
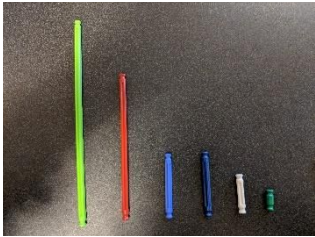



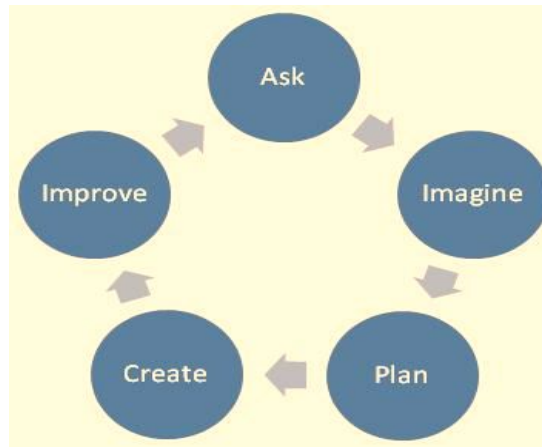
Twenty-One Elephants and Still Standing: Engineering Design Process

Your team's challenge is to build a bridge by following a set of directions and then modify the design to make the bridge longer. The materials you will be using to build your bridge are pictured below.

		
K'Nex Panel	K'Nex Rods	K'Nex Connectors

- 1) Notice that the word Ask is in one of the circles in Figure 1. Ask yourself: What more do I want to learn about bridges before I design a bridge?
- 2) Notice that the word Imagine is in one of the circles in Figure 1. Imagine what your bridge will look like. Draw a picture of your bridge 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 Plan is in one of the circles in Figure 1. Plan what your bridge will look like. You can use one of your teammates' ideas or a combination of the teams' ideas. But remember, you must create your bridge together as a team!
- 5) Draw a picture of your bridge on your STEM Challenge handout.

Twenty-One Elephants and Still Standing: Determine the Cost of Your Bridge

Now that you have finished building your bridge, let's figure out how much it would cost to build a second bridge just like it. Count the number of K'Nex panels, rods, and connectors that your team used to build your bridge. Write these numbers in the table below. The items and their prices are shown below.

Material	Cost per one item	Number of these items your team used to build your bridge	Cost of the items your team used to build your bridge
K'Nex Panels	\$0.50		
K'Nex Rods	\$0.05		
K'Nex Connectors	\$0.20		
Total Cost:			

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

Twenty-One Elephants and Still Standing: Test and Improve Your Bridge

It is finally time to test your bridge.

1) Draw a picture of your bridge and show where you placed the mass on the bridge.

2) How much mass did your bridge hold?

a. Count the number of masses your bridge held before it broke. Notice the masses are different sizes. Write the number of each type of mass the bridge held in the box below the mass size.

Size of Mass:	1000 grams	500 grams			
Number of these Masses the Bridge Held:					

b. Add all the masses together to calculate the total mass the bridge held. Remember to add each mass as many times as the number the bridge held.

Total Mass the Bridge Held: _____

3) How did your bridge fail?

4) Where on the bridge did it come apart first?

5) Could someone drive on the bridge after it broke?

6) How can you make the bridge stronger?
