

# Design Challenge: Ships Ahoy!

*Design the fastest sailboat or one that carries the most treasure!*

## **Goal:**

Design, build and test a sailboat that can make it across our track in the shortest amount of time, OR a sailboat that carries the most treasure.

## **Time:**

20 minutes for the activity, 10 minutes for set up and cleanup

## **Materials:**

- Boat hulls
- Masts (K'NEX)
- Sails (Fun Foam shapes)
- Plastic clips
- Gems

## Design Cycle!

- 1 ASK/IMAGINE/PLAN:** What makes a sailboat go? How are our sailboats powered? How can you build yours so that it stays afloat?
  - Brainstorm different combinations of materials you could use to design your sailboat.
  - Think of many different possible solutions and discuss them with your team or classmates. Think of what real sailboats look like, and how they sail.
- 2 CREATE:** Construct your prototype with the materials you have selected.
- 3 TEST:** Ask Design Challenges staff to help you test your device. Record your results.
- 4 IMPROVE:** Try to improve your sailboat by changing one variable. Test your new prototype. How long did it take to get to the end of the track? Did your sailboat stay afloat? How much treasure did it carry? Which design worked best? What did you learn from your tests?

# Ships Ahoy!: Facilitation

## Talking Points

- How tall can your sail be before it becomes unstable?
- What happens when your sail fills with air?
- How does adding weight to your sailboat affect it's center of gravity?
- Do you think there is a maximum weight your boat can be loaded with and still float?
- Do you think using our test track (when available) can help you predict whether your boat will float or not in the racetrack?
- What do you predict would happen if you added more surface area to your sail?
- What is the Engineering Design Process?
- What are some of the variables you can change?
- Why is it important to try to change one variable at a time in your design?

## Calculate your boat's speed

Our records are measured in time, not speed, but you can convert your boat's time to speed by using the simple formula  $S=D/T$  - Speed equals Distance divided by Time.

Our track is six feet long, so divide six by your boat's time to get your boat's speed in feet per second. Then to convert that to miles per hour, multiply by 0.7.