connection: Try experiments with freezing. Place the sponge in water and freeze the water. After the water is frozen, observe the sponge as the water melts. Does the sponge sink or float? Try soaking the sponge and freezing it. Then, place the sponge in water—did it sink or float?