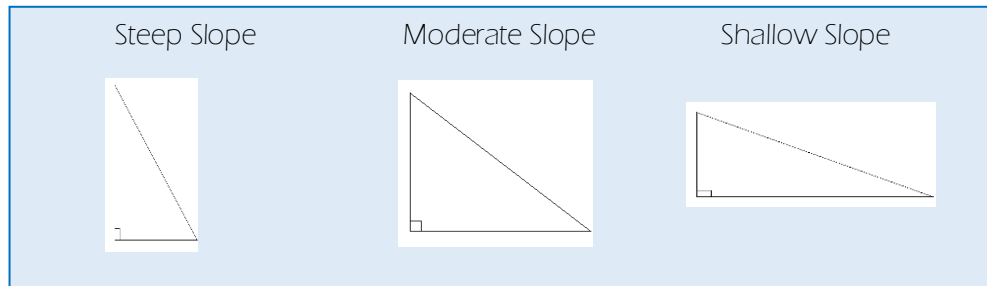


Slope and Speed Zipline Experiment!

The slope describes how steep a straight line is.



Experiment Outline

First, students construct their cups and use the stems to create hooks with the bobbins. Next, they race the baskets down the zipline! The cups should race at about the same speed. They have the same amount of friction and gravity pulls them at the same rate.

For a more in-depth examination of gravity and friction, add weights to the baskets to see how the added weight affects the baskets going down the zipline. The heavier cup pulls the string to a steeper slope. Does the cup move faster on a steeper slope or a more shallow slope?



Making your Zipline

First loop the end of one of your pipe cleaner through one of the holes in the side of the cup and twist it to secure it. Then do the same with the other end of the pipe cleaner through the hole on the opposite side of the cup, to make it into a basket!



Secure the second pipe cleaner around the bobbin and then twist the other end together around the "basket handle" you just made. Experiment with the best way to tie your cup so that it stays balanced on the string when it is zipping!

Tie your string from somewhere such as a door handle to the back of a chair, as show in the picture. Race your cup down the zipline!

Reflect on Your Experiment

What happened when you raced the cups when they had the same amount of weight (or no weights at all)?

What happened when you added more weights to one cup?

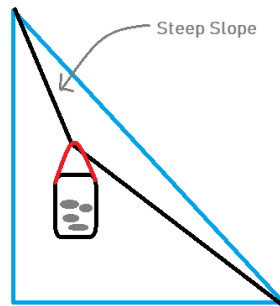
Change the slope of the of the zipline. Make it a steeper angle. Make it a more shallow slope. What do you observe?

Do the cups move faster on a shallow or steeper slope?

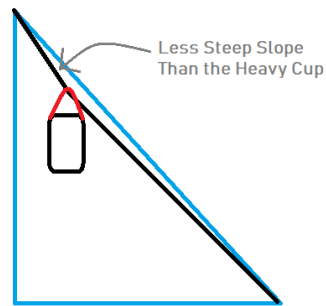
Do heavier or lighter cups move faster? Why do you think this is true?

Experiment Explained!

Heavier objects move faster down a steep zip line because their weight pulls the string into a steeper slope.

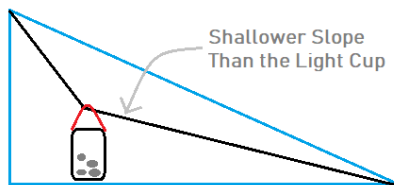


Heavy Cup

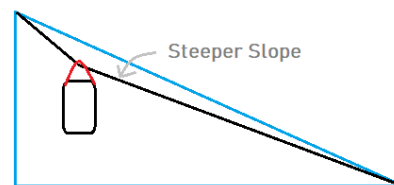


Light Cup

Lighter objects move faster on the shallow slopes, because they don't weigh the zipline down as much, keeping their slope steeper. Heavier objects pull the zipline down and create a shallower slope.



Heavy Cup



Light Cup

Whether the heavy cup is faster or slower depends on the slope of the zipline. The light cup will move slower than the heavy cup at the beginning and faster at the bottom of the zipline.

Length of the zipline can also play a role in which cup wins. The light cup needs time to pass the heavy cup at the bottom of the zipline where the slope is shallower.

Word Search



Word Bank:

BOBBIN
CUP
REFLECT
STEEP

CHART
EXPERIMENT
SHALLOW
STRING

COIN
PREDICT
SLOPE
ZIPLINE



Books

Everything You Need to Ace Math in One Big Fat Notebook by Altair Peterson	510
Primary Physics The Principles Behind Roman Machines by Marti Ellen	530.7
Primary Physics The Principles Behind Leonardo's Science by Marti Ellen	530.7

