



Brace Against the Wind

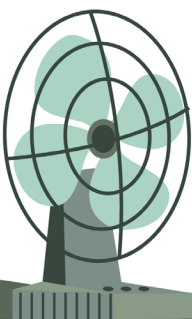
Grades
3-5

Student Activity Workbook

Name: _____

Date: _____

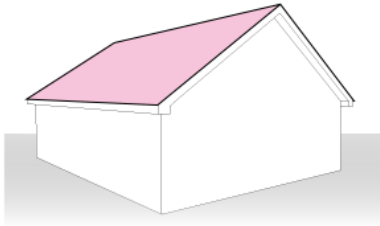
Engineering Notebook



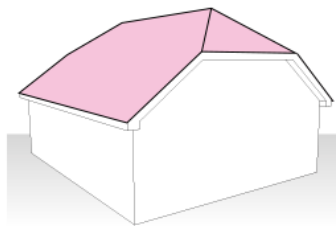
Seaworthy STEM™ in a Box Series

Brace Against the Wind

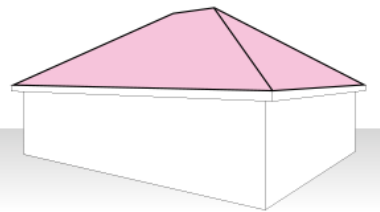
Roof Types and Styles:



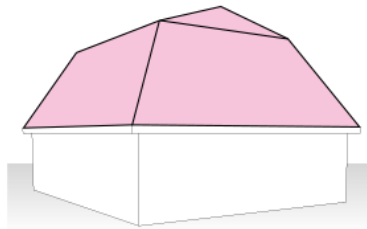
GABLED ROOF



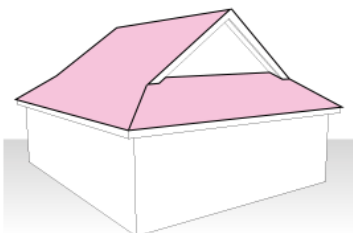
CLIPPED GABLE ROOF



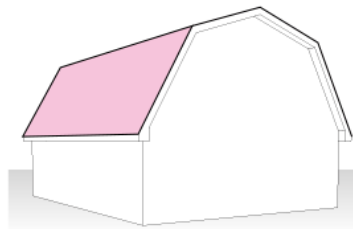
HIP ROOF



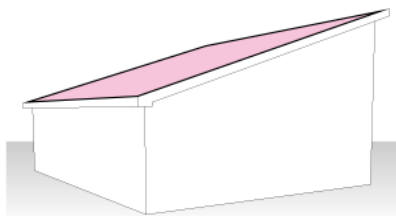
MANSARD ROOF



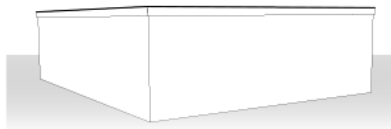
DUTCH GABLED ROOF



GAMBREL ROOF



SHED ROOF



FLAT ROOF

Did You Know?

Engineers study climate, air pollution, and weather to address problems which might occur in a building's life. It is crucial for engineers to create and maintain a safe infrastructure with the ability to withstand severe weather conditions. Designing buildings can be similar to designing airplanes when it comes to aerodynamics.

- I** Your team was tasked to find the best solution to protect the boat from extreme weather conditions. Look at the pictures on page 2 of the workbook. What type of roof do you predict will work best when tested in windy conditions? Describe why by completing a short paragraph then drawing a design of what your team will build for testing.

Describe:



Draw out your solution:



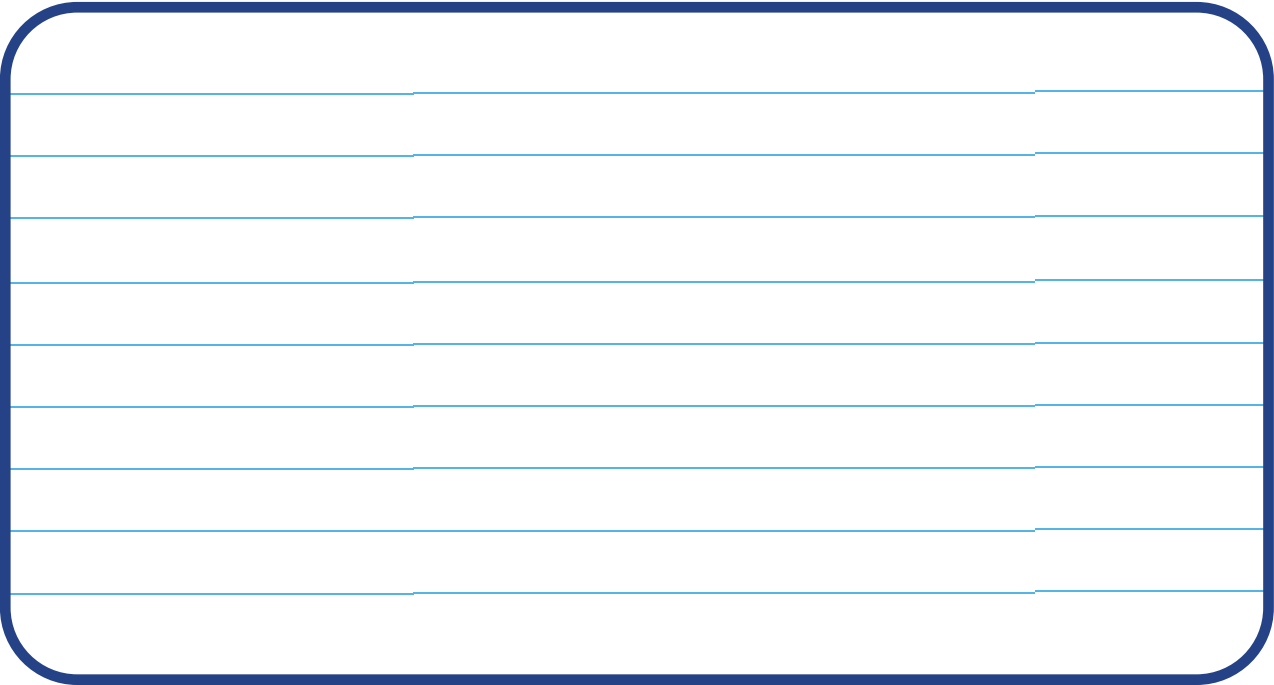
2

Redesign.

Please write in the space below of how you changed your design and why.

Please draw your newly redesigned roof in the box at the bottom of the page.

Describe:



Draw out your solution:



The Navy has hundreds of boats within its fleet! When the weather forecast predicts possible hurricanes or other natural disasters, where do you think the Navy moves its fleet to protect the boat and crew members?

[illegible]

- 4 Environmental scientists and engineers are constantly creating new solutions and ways to protect our buildings and citizens from natural disasters. Below is a model of a town by a coastline. The weather forecast predicts high winds, rise of water levels, and possible flooding. What would you do to protect the town? Draw out your solution and use the text box to describe how you would protect the town.



A large, empty rectangular box with rounded corners and a blue border, intended for drawing a solution to protect the town.



Fun Fact!

When a ship tips due to wind or waves, there is a righting motion caused by several engineered elements that brings the vessel upright once more. This includes the structural weight including placing heavier equipment and cargo below deck to create a low center of gravity. However, there comes a point in which a ship cannot correct itself and will capsize. This is the tipping point or angle of vanishing stability. Knowing at what angle a ship can safely roll and when it is in danger are crucial for naval architects and pilots alike as they work to keep the lives of those on board safe.



Fun Fact!

Even though we are designing paper houses in this experiment, builders wouldn't want to use paper to build an actual shelter! When building a safety shelter, engineers and architects use metal to build the structure's roof. A metal roof can weather hurricane-force winds up to 160 mph, making it the most wind-resistant solution. Metal roofing systems are expensive but they last longer and are more durable than any other types of roofing.

#SeaworthySTEM

Brace Against the Wind Engineering Notebook



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