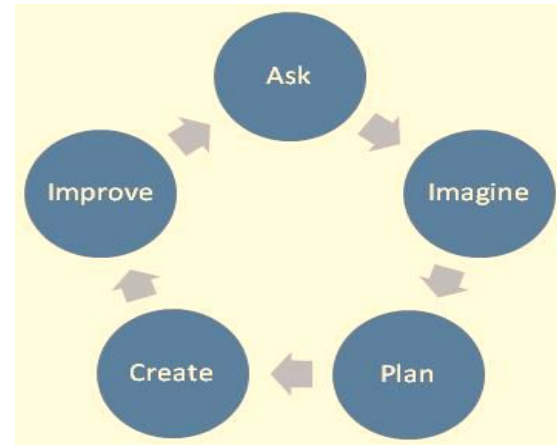# The Knights Before Christmas: Engineering Design Process

Your team of engineers will design a way to protect the presents from being damaged as they are sent into the castle by a catapult and hit the ground with great force. You will use crackers to represent the presents. The materials you can use to build your house are pictured below.

Craft Sticks	Rubber Bands	String	Masking Tape
Coffee Filters	Cotton Balls	Tissue	

1) Notice that the word <u>Ask</u> is in one of the circles in Figure 1. <u>Ask</u> yourself: What materials would I like to use to design a way to protect the presents or crackers from being damaged as they are sent into the castle by a catapult and hit the ground with great force? Write these materials on your STEM Challenge handout.

2) Notice that the word <u>Imagine</u> is in one of the circles in Figure 1. <u>Imagine</u> what your device will look like. Draw a picture of your device on your STEM Challenge handout.

Figure 1: Engineering Design Process

3) It is time to share your ideas with your team! Put on your listening ears and, one at a time, share your ideas!

4) Notice that the word <u>Plan</u> is in one of the circles in Figure 1. <u>Plan</u> what your device will look like. You can use one of your teammates' ideas or a combination of the teams' ideas. But remember, you must create your device together as a team!

5) Draw a picture of your device on your STEM Challenge handout.

The Knights Before Christmas: Buying Time!

You will buy items to design a way to protect the presents from being damaged as they are sent into the castle by a catapult and hit the ground with great force. Remember that the crackers represent the presents. You have $4.00 to spend. The items and their prices are shown below.

Material	Cost per one item	Number of items your team would like to purchase	Total cost of the items your team would like to purchase
Craft stick	$0.25		
Rubber band	$0.15		
Two feet of string	$0.75		
One foot of masking tape	$0.50		
Coffee filter	$0.25		
Cotton ball	$0.15		
Tissue	$0.15		
		Total Cost:	

Show your work here or on the back of this handout:

The Knights Before Christmas: Test and Improve Your Device

It is finally time to test your device.

1) Did your device keep the presents from being damaged or the cracker from breaking? Write a sentence or two about why your device did or did not keep the cracker from breaking.

_____

_____

_____

_____

_____

2) Write a sentence or two about how you will improve your device.

_____

_____

_____

_____

_____