STRANDED! OVERVIEW: STORY LINE AND LEARNING OBJECTIVES

	DESIGN CHALLENGE OVERVIEW	STUDENTS WILL:
WHERE ARE WE?	Students imagine that they are on a school field trip to New Zealand to see where The Lord of the Rings movies were filmed. The plane is on course for New Zealand until a severe thunderstorm causes both the engine and radio to fail. The plane is forced to crash down somewhere in the South Pacific. The students climb into the emergency raft and drift in the ocean. Eventually, they wash ashore on what seems to be a deserted island. Students will use airplane speeds, flight durations, and a drawn-to-scale map to determine their approximate location in the South Pacific.	• Interpret a scale on a map. • Use proportional reasoning to calculate actual distance and drawn distance on a map according to a scale. • Use the relationship speed = distance/time to find one quantity given the other two quantities. • Solve a multistep problem. • Use a ruler.
DC 1: A STORM IS APPROACHING!	A severe thunderstorm is heading toward the island and will be arriving in just a few hours. Students must build a shelter to protect them from the rain and strong winds. There is a limited supply of materials on the island. Students will work in teams to design and build a scale model of a shelter that can withstand strong winds, is water resistant, and provides a minimum of 1 cubic meter of personal space for each member of the team.	• Identify similar three-dimensional objects. • Identify corresponding dimensions of similar objects. • Use a ruler to measure three-dimensional objects. • Calculate surface area and volume of rectangular prisms. • Analyze a table of values for patterns. • Generalize patterns using symbols. • Use a scale to calculate the amount of materials available for building a scale model. • Apply the engineering design process to solve a problem.
DC 2: WE NEED WATER!	The average person cannot survive for more than one week without fresh water. Ocean salt water surrounds the island, and there is no supply of fresh water on the island. Students will have to rely on rainwater for survival. In this activity, students discover an irregularly shaped piece of plane siding. Students will use this piece of siding to create a rainwater collector. The challenge is to create a collector design with a large volume as well as functionality. Students will investigate the relationship among height, radius, surface area, and volume of a cylinder to help them with their design.	• Find the area of an irregular two-dimensional shape using strategies for finding the areas of triangles, rectangles, and parallelograms. • Use a ruler to measure three-dimensional objects (cylinders and rectangular prisms). • Calculate the surface area and volume of three-dimensional objects. • Analyze a table of values for patterns. • Make and test conjectures about the relationship between surface area and volume, and dimensions and volume. • Produce and analyze line graphs that represent the relationship between two variables. • Apply the engineering design process to solve a problem.

DC 3: BALANCING ACT!	The students are in luck! Some Maori people, canoeing nearby, have spotted the students and have come to take them to the mainland of New Zealand. However, the canoe is extremely unstable. If the canoe is even the slightest bit unbalanced, it will tip over. Students will work in teams to learn how to balance multiple objects of different weights on a seesaw-like platform. Then they will design and test a loading plan in order to get everything, including themselves, into the canoe without it tipping over.	• Investigate how the weight and distance of objects on a horizontal platform with a center fulcrum relate physically and mathematically to keep the platform balanced. • Generalize and represent a pattern using symbols. • Apply the engineering design process to solve a problem.