

*What happens when
speed changes super fast?*







Which dog has less inertia?
Which would be harder to move?

Experiment Time!



Materials:

- 1 index card (found in your KDA lab supply bag)
- A cup
- A coin

I shall wait here while you grab those items...

Experiment Time!



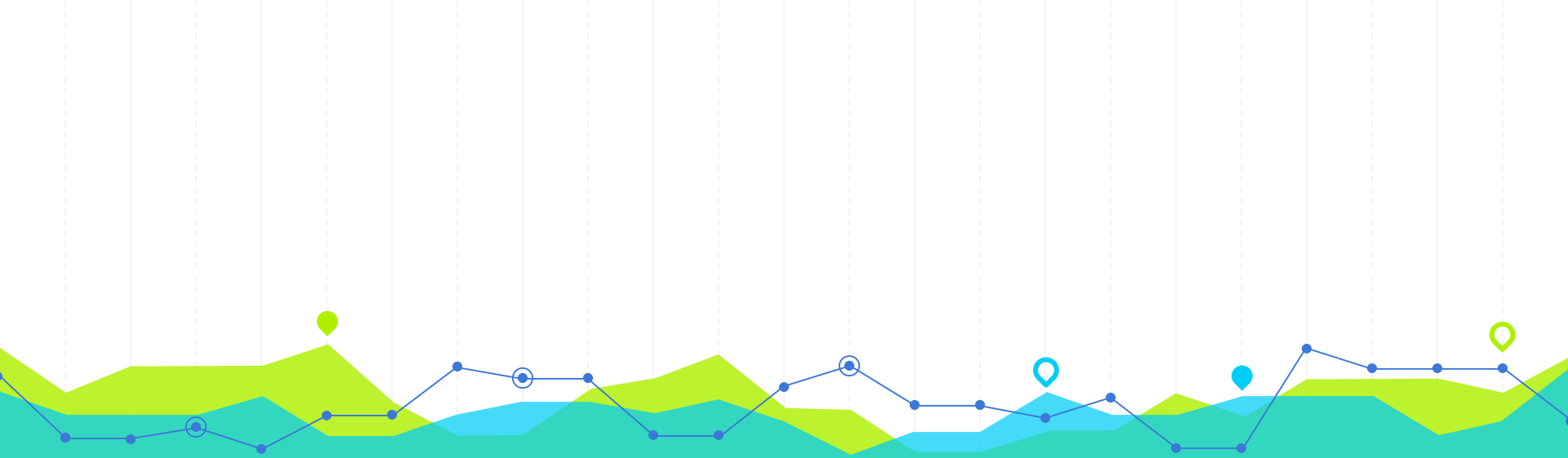
Materials:

- 1 index card (found in your KDA lab supply bag)
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Inertia in action!



NEWTON'S LAWS



Inertia

The resistance of matter to not change its velocity.

Thought Experiment



One of these eggs is hard boiled and one is raw. Using what you know of inertia, watch this and figure it which is which!

Now Do Your Own Experiment!

Click on the Doc in the Google Classroom post to see all the activities for Newton's First Law of Motion.

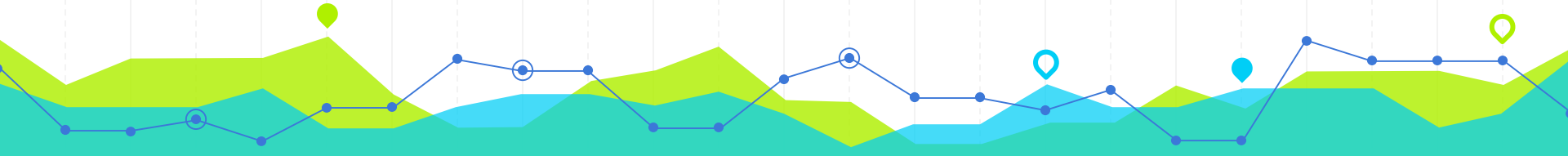
Pick one to complete and do it!

Be prepared to share what happened during your experiment!



What happened?

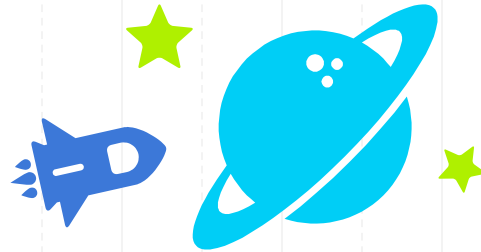
How did it show inertia?



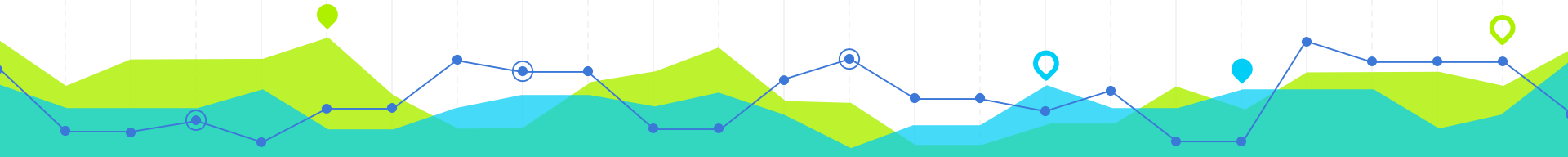
Explore 1st law

Doc and <https://www.youtube.com/watch?v=-luKN6mad5w>



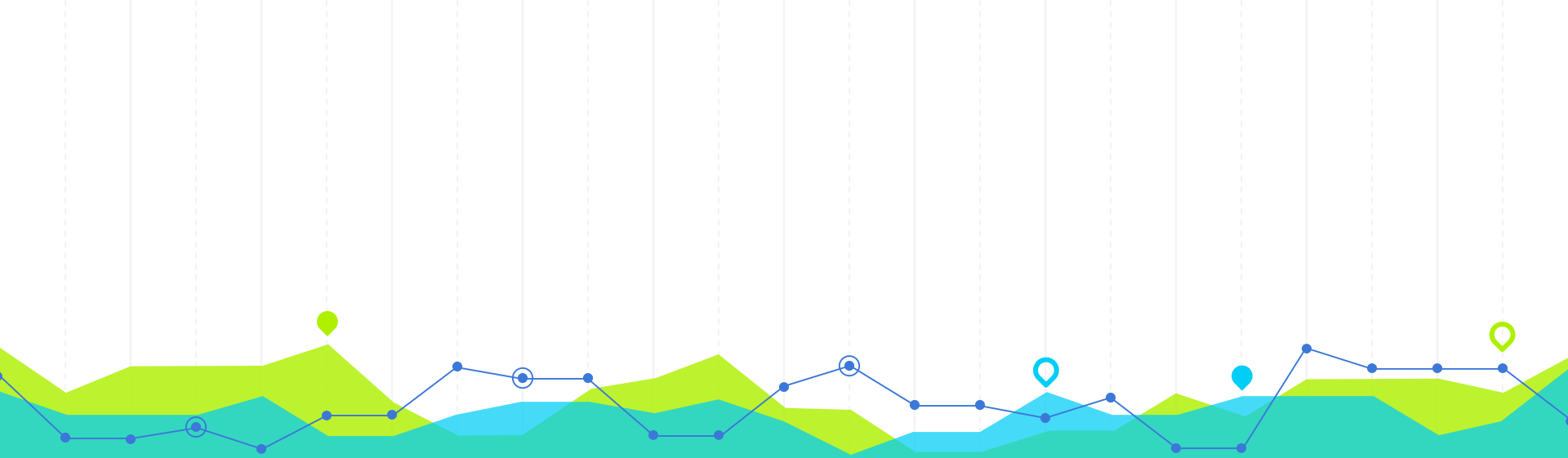


Why is space a good place to demonstrate inertia?





What is Newton's First Law?



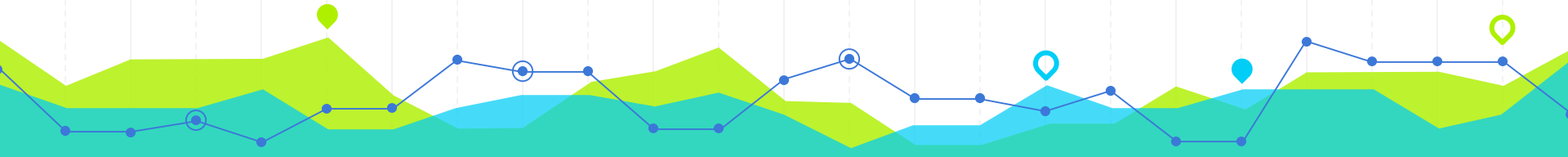
$$\mathbf{F = M \times A}$$

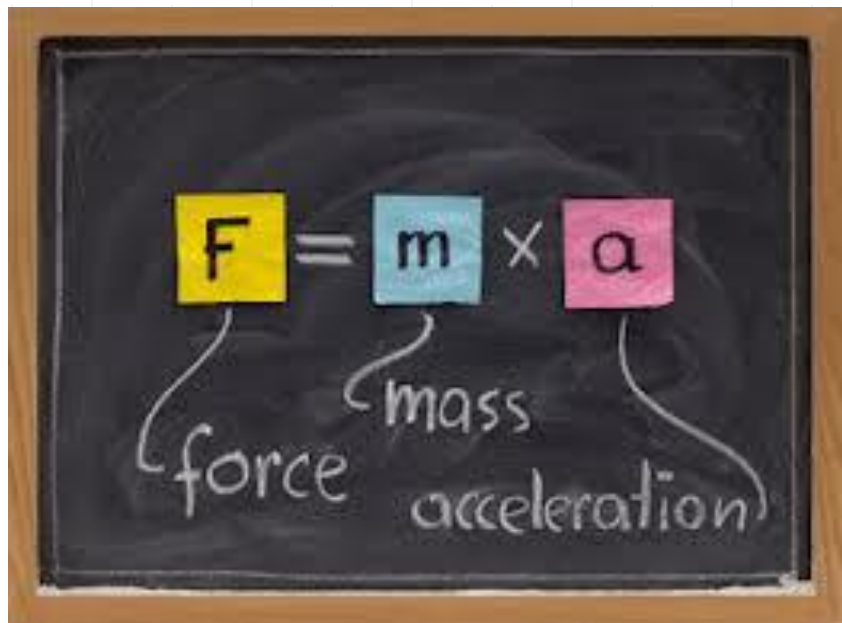
Force is equal to mass times the acceleration.



How can we
increase the sled's
acceleration?

How can we
decrease it?



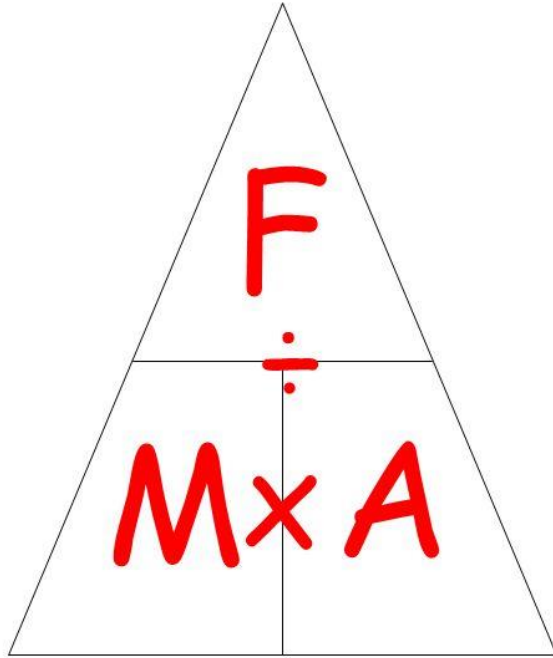


$$F = ma$$

N kg m/s²

The equation $F = ma$ is shown in large blue letters. Below the 'F' is a yellow arrow pointing up to the letter, with the unit 'N' written below the arrow. Below the 'm' is a yellow arrow pointing up to the letter, with the unit 'kg' written below the arrow. Below the 'a' is a yellow arrow pointing up to the letter, with the unit 'm/s²' written below the arrow.

Force



Force=

Mass x Acceleration

Mass=

Force / Acceleration

Acceleration=

Force / Mass

Experiment Time!



Materials:

- Piece of paper slightly crumpled up into a ball
- Ruler

I shall wait here while you grab those items...



To 9:07

Explore 2nd law

Watch the video attached to this post.

Then create your own demonstration by using multiple objects of different mass. Apply the same force to each object and watch the difference in acceleration.

Now, figure out how to demonstrate for mass instead of acceleration using one of the objects used above!

Done early? Check out more experiments on Second Law below!

- <https://sciencing.com/science-project-effect-mass-distance-ball-travels-2550.html>
- <https://spark.iop.org/investigating-newtons-second-law-motion>
- <https://4-h.org/about/4-h-at-home/newtons-speedway-acceleration-mass-force/>

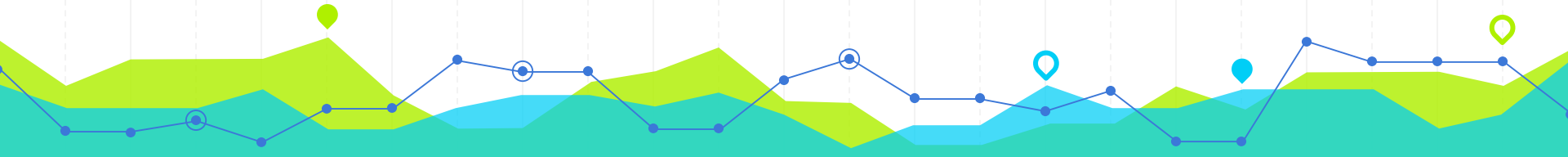
<https://www.youtube.com/watch?v=SPZ2bjW53c8>

Now Do Your Own Experiments!

Watch the video attached to the post in Google Classroom.

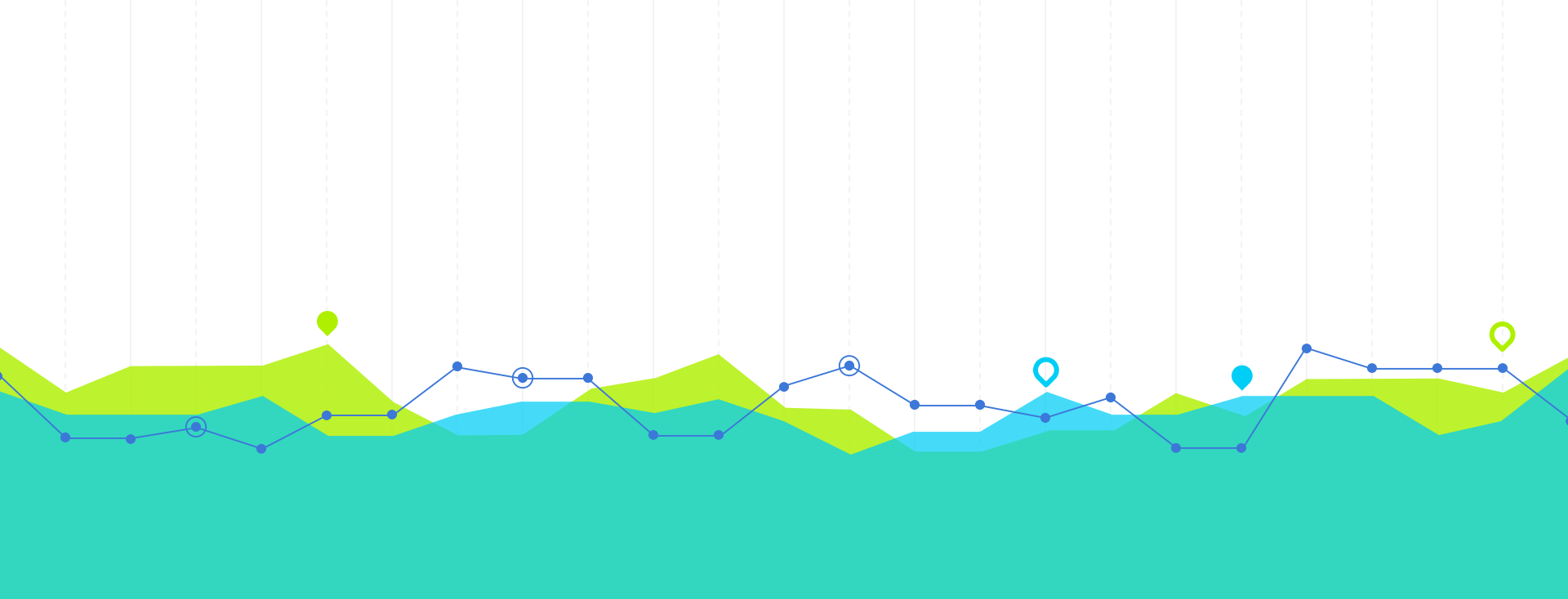
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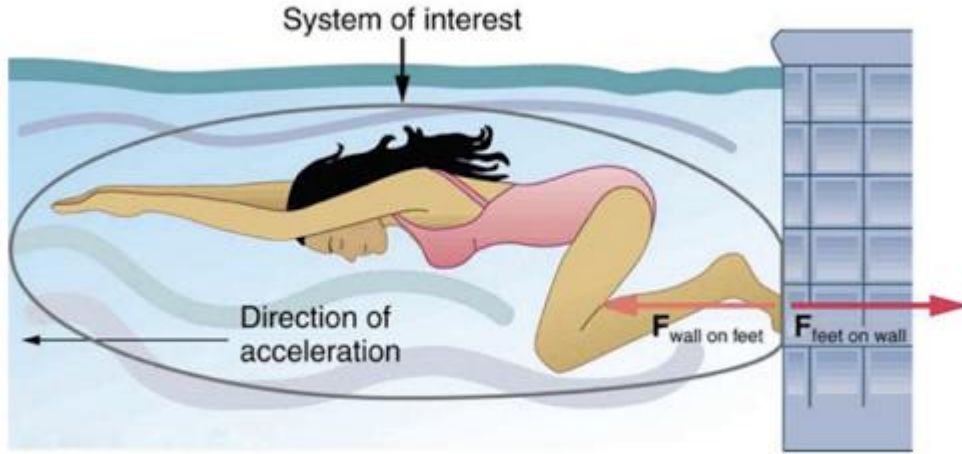


What happened?



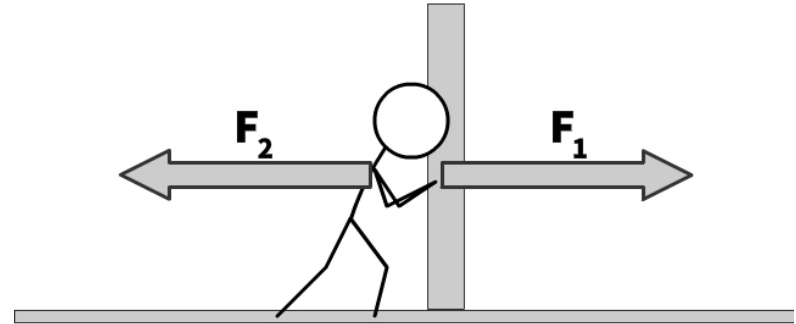


What is Newton's Second Law?



Equal and opposite
reactions

Newton's Third Law

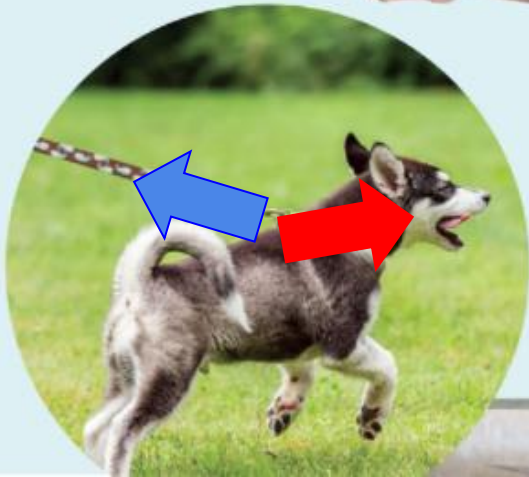


**Forces always Come in Pairs:
You Push on a Wall
the Wall Pushes Back**



Action
You push
on ground

Reaction
Ground
pushes
on you



Reaction force

Applied by: the ground

Applied to: the player

Reaction force

Applied by:

Applied to:

Action force

Applied by:

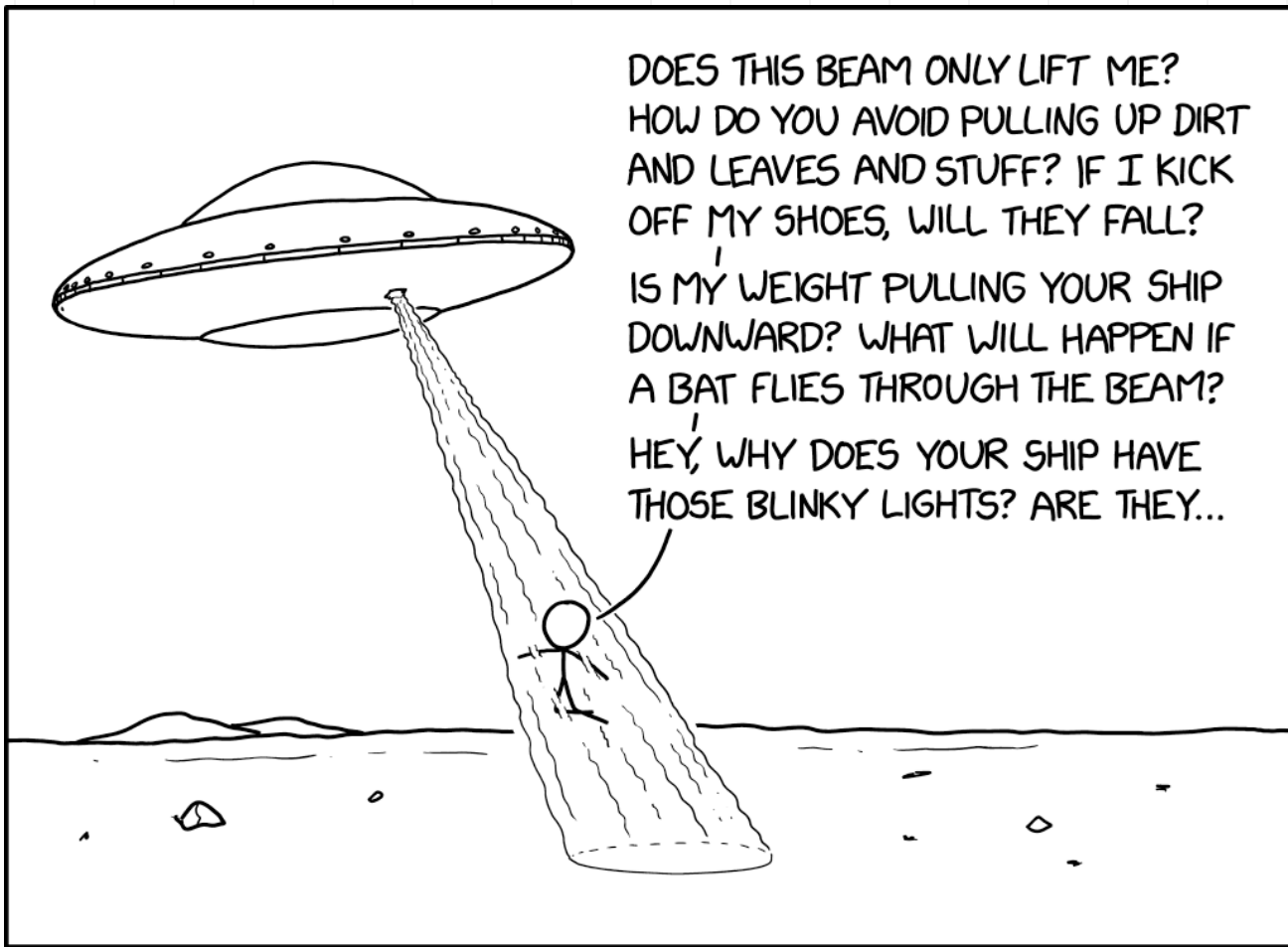
Applied to:

Action force

Applied by: the player

Applied to: the ground





DOES THIS BEAM ONLY LIFT ME?
HOW DO YOU AVOID PULLING UP DIRT
AND LEAVES AND STUFF? IF I KICK
OFF MY SHOES, WILL THEY FALL?
IS MY WEIGHT PULLING YOUR SHIP
DOWNWARD? WHAT WILL HAPPEN IF
A BAT FLIES THROUGH THE BEAM?
HEY, WHY DOES YOUR SHIP HAVE
THOSE BLINKY LIGHTS? ARE THEY...

MOMENTS LATER, THE ALIENS SET ME BACK DOWN AND LEFT.

Experiment Time!

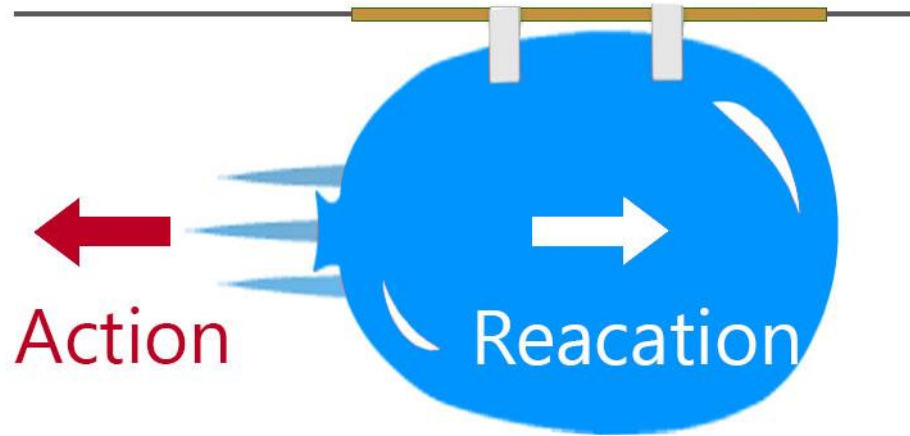


Materials:

- Bathroom or kitchen scale
- 1 balloon (from your lab supply bag from KDA)

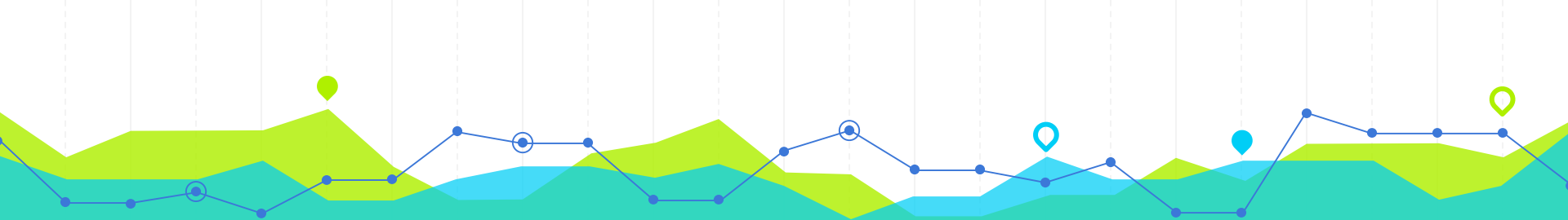
I shall wait here while you grab those items...

Have a straw and string?





To 16:06



Equal and Opposite Reactions

Explore 3rd law

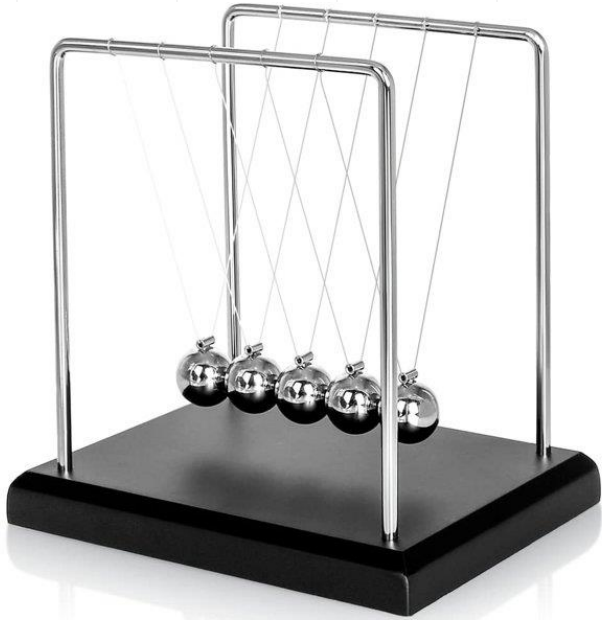
Go to this website: <https://sintsp13.wgbh.org/en-us/lesson/midlit10-sci-splspace> and click Continue As A Guest when that pops up.

Read through, watch the videos, and answer the questions as they come up to give you more practice with Newton's Third Law.

Done early? Check out the attached video about how Newton's third law works on the ISS!

<https://www.youtube.com/watch?v=dCF--YOjiOw>

How many of you have seen one of these?



Newton's Cradle!

How does this show
Newton's Third Law?



Why science teachers
should not be given
playground duty.

Thought Experiment



Watch this and decide how Newton's Third Law is shown. How could the Third Law be better utilized to make this go faster?

Now Do Your Own Experiment!

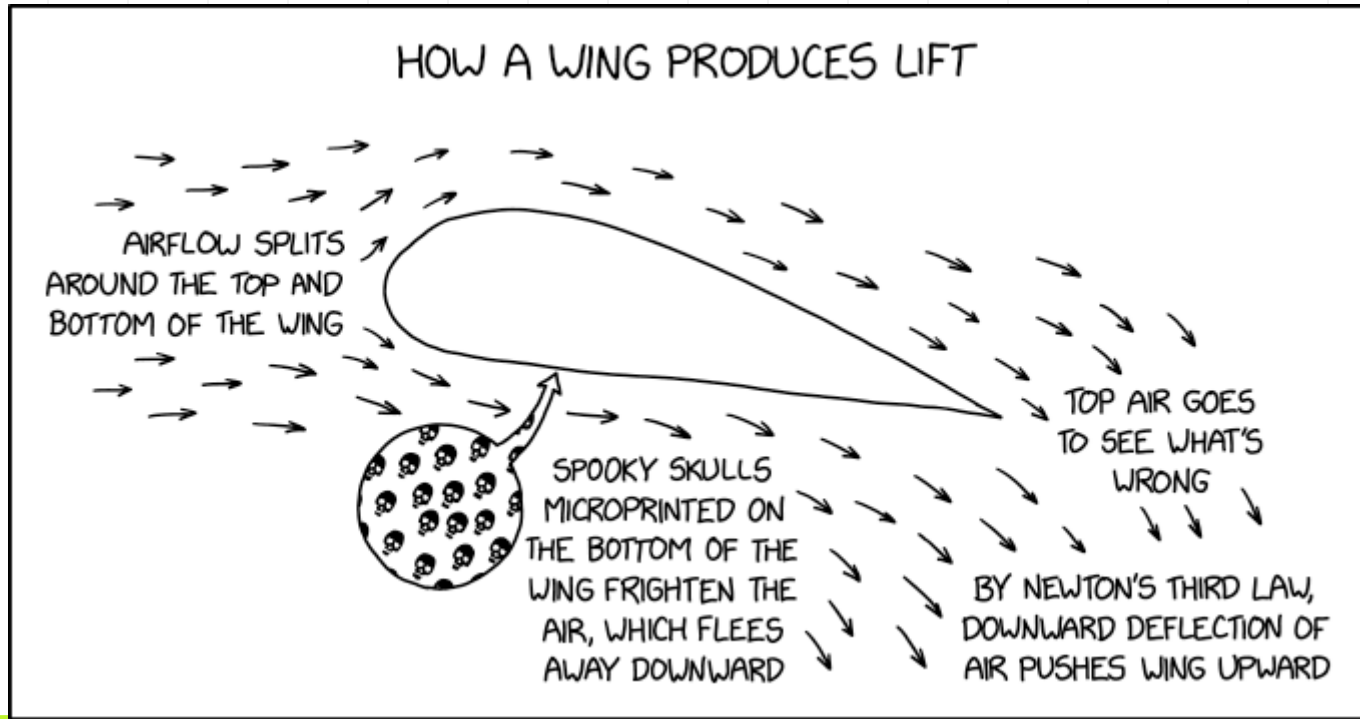
Go to the website in the Google Classroom post and click Continue as a Guest.

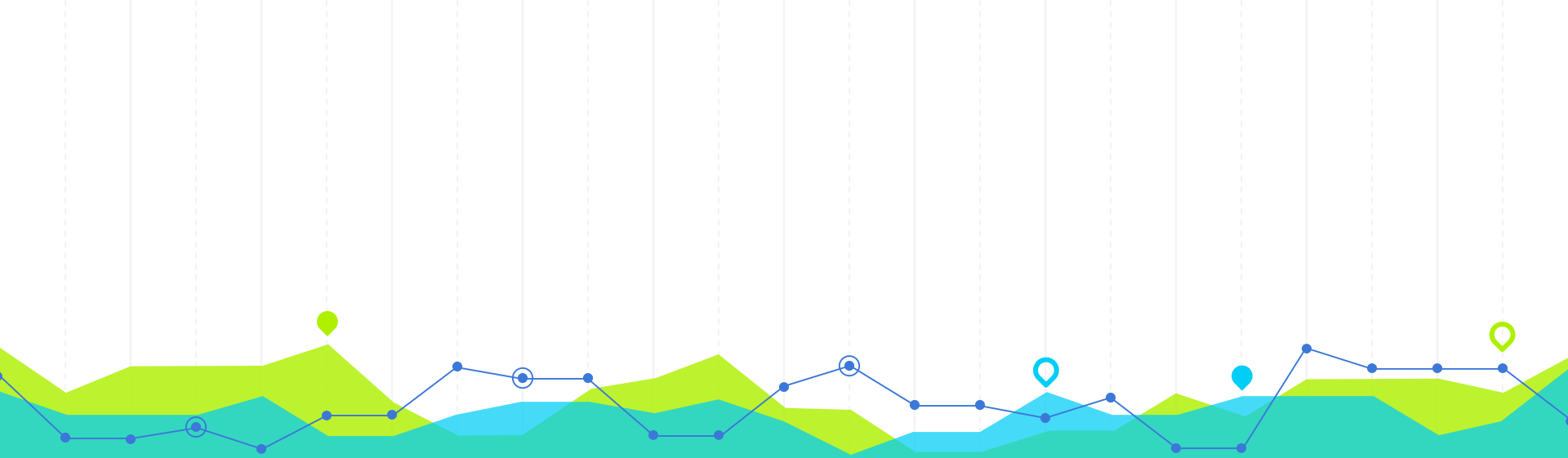
There are things to read, videos to watch, and activities to do on that site.

How can you create an activity to show the third law in your house?



Newton's Third Law in Action!





What is Newton's Third Law?