



Engineering Virtual Learning

HS Intro to Engineering Design Lesson #11

April 20, 2020



Objective/Learning Target:

Students will create a “Free Throw” game
& collect data to work with statistics,
standard deviation, and the empirical rule.
(this is a 4 day project)

“Free Throw Activity and the Empirical Rule”

Have you ever played horse or a free throw game as part of basketball practice? One famous coach said, “To put it simply, free-throws are the most important shot in basketball.”

Today you are going to create an indoor basketball goal and shoot some “paper wad” basketballs into it while recording your free throw data. We will determine statistically if you have “game” or need practice.

For this activity you can create a cardboard basketball game like the ones in the videos on the next page, a basketball stand like the directions given in this activity, use a simple basket/bucket or go outside and use your own goal. It does not matter which goal you use as long as you record your data like on page 6 and keep that data for use tomorrow.

Bell-work:

Watch these videos on homemade free throw games.

<https://www.youtube.com/watch?v=ZfaAJrwcU>

https://www.youtube.com/watch?v=_wNtNtOIJQk

What do you think the advantage of the moveable free throw shooter would be?

Record your thoughts in your engineers notebook.

Title the page “**Free Throw Activity and the Empirical Rule**”

Learning Practice:

Step 1: Gather materials from around your home and build a basket ball base, stand, and rim.

Some items you might use:

Base – old book, flat rock, piece of 2 x 8 board (something heavy)

Stand – straws, paint stirring sticks, popsicle sticks, rulers (something that stands straight)

Rim – wire coat hanger, pipe cleaners, coffee can lid with center cut out (something that forms a circle)

You can design your goal to be heavy duty or light duty and the items you select need to be similar in construction and match your design. Follow the Specifications below:

-Base should be approximately 8" x 8" so if you used a 2 x 4 you can cut 2 pieces 8" long and glue or fasten them together on the short side.

-Stand should be about 15" tall. It needs to be fastened to the base and sturdy enough to hold the rim.

-Rim needs to be about 6-8" in diameter (that is the measure all the way across) It is fastened to the top of the stand and needs to be sturdy enough so when you hit the rim it does not bend down.

-Ball should be about 3" in diameter and can be paper wad or some other light material.

Step 2: Use your completed basketball goal to shoot free throws and record your data.

Place your goal on the floor or on a table and stand back 6 feet. Keep track of how many shots you make out of 20 total shots. Record this data in a chart similar to the one below (sample data) and **repeat the experiment 10 times**. We will use this data tomorrow.

Number of Free Throws Made	Number of Free Throws Missed	20 Total Attempts
15 made	5 missed	20
12 made	8 missed	
16 made	4 missed	
9 made	11 missed	
14 made	6 missed	
15 made	5 missed	
6 made	14 missed	
13 made	7 missed	
11 made	9 missed	
18 made	2 missed	

Learning Resource Links:

Do It Yourself basketball game –

https://www.youtube.com/watch?v=ZfaAJrwcU_U

https://www.youtube.com/watch?v=_wNtNtOIJQk