

ENGINEERING DESIGN

A
SCIENCE @ HOME
ACTIVITY

DESIGN A SPINNING TOP

CHARLES COUNTY PUBLIC SCHOOLS
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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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PROBLEM:

I want to design a spinning top.



QUESTIONS

What is a spinning top and why does it spin?

What size should it be?

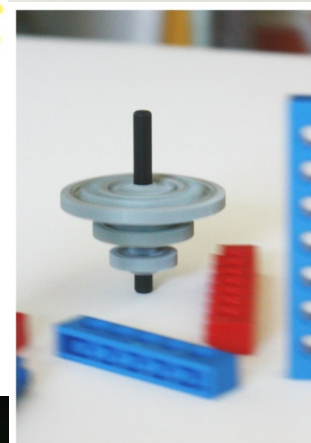
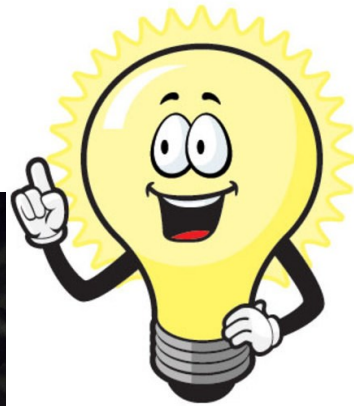
How do I make it?

What materials could I use?

What design would make it spin the longest?



AREA TO WRITE RESEARCH & IDEAS



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.

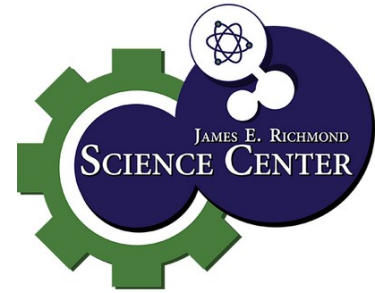


Build Your Prototype (*prototype is another word for model*)

HOW?

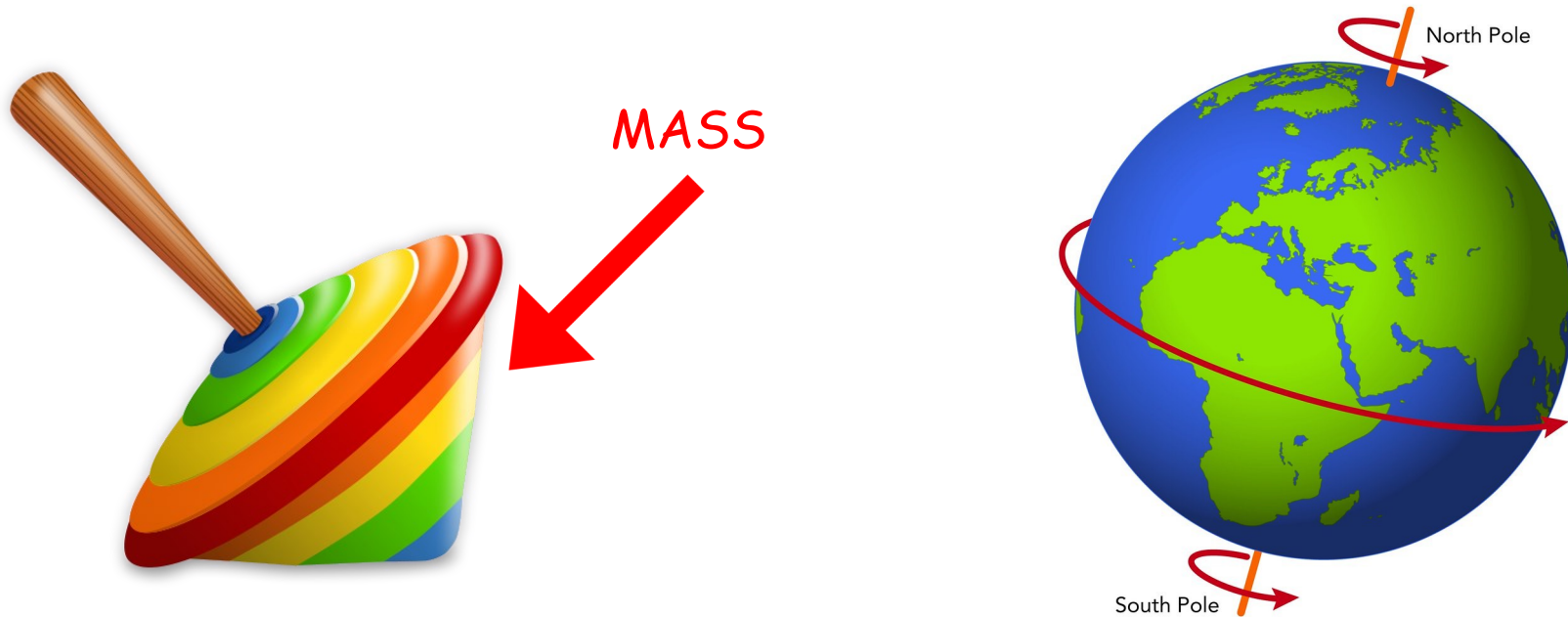
Use materials around the house to layout a model
or draw a picture

You can use the space below to illustrate your model



HOW & WHY DOES A TOP SPIN?

When a top is spinning, it balances on a small tip. This minimizes the amount of **friction** (*a force that acts in the opposite direction of the original force produced*) generated by its contact with the surface below it. Eventually, though, friction will begin to slow the top's spin and it will begin to wobble.



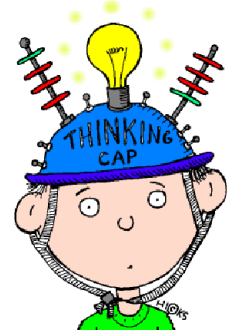
A top spins on an axis, much like the Earth spinning on its axis. The tilt of both is based on the way the **mass** (*measurement of how much matter is in an object*) is distributed. The difference is that Earth keeps the same tilt and rotation because of **gravity** (*a force that always attracts or pulls objects toward each other without direct contact*) and its pull from the Sun, but a spinning top will eventually decrease in speed due to friction and topple over.

***Make sure to check out the next couple of experiments on the Science Center as we will revisit these vocabulary terms.**

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:

- Does a heavier body (more mass) make the top spin longer than a lighter body?
- How does the placement of the body on the spindle/axis affect how it spins?
- If we added two bodies on the spindle does it spin better or worse?
- If you add two bodies does it work better if they are the same size or not?



NOTES SECTION

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.