

4. Raft

Science

- Balance
- Buoyancy
- Pushes and pulls
- Wind energy

Design and Technology

- Assembling components
- Combining materials
- Evaluating
- Properties of materials

Vocabulary

- Area
- Float
- Force
- Load
- Sail
- Sink
- Stable
- Unstable

Other Materials Required

- Large tub
- Ruler
- Timer or clock
- Towels to dry the wet bricks

Connect

Captains Sam and Sara are dangerous pirates on their way to Treasure Island. They are going to bury all their precious treasure of silver and gold. They must hurry so nobody sees them since they wouldn't want anyone to steal their loot. But Captains Sam and Sara and their infamous raft aren't going very fast. Sam blows hard on the sail to make the raft go faster. Sara says they will need to hurry if they are not to be seen.

**Can you help Sam and Sara make their raft sail faster?
Let's find out!**

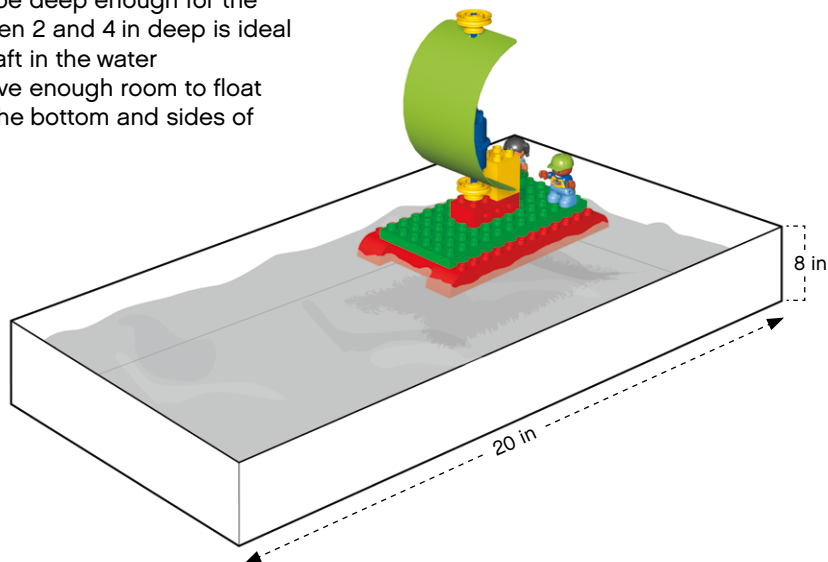


Construct

Build the raft using
building instructions no. 4



- Fill the tub
- The tub should be a minimum of 20 in long
- The water should be deep enough for the raft to float. Between 2 and 4 in deep is ideal
- Gently place the raft in the water
- The raft should have enough room to float without bumping the bottom and sides of the tub



Contemplate

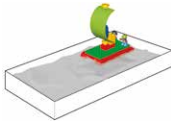
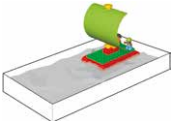
Fast or faster?

Blow or wave the box lid as a 'breeze maker'. Find out which sail will make your raft sail faster.

First predict which of the rafts will sail fast and which will sail faster. Write down your predictions using the words on the worksheet.

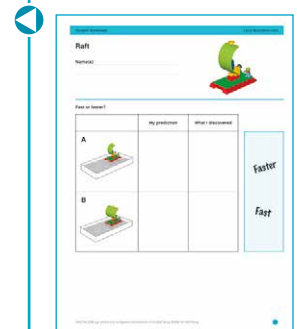
Next, test the raft with the small sail and then with the big sail. Write down your findings using the words on the worksheet.

The large sail has more area to catch the force of the wind. The wind pushes the sail, thereby pushing the raft forward.

	My Prediction	What I Discovered
A 		Fast
B 		Faster

Have the students reflect on their tests by asking questions such as:

- What did you predict would happen and why?
- Describe what happened.
- How did you make sure your tests were fair?
Did you blow or wave at the same speed?
Did you blow or wave from the same position?
- Describe how the model works.
- If you could improve three things about your raft, what would you do and why?



Tip: When making changes to the raft, it is a good idea to dry it with a towel first. Water collected on the raft can influence its buoyancy.

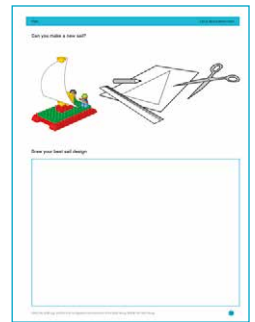
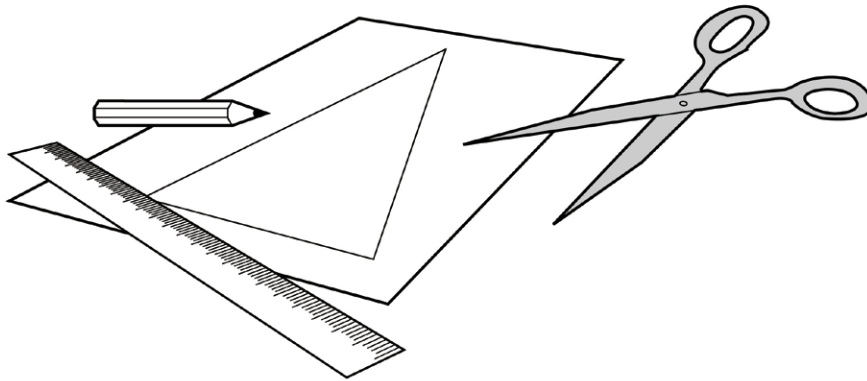
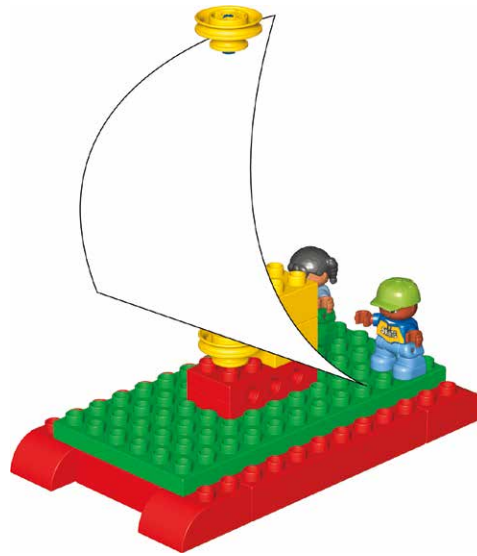
Did you know? The air trapped under the LEGO® DUPLO® bricks makes them float (buoyant). If all the air leaks out, the raft will sink.

Continue

Can you design and make a new sail?

Use your imagination to design your very own raft sail.

Design sails of different shapes and test how they work. Consider which materials would be best. Then make them beautiful and colourful. *On the worksheet, draw your best sail design.*



Optional: Build Your Own Raft

Can you build a raft that will carry lots of silver and gold – without sinking?

Raft

Class: _____

Date: _____

Performance and Learning Targets Linked to the Activity and the Eight Next Generation Science Practices	Name(s):											
<p>Observe the suggested student behaviors while working with the activity. Either use the suggested Emerging (E), Developing (D), Proficient (P), Accomplished (A) proficiency level descriptions or use one relevant to your context.</p>												
Student Performance Targets Linked to the Activity To what degree can the student...?												
Adequately build the raft model with help or independently using the Building Instruction (1, 2, 3, 6)												
Use the model to demonstrate understanding of terms and make predictions about speed and stability (1, 3, 4, 5)												
Meet or exceed expectations in the design of the raft based on directions of activity (E.g. Must have a sail, Fill tub adequately with water, Create stable base) (2)												
Make changes or create a new model design in order to create a more advanced model based on tests and data (2, 3, 4, 6)												
Use raft worksheets to record and analyze data collected from the model investigation (3, 4, 5)												
Selected Student Learning Targets Linked to the Practices To what degree can the student...?												
Ask simple to advanced questions based upon observations to make predictions (1, 3)												
Demonstrate ability to use fair testing of models and make adjustments based upon data (3, 4, 6)												
Communicate the meaning of the findings with others (E.g. orally, in drawing or writing) (4, 8)												
Follow a plan to define, carry out, test, evaluate and share a design task (2, 3, 4, 5, 6, 7, 8)												
Compare solutions with other groups and listen to the ideas of others (6, 7, 8)												
Optional Student Learning Targets												
Lesson Observational Notes:												