

CHARLES COUNTY PUBLIC SCHOOLS
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ENGINEERING DESIGN

A
**SCIENCE @ HOME
ACTIVITY**

BALL DROP

OVERVIEW FOR PARENTS



The Engineering Design Process...

This lesson introduces the process which engineers use when creating, developing, improving, or implementing an idea. The goal is to help students understand this process when coming up with a solution to a problem. In this experiment:

- A problem has been presented with some questions to think about
- Some ideas have been presented in helping them come up with a solution
- Students should take notes as they work through the process
- Length of time for the project will be different for each individual

We would love to see their creativity so please tag us at James E. Richmond Science Center on Facebook and Twitter.

Thanks for visiting! See you soon!

THE ENGINEERING DESIGN PROCESS

COMMUNICATE
your solution

ITERATE
to improve
your prototype

TEST
and evaluate
your prototype

DEFINE
the problem

IDENTIFY
constraints on your
solution (e.g. time, money,
materials) and criteria
for success

BRAINSTORM
multiple solutions
for the problem

SELECT
the most
promising solution

PROTOTYPE
your solution



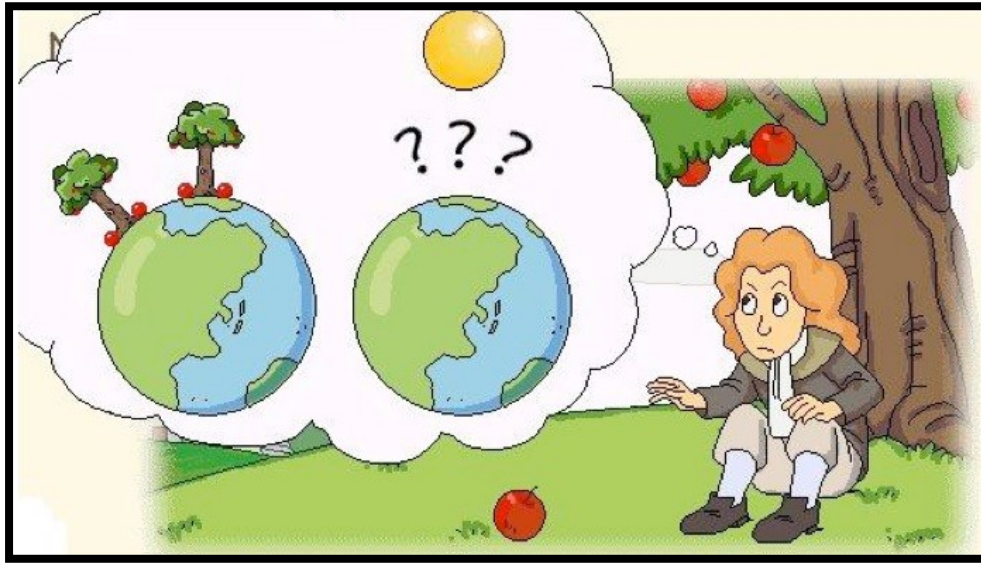
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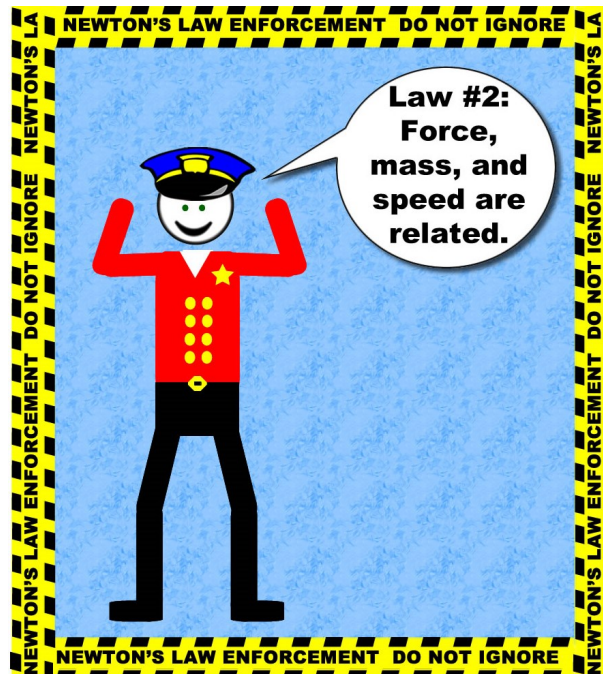
Sir Isaac Newton...a very, very long time ago.
 "What goes up must come down"

BACKGROUND

From the previous lesson, we learned about friction and gravity, both of which are forces and affect motion (the movement of objects).

Isaac Newton, considered to be the Father of Modern Physics, studied the relationship of force on an object and the resulting motion of the object.

Result = Newton's 3 Laws of Motion



PROBLEM:

I want to build something that shows the relationship of gravity, friction and motion.



QUESTIONS

What can I build?

How do I make it?

What materials could I use?

Should I have a timer to test the effect of friction?

What resources can I use to help me?



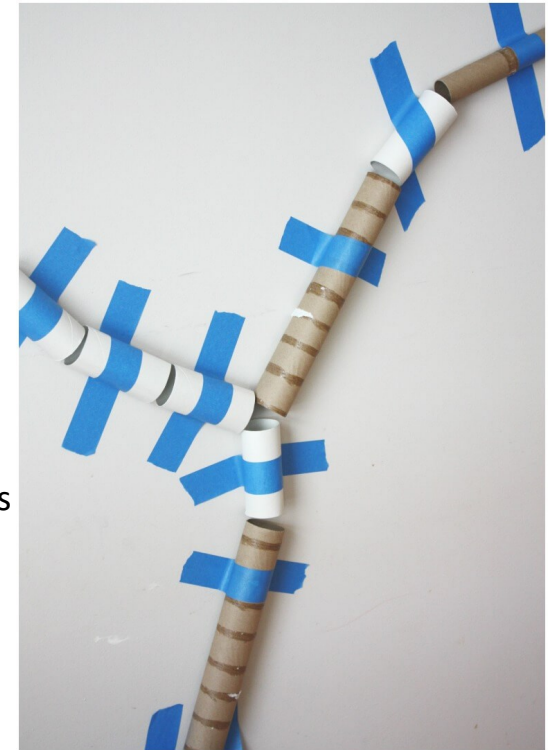
AREA TO WRITE RESEARCH & IDEAS



Note: Don't waste toilet paper or paper towels! Use empty toilet paper and paper towel rolls since no one can find either of these right now!



* Keep in mind glass marbles could shatter if they are dropped from too high a height.



Videos to Help With Your Design

<https://youtu.be/8U-CqMFxB0I>

<https://youtu.be/jbjRzyvSjHo>

Engineering Notebook

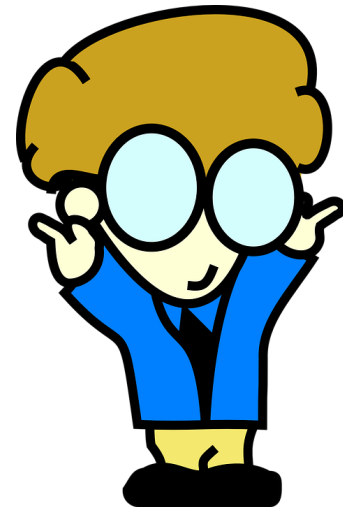
Design: _____

Materials Needed: _____

How To Construct: _____



It is important to note the engineering process is a *cycle* and can be started *anywhere* in the process/cycle.

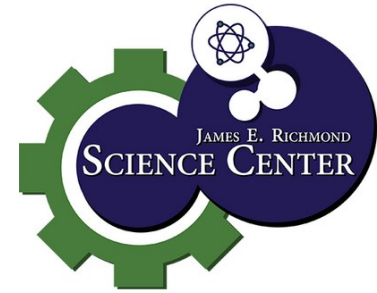


Build Your Prototype (*prototype is another word for model*)

HOW?

**Use materials around the house to layout a model
or draw a picture**

You can use the space below to illustrate your model



Now that you have your prototype it is time to test your final result—TIME TO BUILD!

Engineers are always thinking and taking notes so let's put on our thinking cap:

- What can you change to make the object drop faster or slower?
- Does a heavier ball (more mass) make the ball reach the bottom quicker?
- What if we cut the tubes to have angles at the bottom for the ball to drop out?
- Does the material or shape of the ball affect the friction and, therefore, overall speed?



NOTES SECTION

Like a challenge? — practice your writing and communication skills by writing a set of instructions for others.

We at the Science Center would love to see your finished project, notes you have taken in your engineering notebook, and/or get general feedback.

Tag us on Twitter or Facebook at James E. Richmond Science Center