



[This Photo](#) by Unknown Author is licensed under [CC BY-SA-NC](#)



[This Photo](#) by Unknown Author is licensed under [CC BY](#)



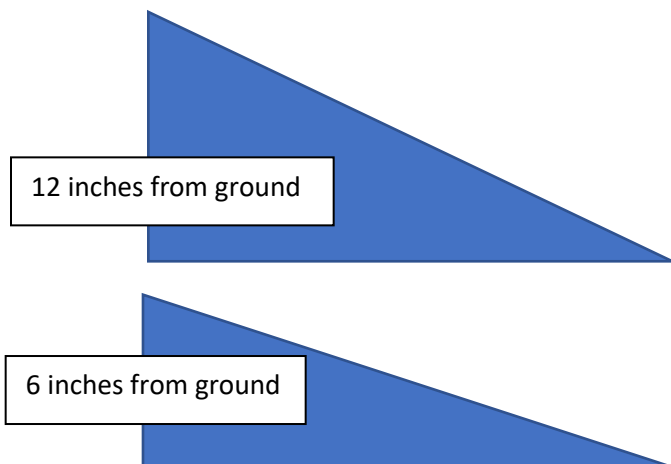
[This Photo](#) by Unknown Author is licensed under [CC BY-SA](#)

Task #1: What happens when we start higher?

Materials Needed: 18-inch sections of cardboard or poster paper tubes that have been cut lengthwise in half, golf balls that fit in the pipe, large marbles that fit in the pipe, stopwatch

Teacher Notes:

- The use of the cardboard or poster tubes allows students to test parts of the coaster as a ramp without the issue of them bending.
- To assist students ahead of time, mark off two different spots on the wall that will indicate where the ramp height will start. This will ensure that all groups are using the same height and length of the tubes for collecting data. Place one measurement at six inches off the ground and another one at 12 inches off the ground.



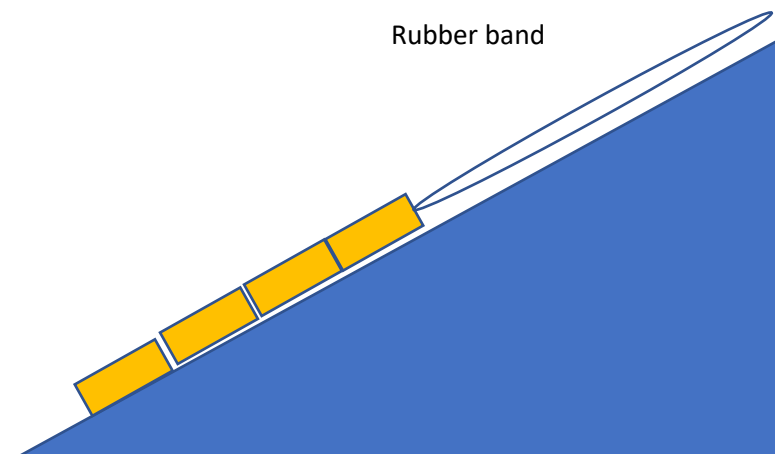
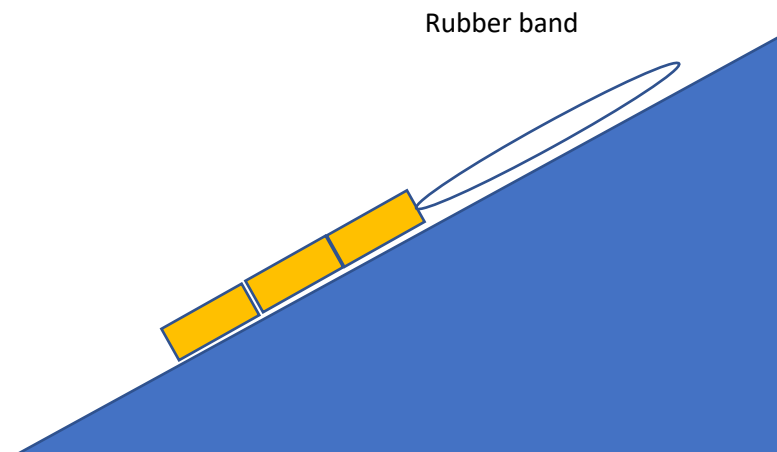
In this situation, the variable that remains the same is the length of the cardboard tube which serves as a ramp. The students will test the variable of the slope of the ramp.

Task #2: Does it matter how many cars are part of the coaster train?

Materials: Linking blocks that pop together, heavy duty rubber bands, meter stick/ruler

Teacher Notes:

- Students at this level can make qualitative or descriptive observations as to how much force is needed to pull the train up the initial hill and how that impacts how many people can ride the coaster at a time.
- The blocks which represent the cars have mass. As they are pulling on the rubber band, they should try and move the cars at the same rate.
- The rubber band will stretch and moving the blocks at the same speed will require more force for more cars.



Task #3: What helps to stop the object?

Materials: Cardboard or poster tubes cut lengthwise in half, strips of felt,

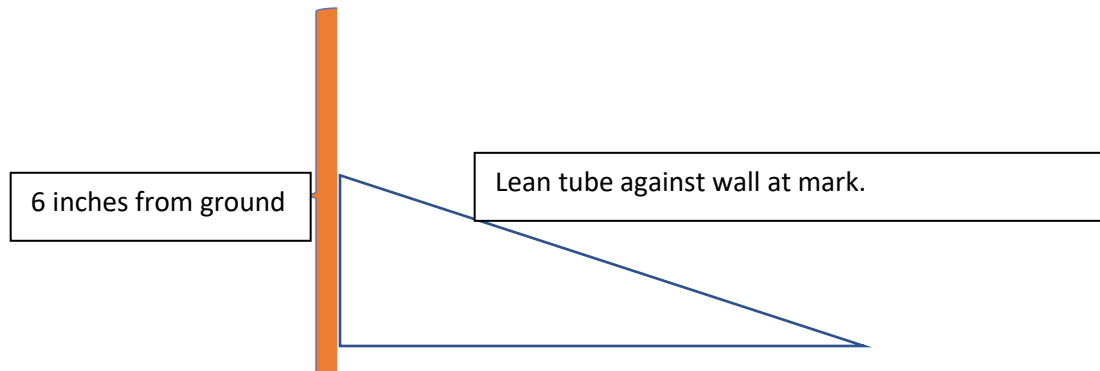
Teacher Notes:

- Students should be shown how to place strips of felt on the track.
- It is important to try and lay the strips as flat as possible so that it slows the marble but doesn't block the track.

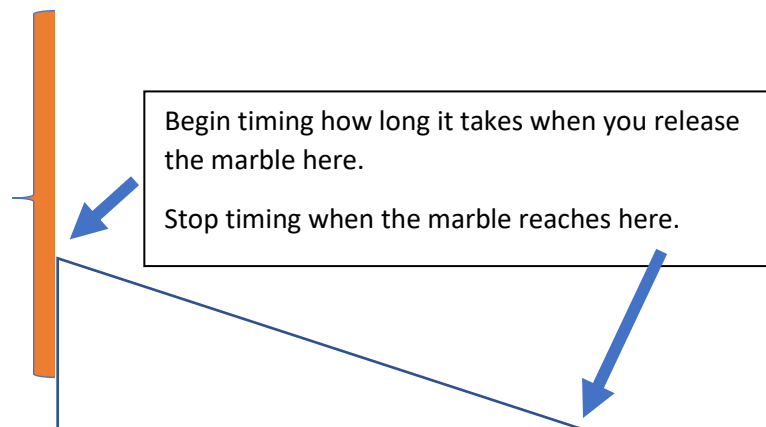
Coaster Fun

Task 1:

- You will be timing how long it takes for a ball to move down a ramp.
- Find the two points that your teacher marked on the wall. One should be 6 inches off of the ground and the other should be 12 inches off the ground.
- Place the tube against the first mark so that it extends away from the wall.



- Place the ball or marble at the top of the ramp and let it go while you time how long it takes to reach the end of the ramp.

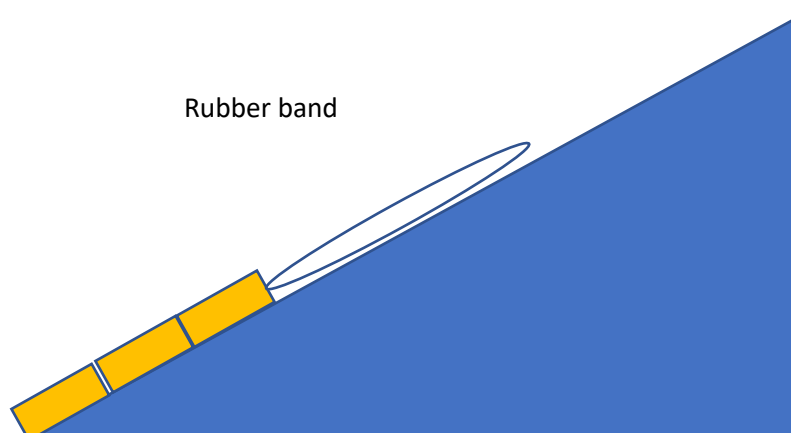


- Do this three times for each ramp and record the time it takes.

Ramp Height	Trial #1	Trial #2	Trial #3
6 inches from ground			
12 inches from ground			

Task 2:

- Safety note: Make sure that you are wearing safety glasses for this task.
- In this task, you are making observations about how much force is needed to pull the car/train up the first hill.
- Using the ramp provided, build a train with three cars and attach the rubber band.
- Place the car at the bottom of the ramp and slowly pull the rubber band until the train starts to move. Observe how much the rubber band stretched.
- Repeat with a train that has four cars.
- Try and make sure you are moving the train at the same speed.



Compare what happened to the rubber band when there three cars on the train and when there were four cars on the train?

Three Cars	Four Cars

Task #3:

- Lay the felt strips on the track so that the marble rolls over them.
- Make observations about what happens to the marble.
- Repeat timing how long it takes from Task #1.

Ramp with Felt Strip

Ramp Height	Trial #1	Trial #2	Trial #3
6 inches from ground			

12 inches from ground			
-----------------------------	--	--	--