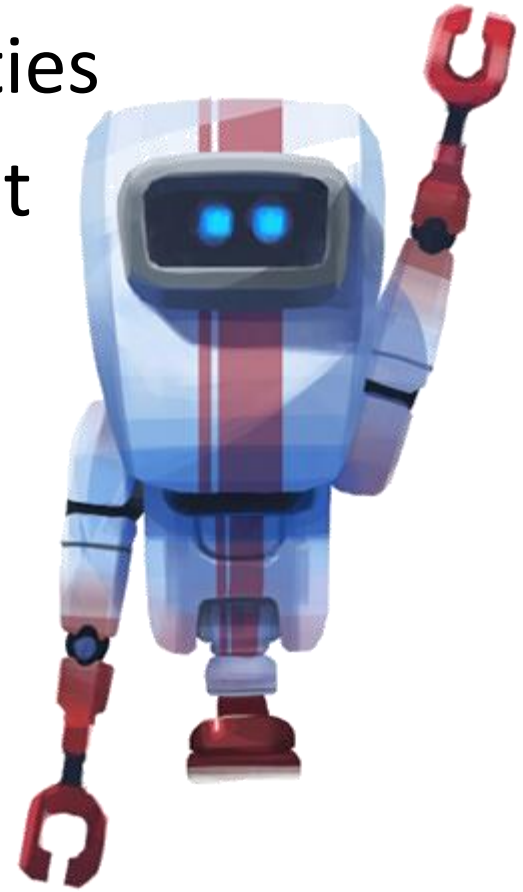
ROBOTS

Creativity in Motion

Introduction

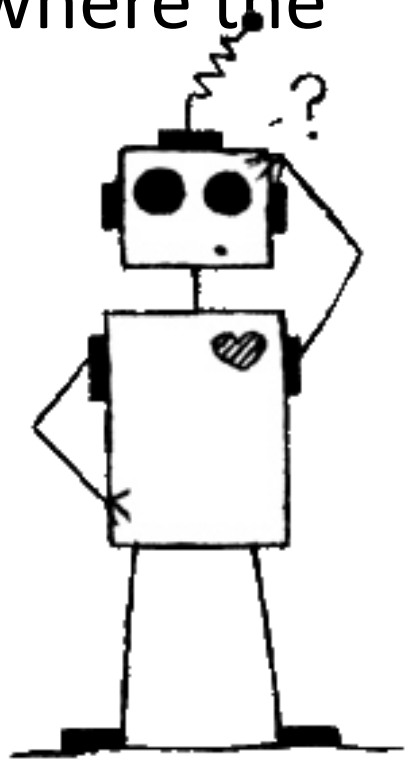
- Access prior knowledge with videos and books
- Discuss range of robot jobs & abilities
- Determine how students feel about

  Robots, ex. trust vs distrust



I, Robot

- Discuss robot and humans' ability (or lack of ability) to read each other
- Begin to explore history of robots & where the word itself began

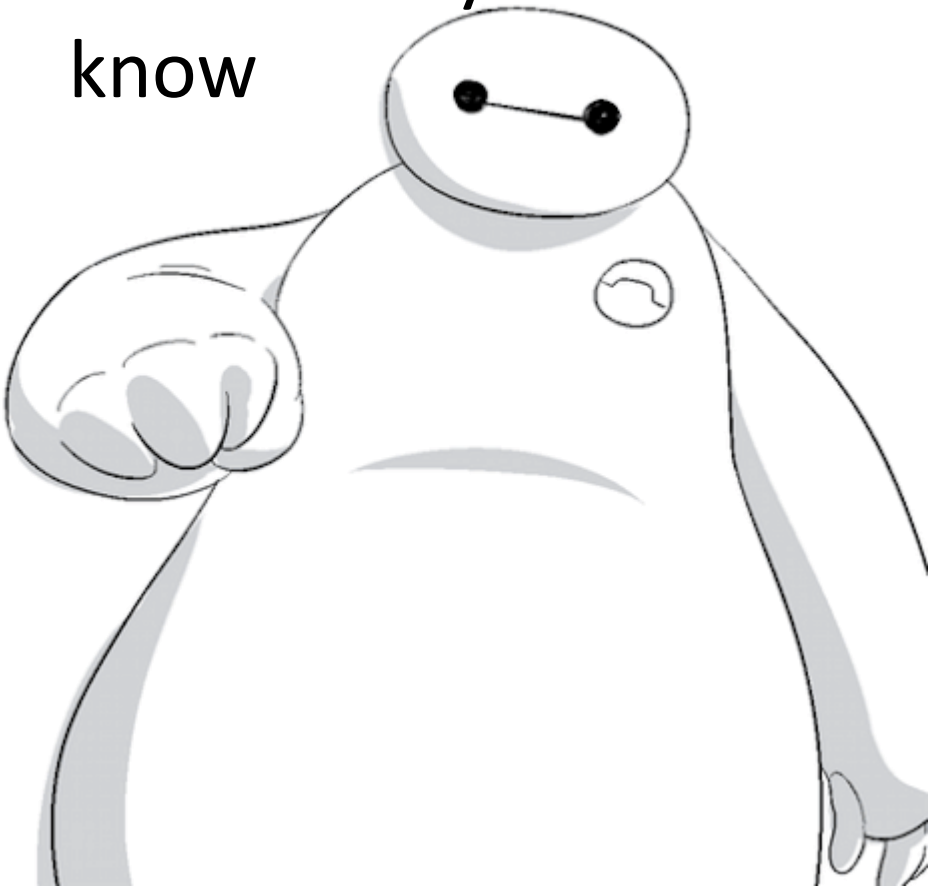


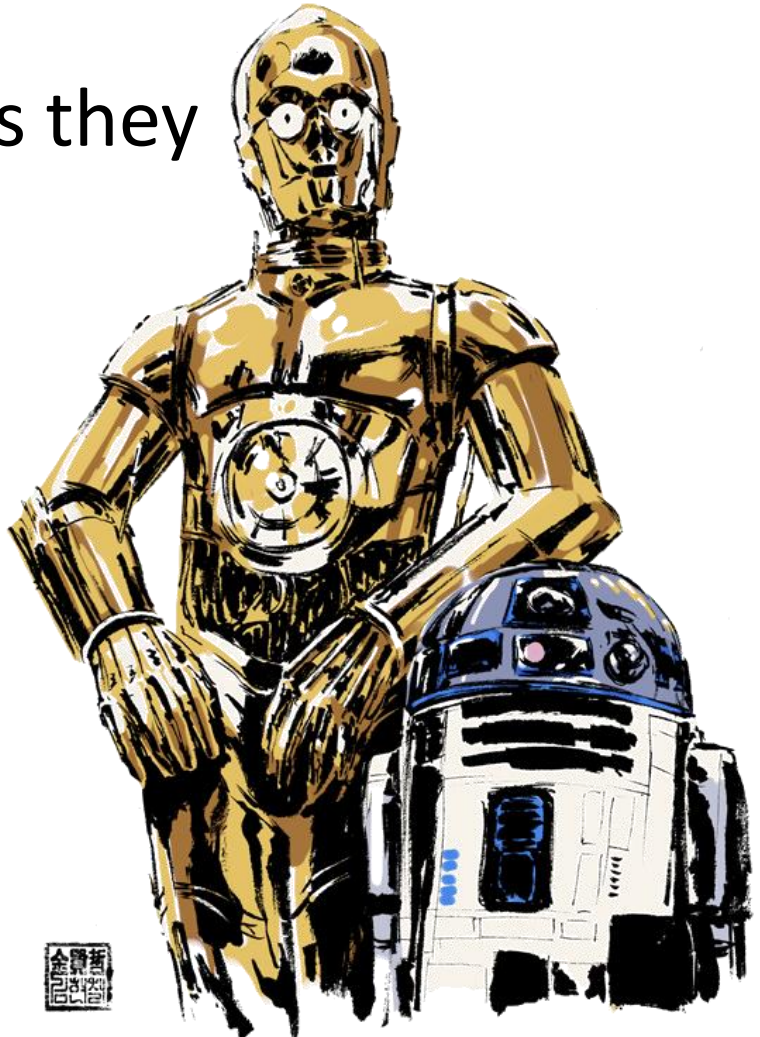
Where it all began

Discover Ancient Egyptian and Greek styles of 'robots'

Android Dreams

- Learn about fictional robots
- Students try to think of ones they know





Talos

- Learn the myth of Talos, the first robot in history
- Students write & illustrate their own myths.

Talos' Island

Finish up with a fun game of Talos' tag to reinforce the concepts learned in the myth.

Whim-agination

Students are inspired to come up with a solution to a problem.

A robotic solution.

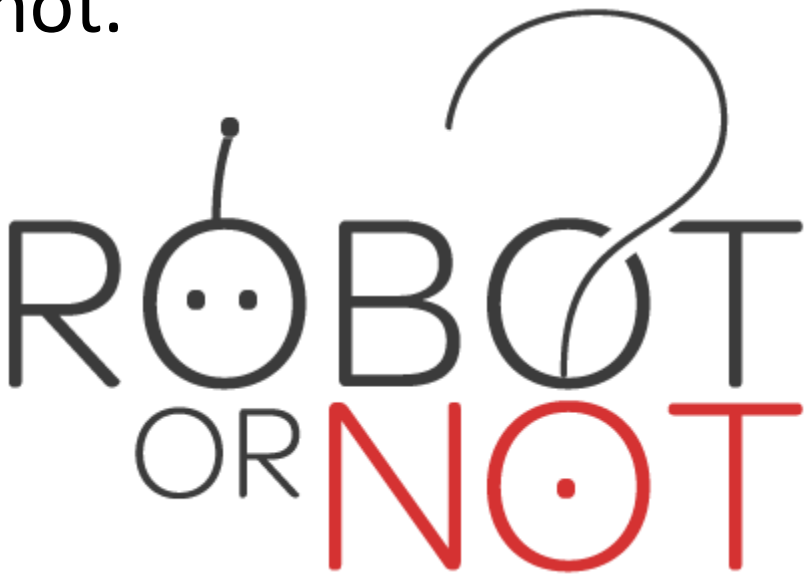
Then illustrate it through paint, name it, and explain how it solves the problem.

Mr. Robot? Oh!

- Explore just what makes a robot a robot.
- Determine how many robots students think they deal with daily
- Discuss whether they agree with the Sense, Think, Act theory

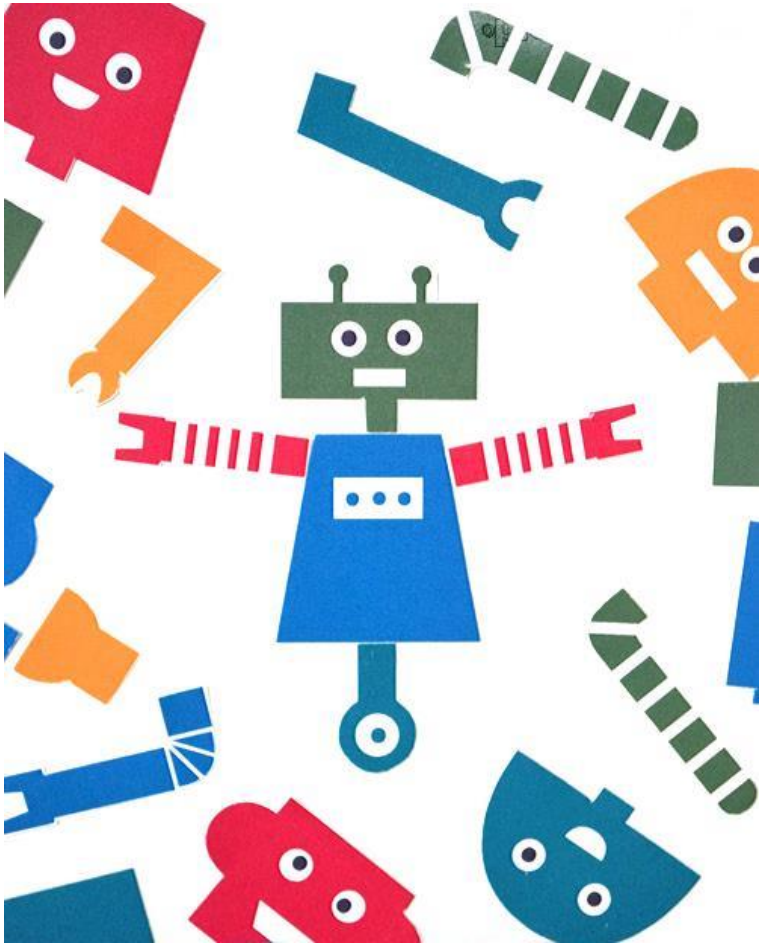
Robot, Or Not?

- Go on a fun scavenger hunt (and follow the flow-chart) to determine just how many robots are around!
- Track data and see if everyone agrees whether something is a robot…or not.



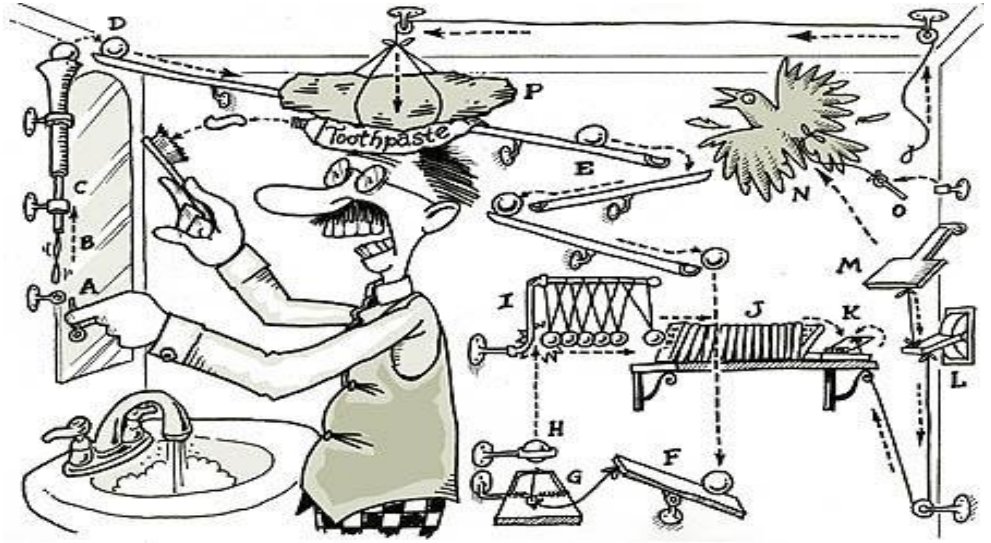
Assemble!: Robot Problem Solvers

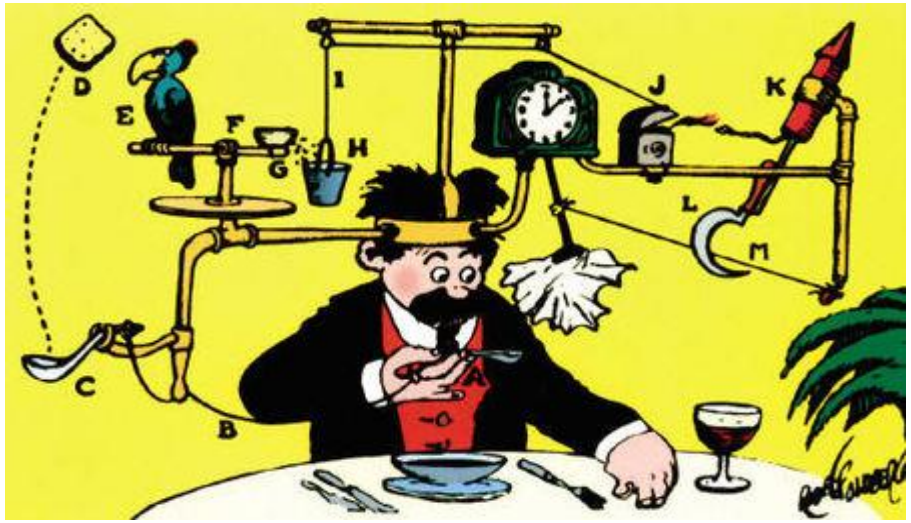
Student teams race to create their own robots out of parts in this fun 'hangman' style math skills practice game.



Chain Reaction: Rube Goldberg Project—Creativity in Motion

- Learn about who Rube Goldberg was
- Explore his cartoons and ideas

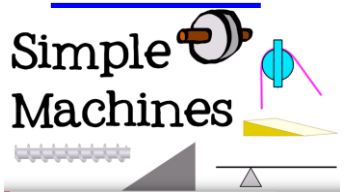


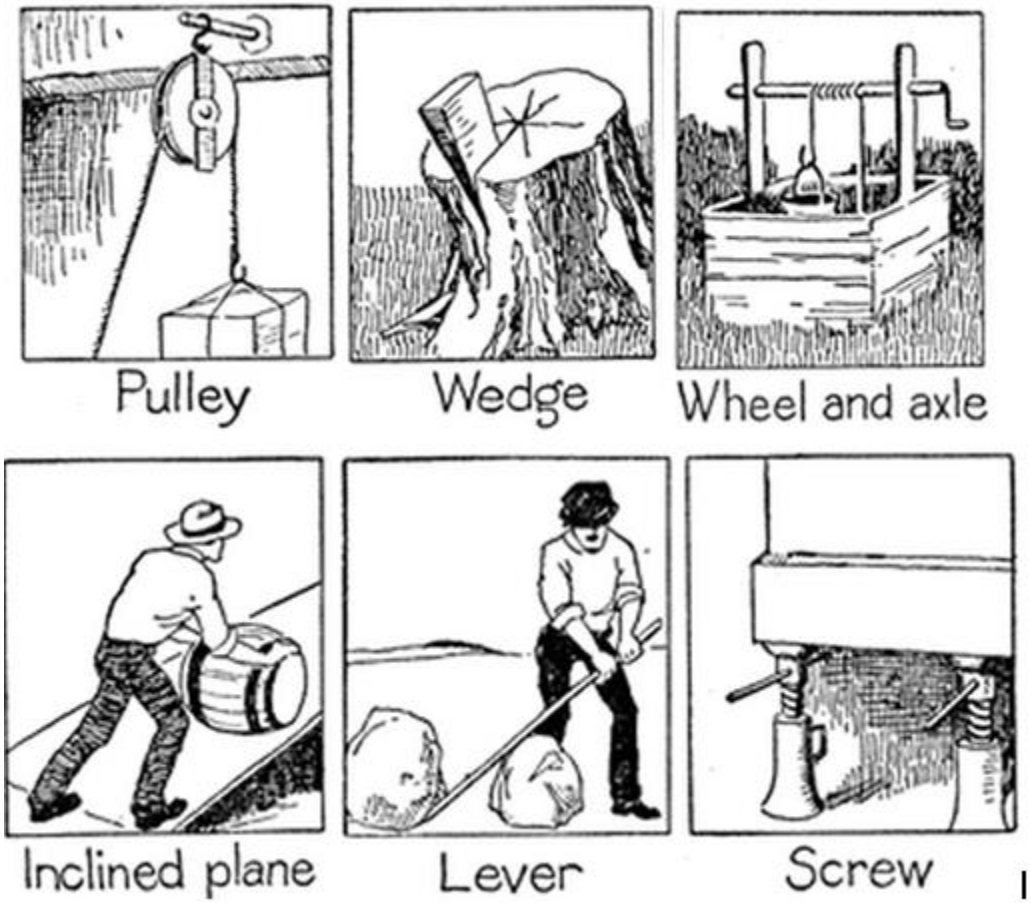


Six Machines to Do It All, Six Machines to Bind Them

Explore the six simple machines, how they work, and make sample models of them.

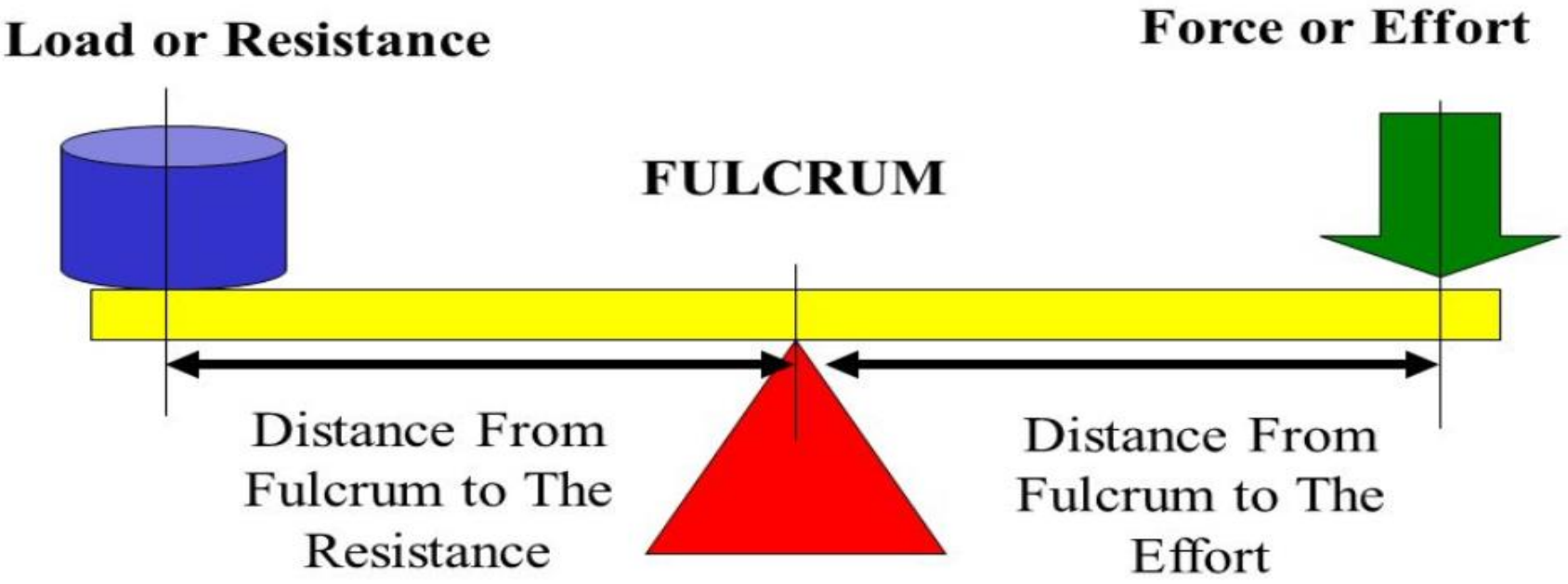
Sample video





Understanding the Lever and Load

Parts of a Lever



Understanding the Lever

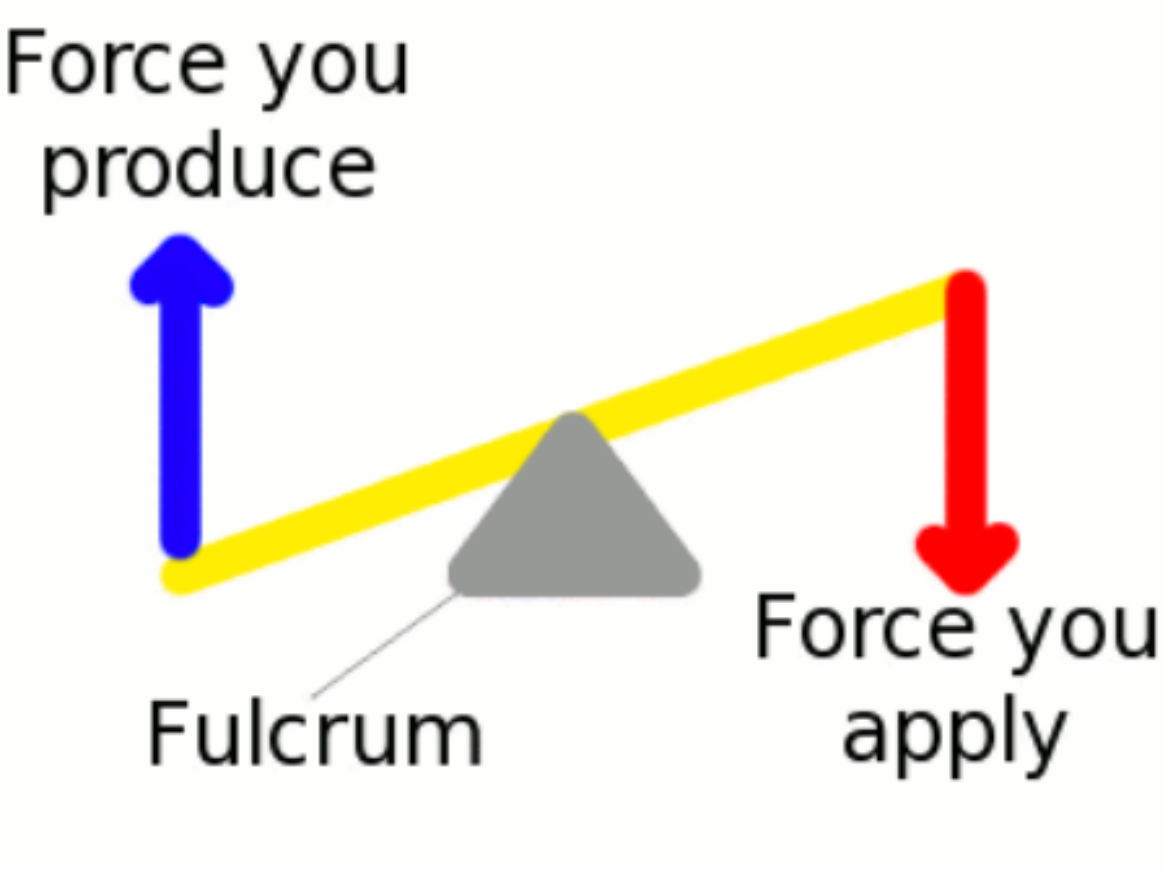
For the experiment hands may not be used to move the ball. Nothing may be used to secure the ball to the lever.

This configuration shows what is needed for students to explore the best lever design.

Understanding the Lever

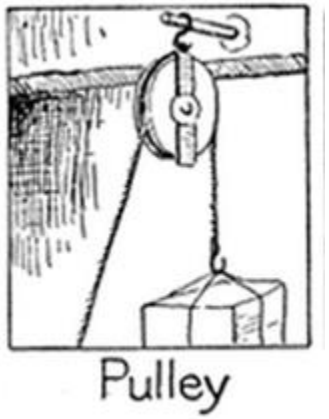
For the experiment hands may not be used to move the ball. Nothing may be used to secure the ball to the lever.

Students need to determine how to use the lever to get the ball where they need it.



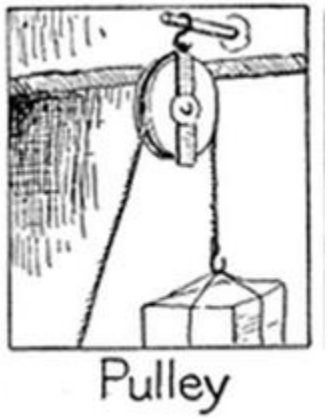
Pulley

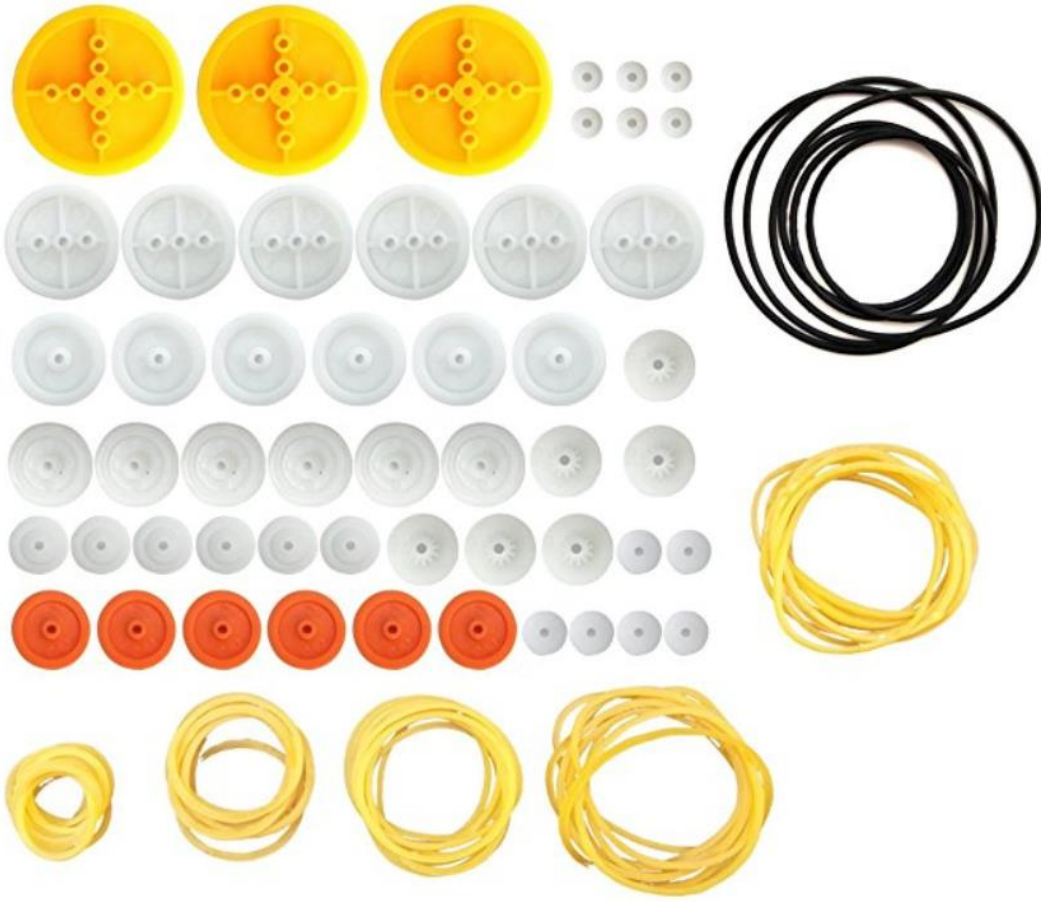
Picking up the milk jug. Which way is easier?



Pulley

Can you make a pulley?

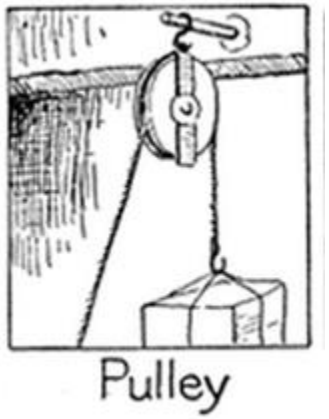




Pulley Challenge

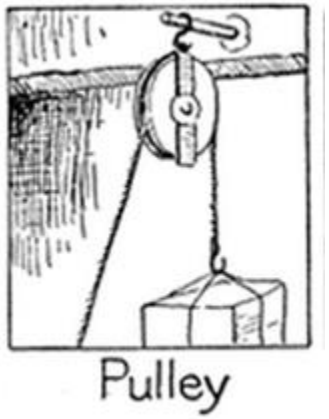
Good video

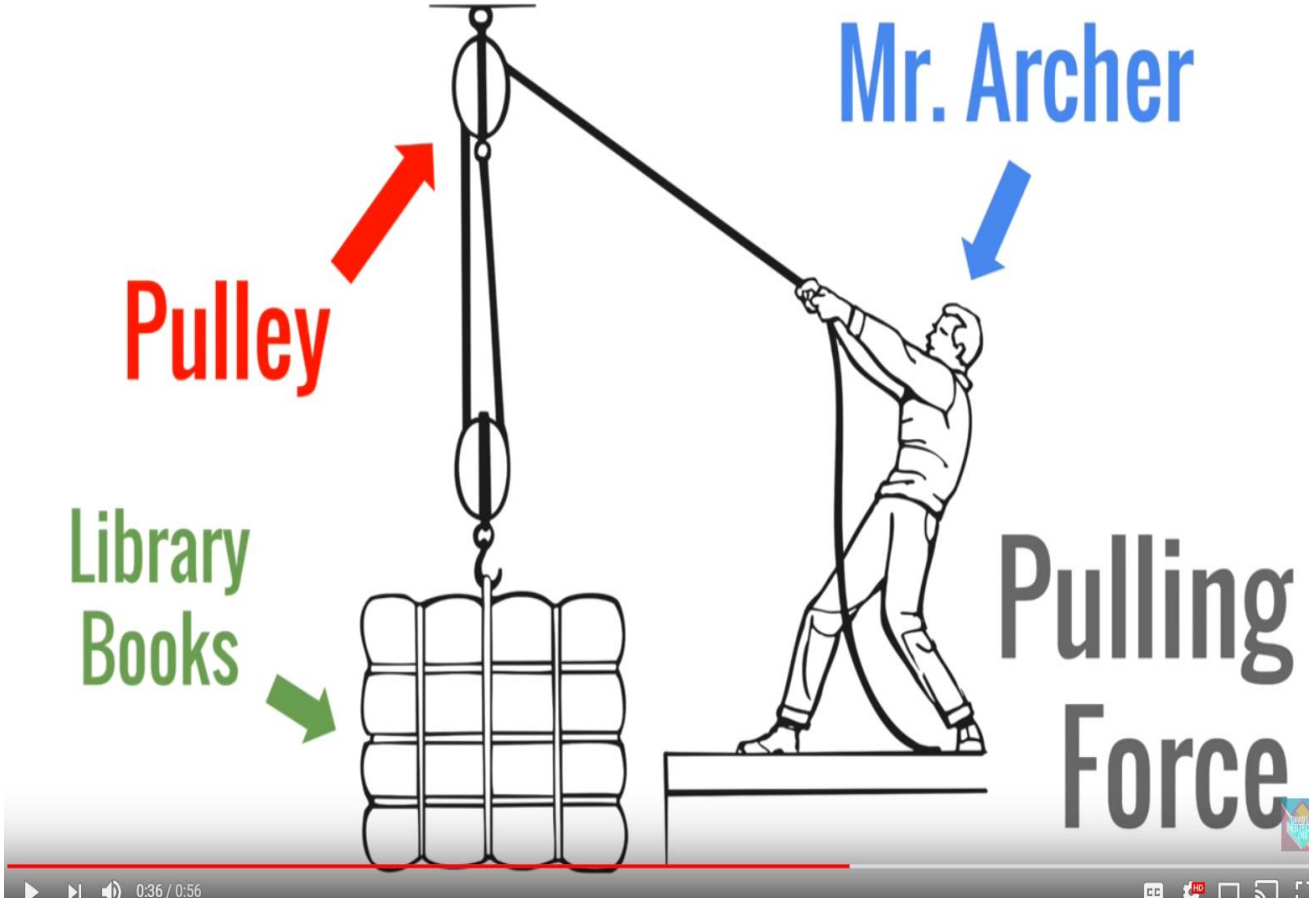
Understanding pulleys



Pulley Challenge

Modify your challenge

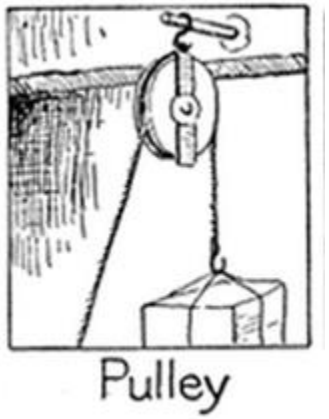


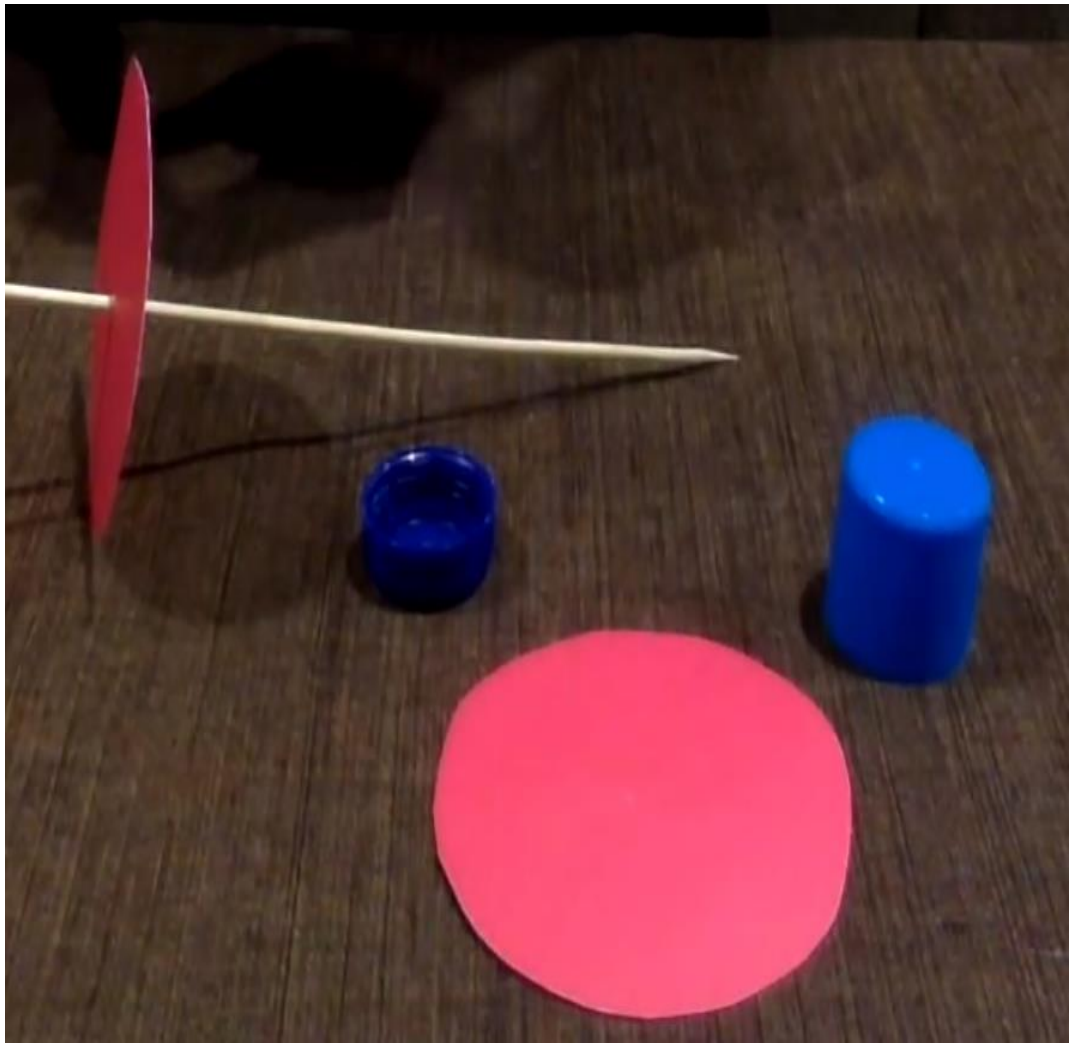


Pulley Challenge

Cups, marbles, pulley tools, thread spools, paper clips, skewers, tape, string

How to make a simple pulley?

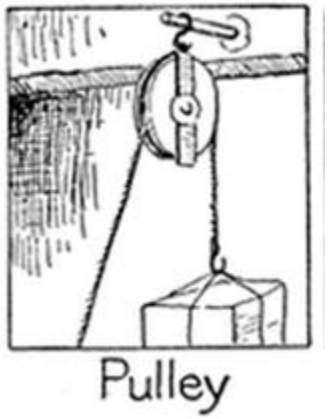


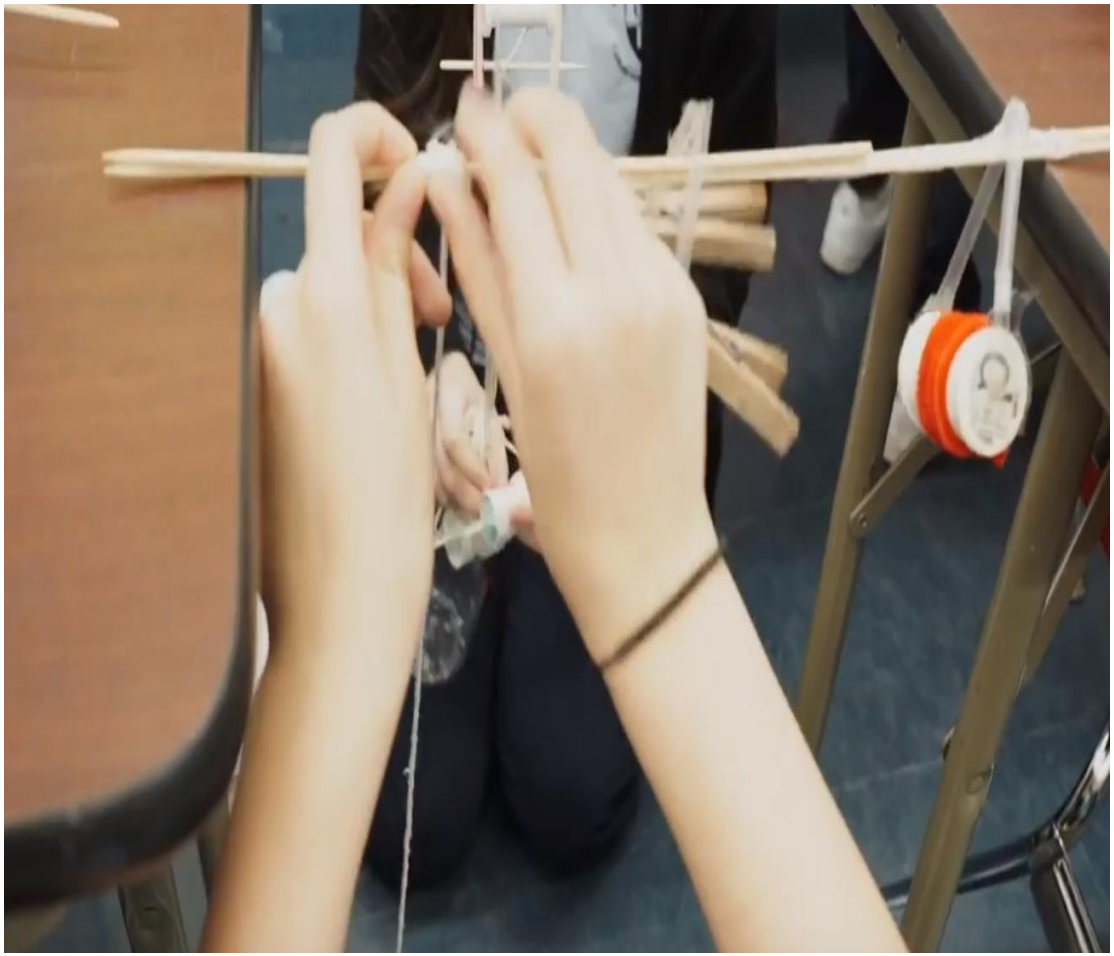


Pulley Challenge

Cups, marbles, pulley tools, thread spools, paper clips, skewers, tape, string

Who can lift the most marbles?

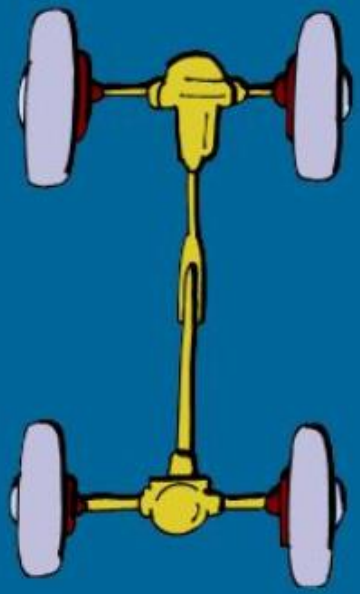


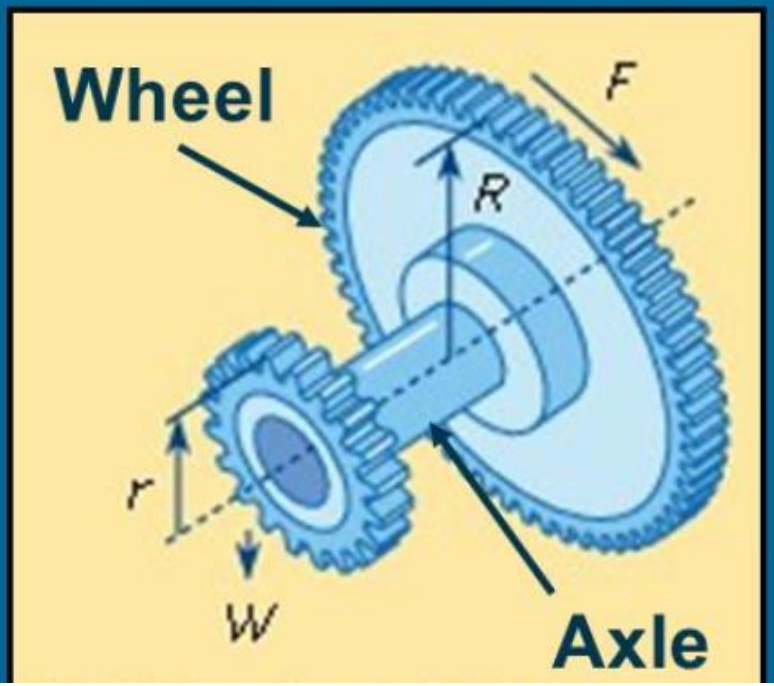


$W = Fd$

Wheel and Axle

- **Wheel and Axle**
  - two wheels of different sizes that **rotate** together
  - the wheel is always larger than the axle
  - a pair of **"rotating levers"**
- Examples: door knob, gears, car axle, pencil sharpener, screw driver, faucet handles





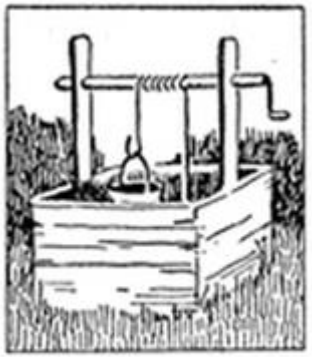
Wheel and Axle Group Challenge

Everyone gets the same materials and the challenge begins-

Who can move the tennis ball the greatest distance.

Wheel and Axle

Wheel and axles- expanded



Wheel and axle

Mousetrap Car

Instructables
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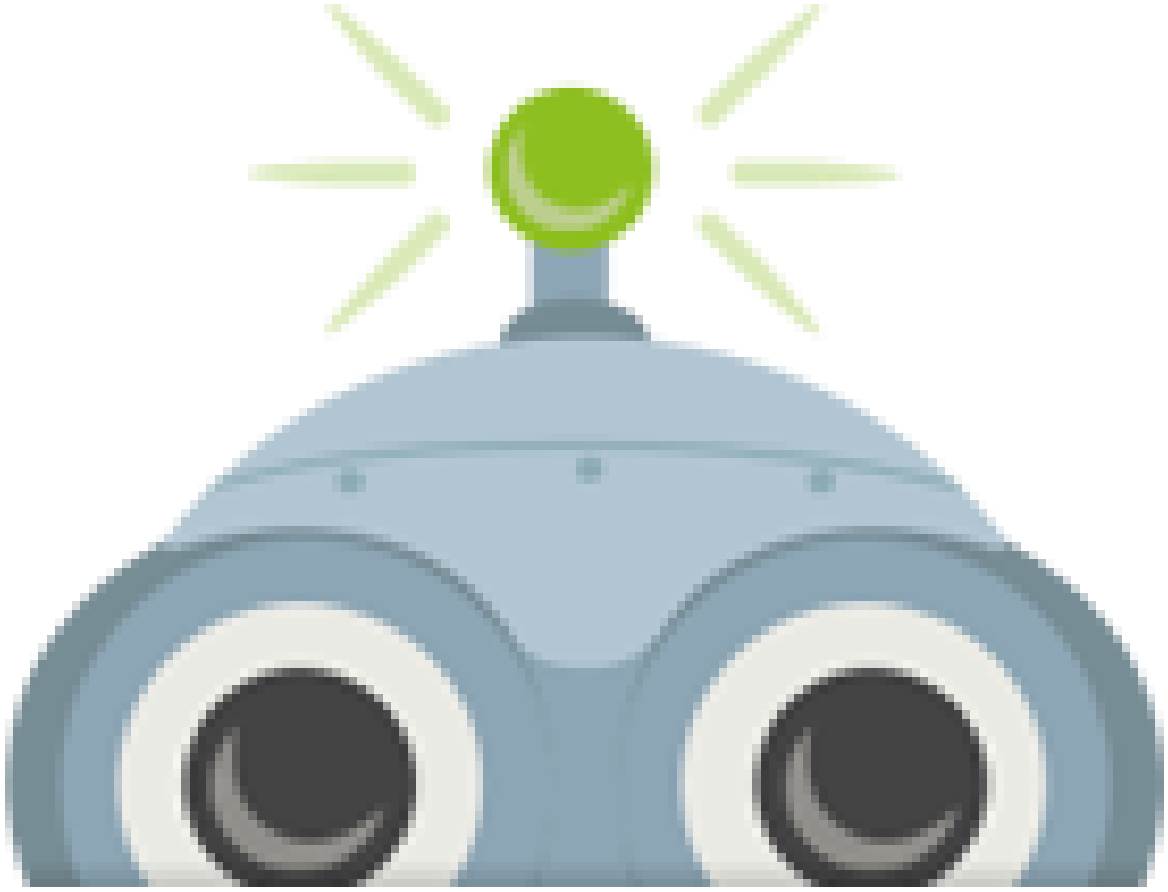
Mousetrap Car: This instructable will help you build a self-propulsion mousetrap car. The car uses physics and engineering concepts such as pulleys, levers, and springs to convert potential energy to kinetic energy which moves the car along. Less

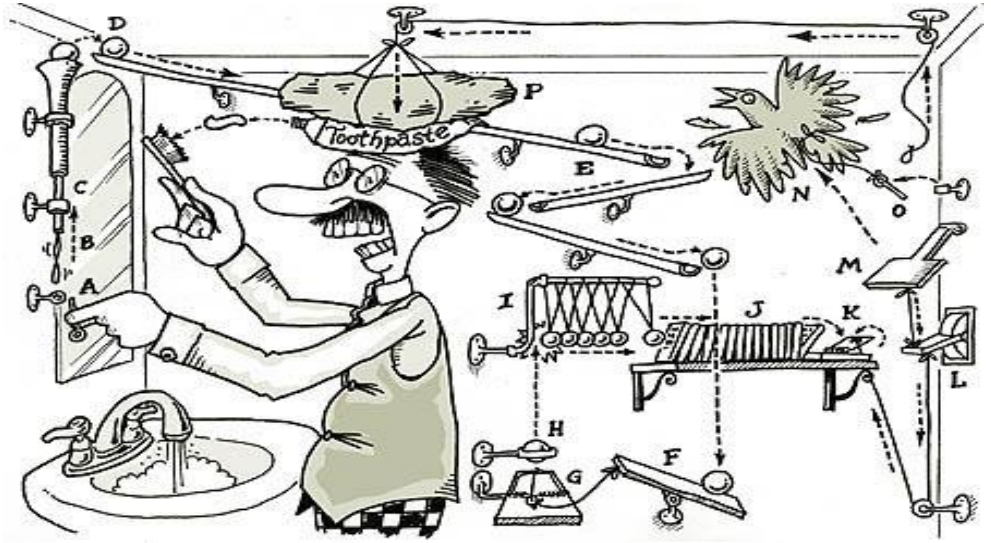
instructables.com

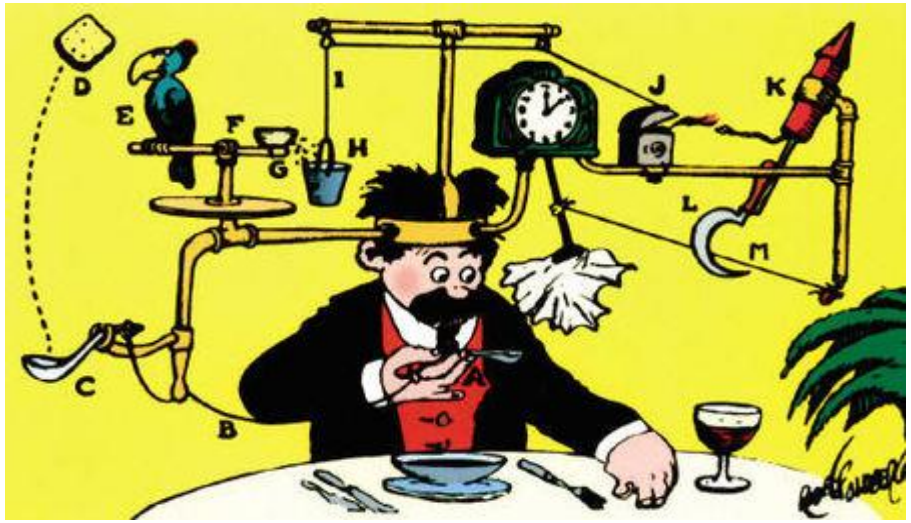
Students Brainstorm how simple machines are used in Robots



Chain Reaction: Rube Goldberg Project—Creativity in Motion

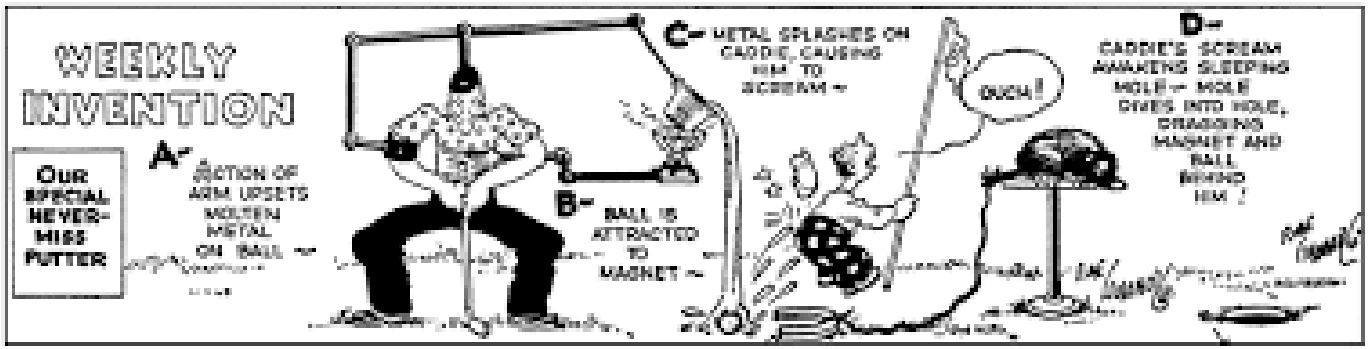
- Learn about who Rube Goldberg was
- Explore his cartoons and ideas





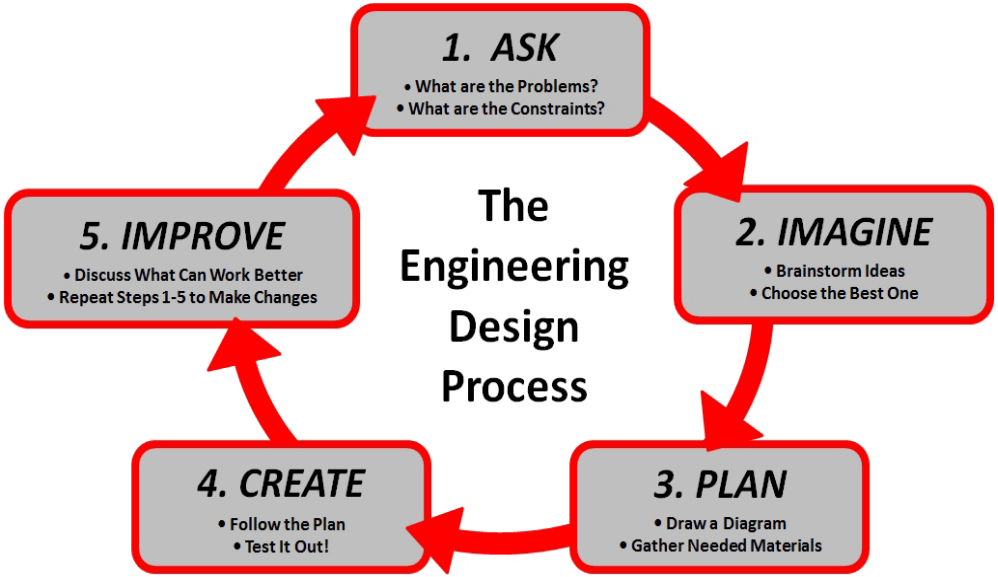
That's So Rube of You!

- Now that we know about simple machines, let's combine a few into something new, a complex machine (several simple machines working together)!
- Get inspiration from videos and Rube Goldberg's illustrations



That's So Rube of You!

And then students work (individually or in teams) to follow the engineering design process create their own Rube Goldberg style machine to solve a specified problem.



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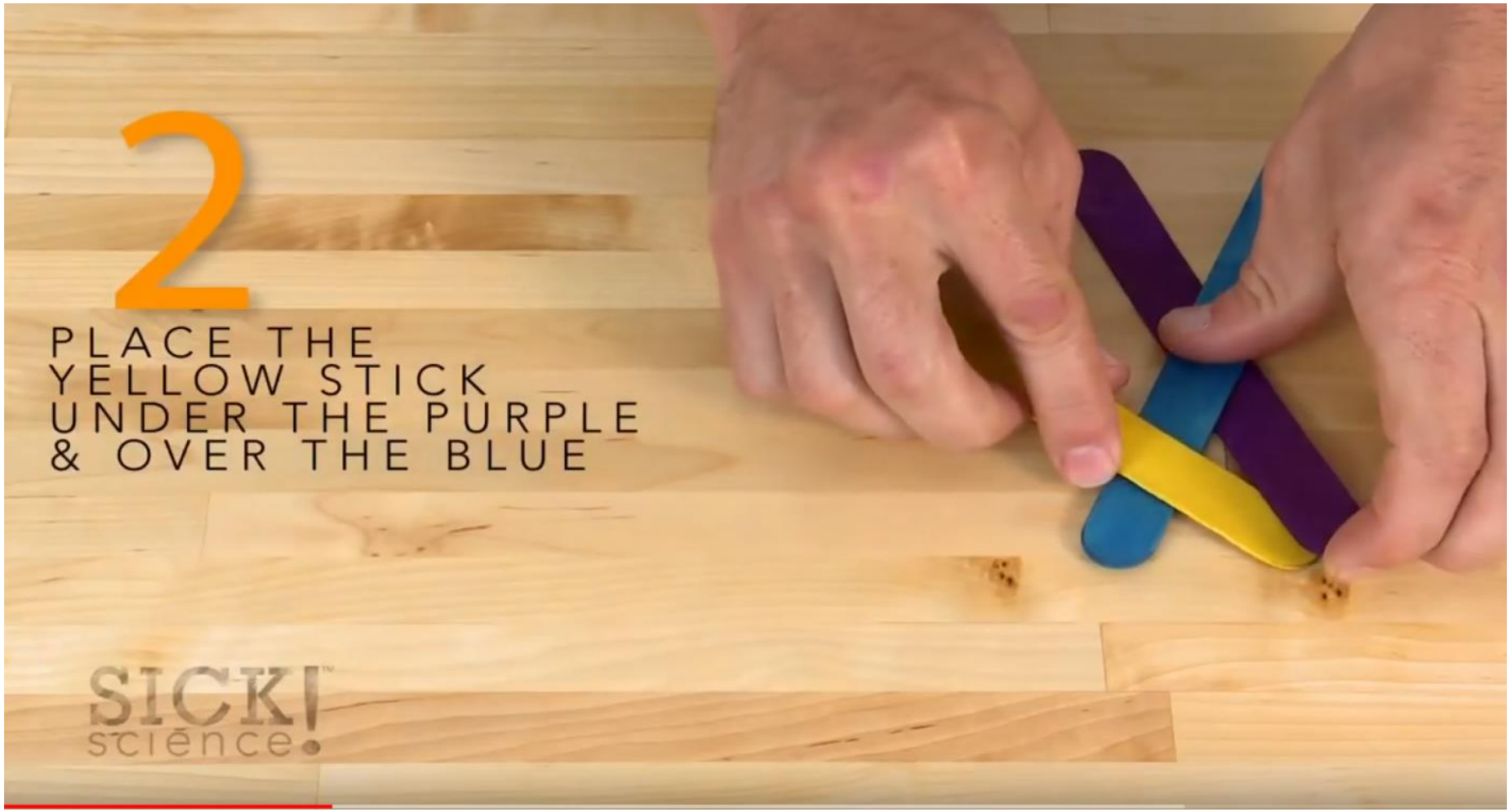
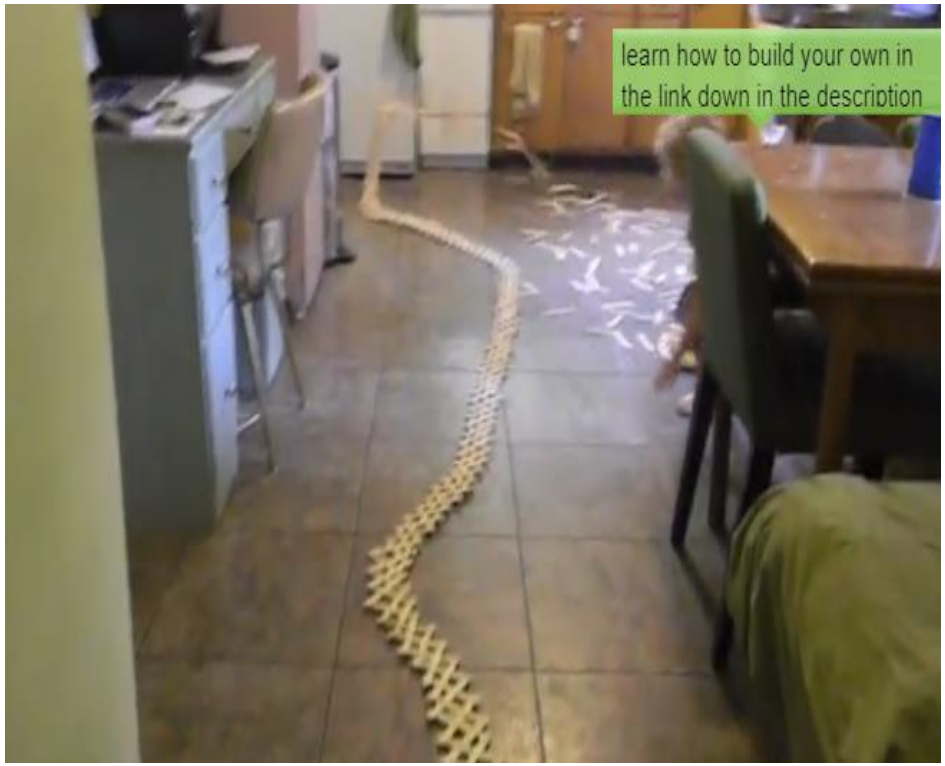
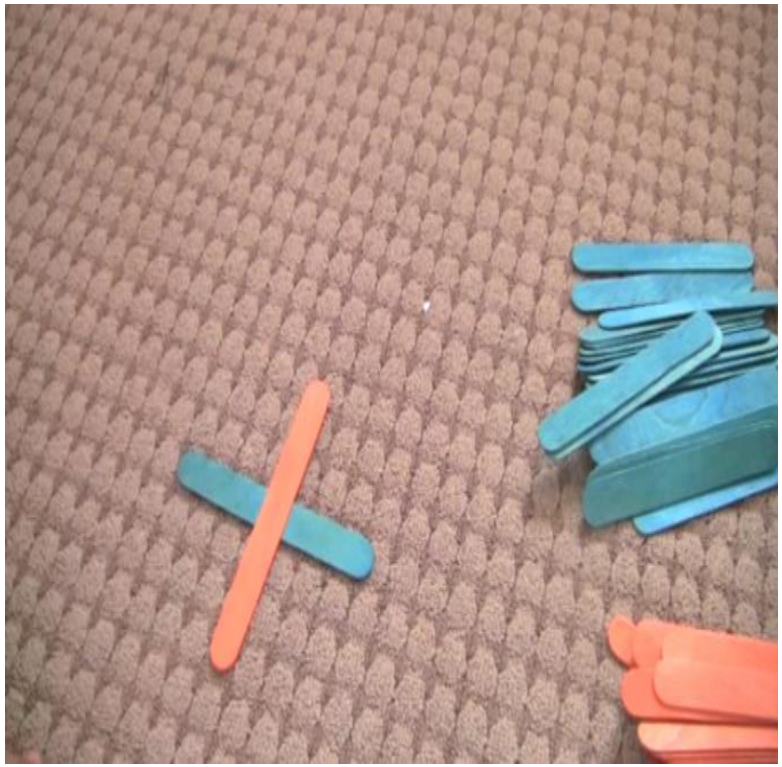


Chain Reaction: Helpful videos

Over 1000 used!



How to do the weave



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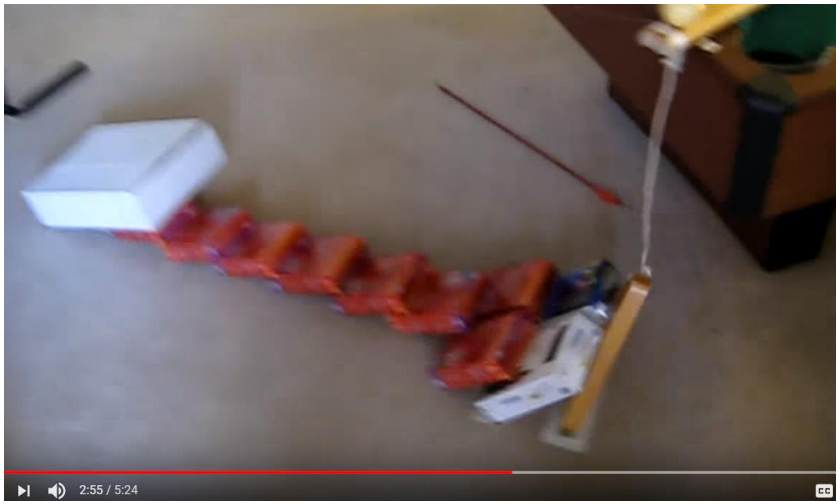
Students make mashed potatoes through a very complicated machine!



That's So Rube of You!

And then students work (individually or in teams) to follow the engineering design process create their own Rube Goldberg style machine to solve a specified problem.

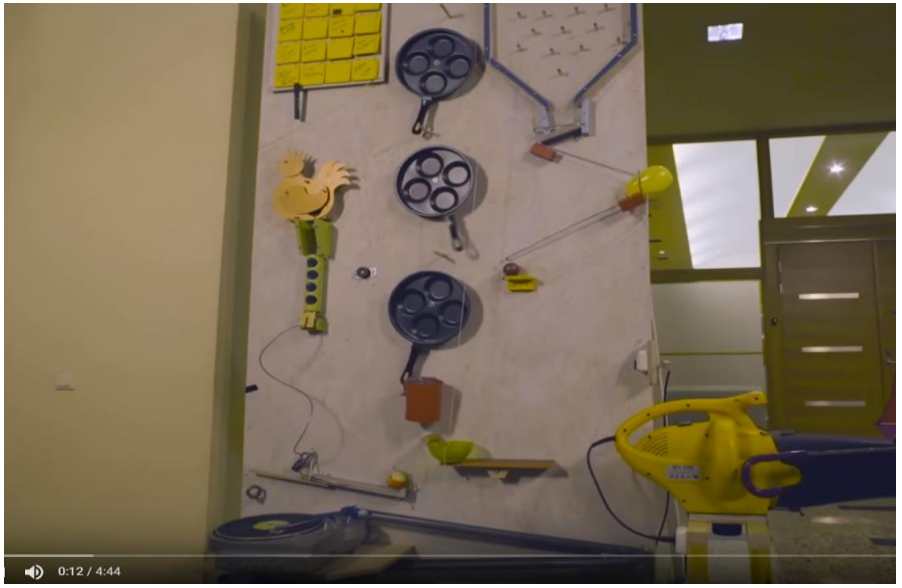
Students using simple machines for the rube Goldberg machine

ın with Rube Goldberg Machines 2018

That's So Rube of You!

And then students work (individually or in teams) to follow the engineering design process create their own Rube Goldberg style machine to solve a specified problem.

In this video the World's Greatest Rube Goldberg Machine lights up a Christmas tree



Rube Goldberg Toys

Between the Greeks and the Geeks: Automatons

- Explore the evolution of robots from ancient Greek inventions to automatons in the Middle Ages.

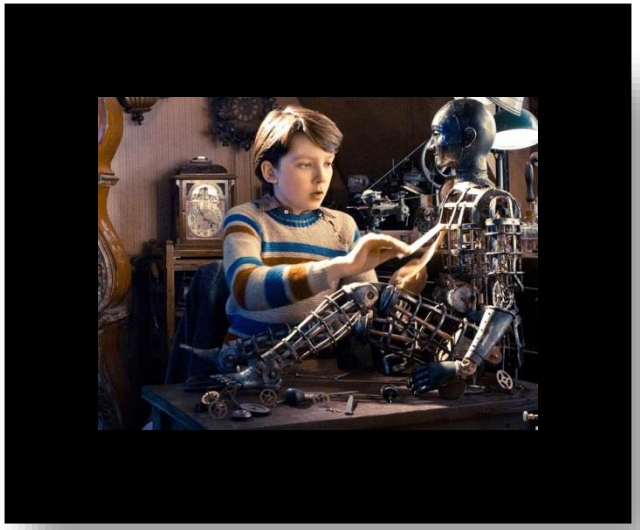
Watch Pipe Dreams: a modern form of 'automaton.' [*Voted one of the 50 best 3D animation projects ever. Most of the other winners were big-budget movies (The Matrix, Toy Story, Star Wars) and a few video/computer games (Doom, Tomb Raider, Myst).]*
And see how it was made into a real world version by intel.

Keeps On Ticking

Explore the history of automatons.

The Illusion of Life

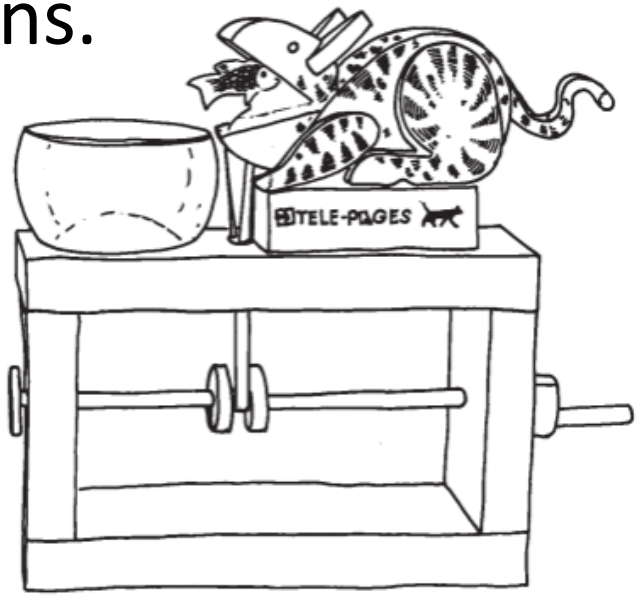
Discuss and discover how real life automatons inspired fictional stories and movies, and fictional stories and movies inspired change in the real world.



Charles F. Penniman, a retired museum employee, gently tended to the automaton.

Cardboard Automata

- Automata, or kinetic sculpture, is quite simply art and science that moves.
- Students use the engineering design process and a new understanding of cams to design and create their own automatons.

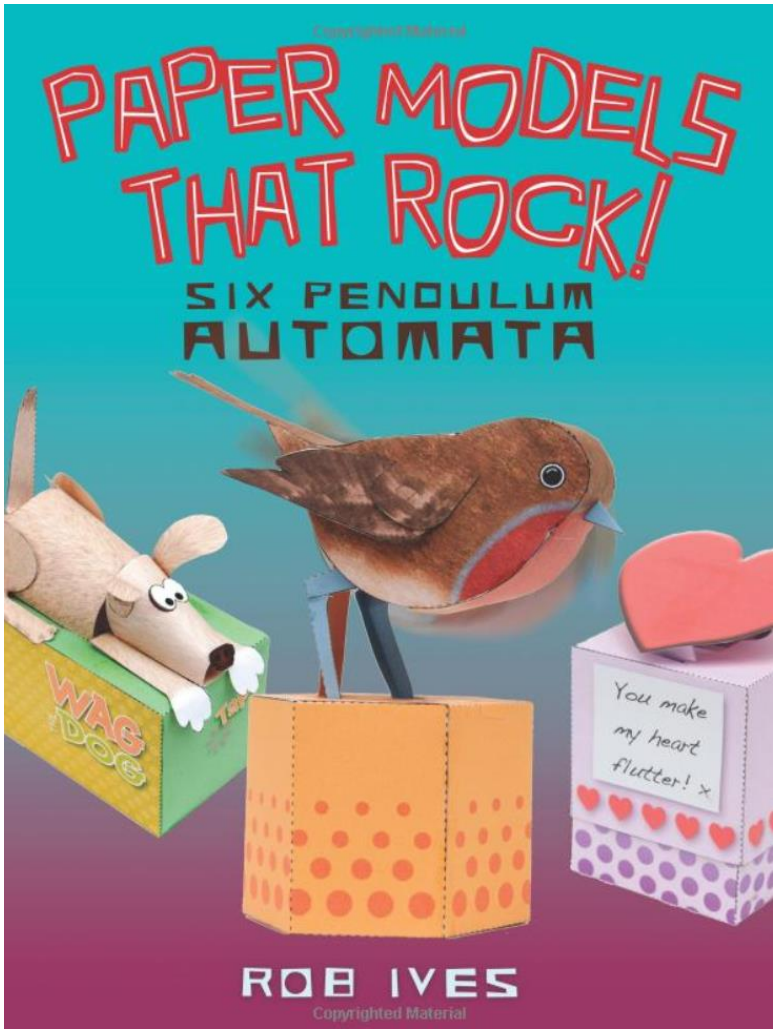


Automatons

The oldest working automaton known today is the rooster atop the cathedral clock tower in Strasbourg, France. Built in 1352, the rooster flaps its wings, thrusts out its tongue and crows. Like the Strasbourg rooster, glockenspiels, German for "players of the bells", are run by the clockwork and move atop clock towers, chiming the hours. Glockenspiels can be quite elaborate and are often life-sized figures moving to the clock chimes in a choreographed dance.

AUTOMATONS

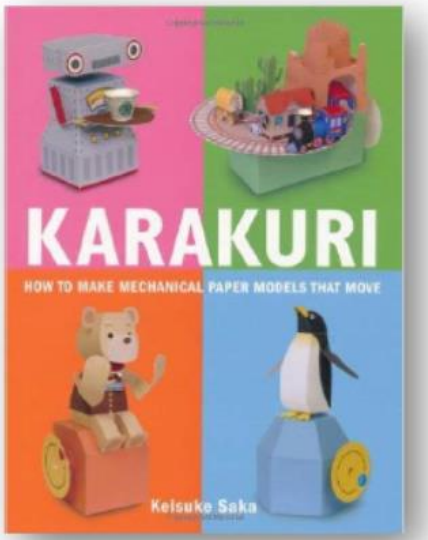
Dog´s Dinner, paper model



Automatons

Resources and Materials:

- RobIves.com
- Printer Paper
- White Cardstock
- Books such as *Karakuri*
- Scissors
- Tape
- Craft/Tacky Glue



robives.com

Designing Paper Animations

Karakuri

- https://www.youtube.com/watch?v=bYd04Zdx-ls

Paperoids

Piperoid- stop motion

French Bulldog
フレンチブルドッグ

Miniature Dachshund
ミニチュアダックスフント

Shiba Inu
柴犬

Miniature Schnauzer
ミニチュアシュナウザー

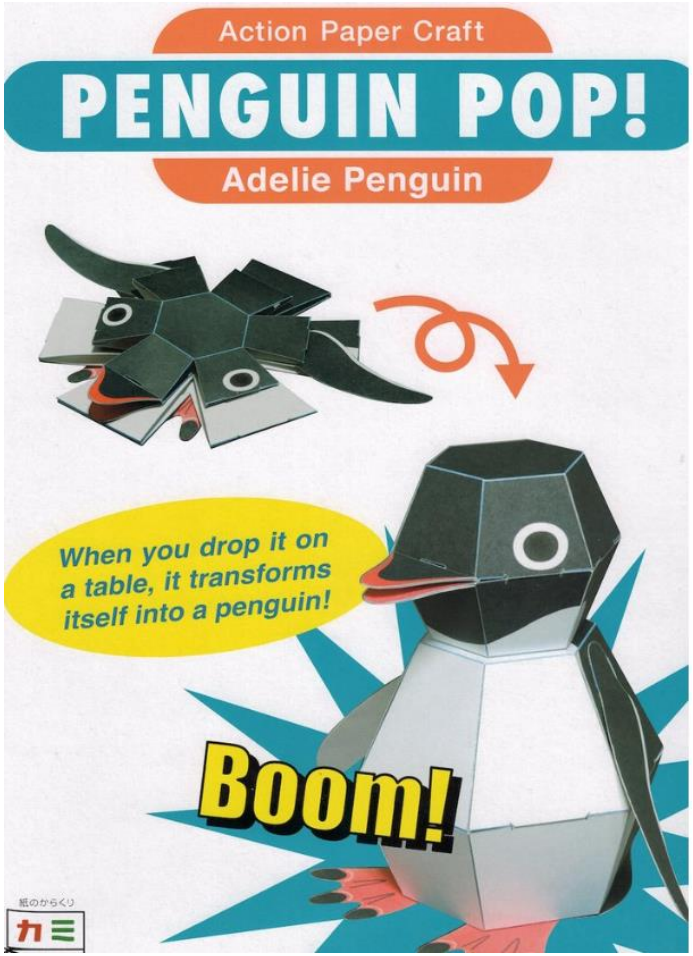
Beagle
ビーグル

Pug
パグ

Our favorite stop motion app

my Create

Penguin Bomb



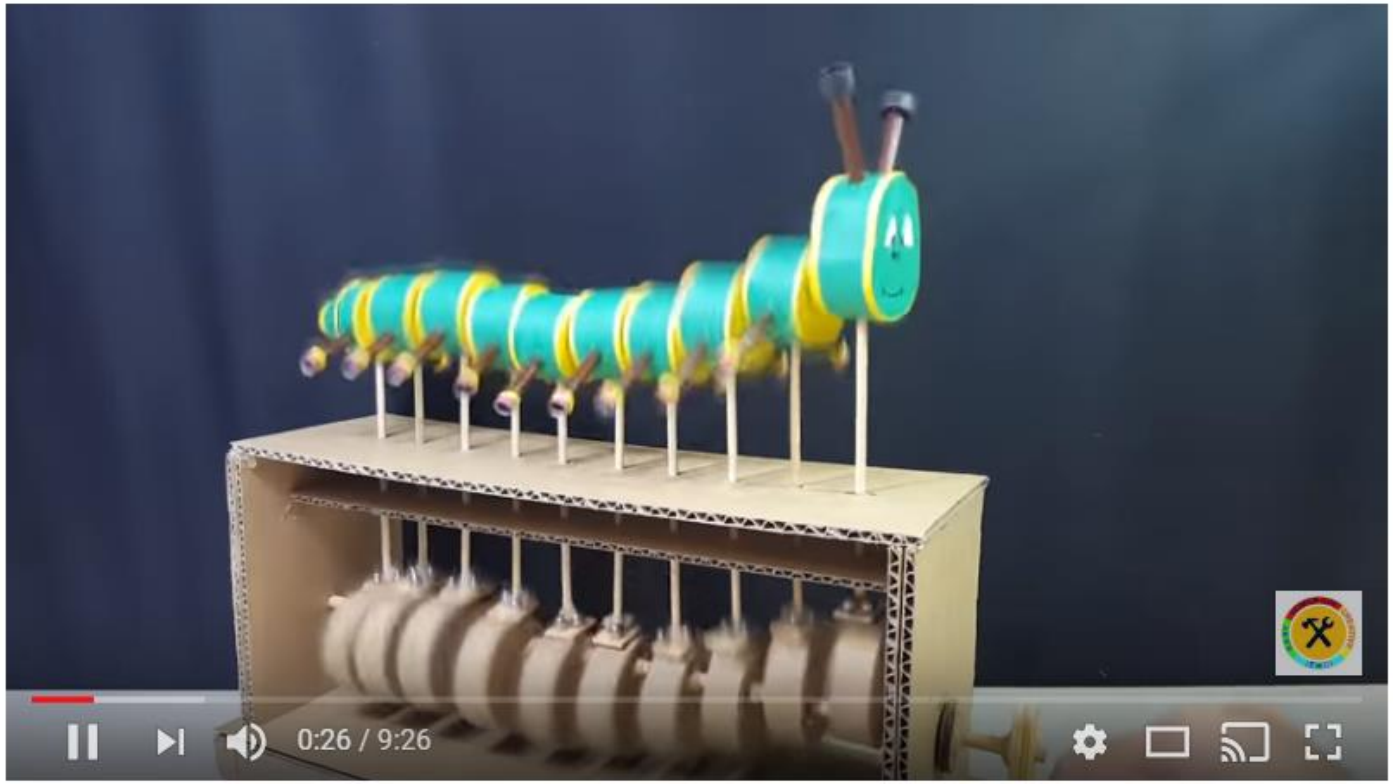
https://youtu.be/I6x1DBd2F4c

Kamikara Paper Toys by Haruki Nakamura

- https://youtu.be/M2IWTEx0bmI

https://mymodernmet.com/karakuri-animal-puppets-haruki-nakamura/

AUTOMATONS



Wow! Amazing DIY Cardboard Caterpillar Automata Toy

6,995 views

178 3 SHARE

Evolution

- Cats in shark costumes riding robots?! Exactly
- Discuss just how far robots have come and how far they've spread…from cleaning your carpet to hanging on walls, and that dress in your closet that's just down the hall…

Artists in the Shaking

Then it's time to get to making an artsy little robot that's all about the shaking.

Skitter Skatter Art

And with remaining time a little art would be sublime! And if it's scatter brained…well, the artbot can't be blamed!

Robot Skin

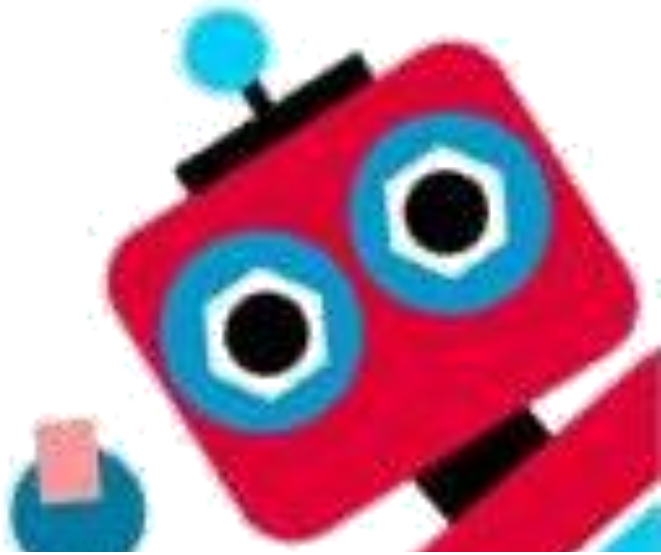
While robots have moved up, they've run into a valley, where they aren't quite real enough (you don't want to see that in an alley!) So it's time to figure out just what's up with robot skin and Albert Einstein is always a great place to begin.

Einstein Robot - UCSD Machine Perception Laboratory

Rubbery Frubbery Robot Skin

- What's tough but soft, sensitive but strong?
- Able to withstand the hardest of knocks, but also able to sense the faintest of touches?
- Why, robot skin of course!
- And now it's time to make our own. Some silver skin that's all home grown.

ROBOTS

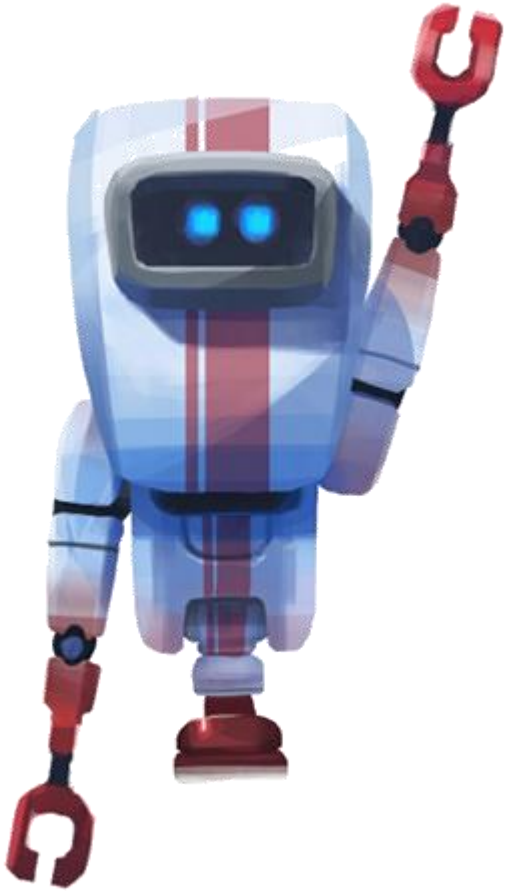


Small and simple things!

Tools of Mass construction!

Introduction

- Learn about simple tools that can be used to have robotic type capabilities
- Such as
- Walking
- Gripping
- Move



Introduction

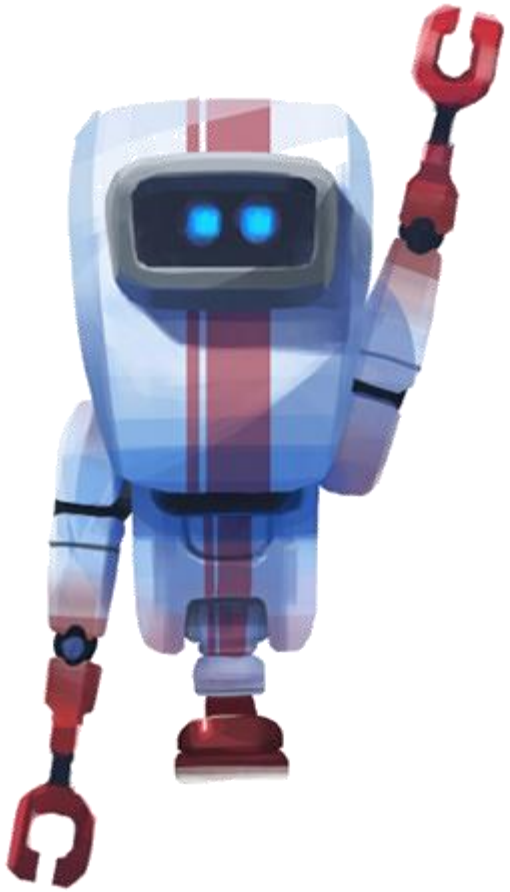
Build the Hand

We're using this process to make an amorphous robot gripper. A balloon filled with coffee is attached to an air hose; when balloon is slightly pressurized the grounds are loose and easily rearranged. By pressing the balloon against an object, the grounds will move around it and take its shape. But when the air is sucked out of the balloon, the grounds are compressed and grip the object. The rubber surface of the balloon also helps to keep a hold on the object.

Materials:

Introduction

Universal Robot Gripper



Walk Like a Human

Walk Like a Hu-uman?

Building a Leg to Stand On

How humans walk with their top-heavy, upright trunk atop two relatively spindly leg
understood. While some scientists believe that the human nervous syst
coordinates balance and locomotion, our research further suggests that
interaction of gravity, inertia and ground contact may also be very importa
coordinating our locomotion.

Walking on two legs may be easy for some humans, but not for robots. To get a rob
balance while standing, walking, running, or going up stairs takes a lot of complicate
programming. That's why some robots are built to stay in place and have work brou
them, like those in factories, and the most common way for robots to get around i
(whether it's one, two, three, four, or even more), and others have treads, just lik

It doesn't have a brain or a heart, and its walk is a little like the scarecrow's, b
headless, armless, trunkless two-legged robot, developed at Cornell Univer
walk, wobble, hobble, limp, stride and stagger. But it can't stand still in any p
without falling over.

Walk Like a human Cornell U

Andy Ruina Cornell Walker

20,182 views

27 0 SHARE

Walk Like a Human Another Sample

assive Walking Robot Propelled By Its Own Weight #DigInfo

87,242 views

Walk Like a Human Another Sample

Passive Dynamic Robotic Walker trial_2 - 7cm popsicle stick legs

2,836 views

24 0 SHARE

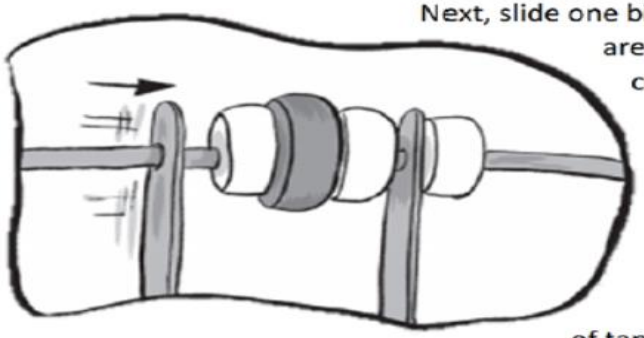
Walk Like a Human Real Life Use

Paraplegics - Active walking

42,087 views

91 16 SHARE

Walk Like a Human Design

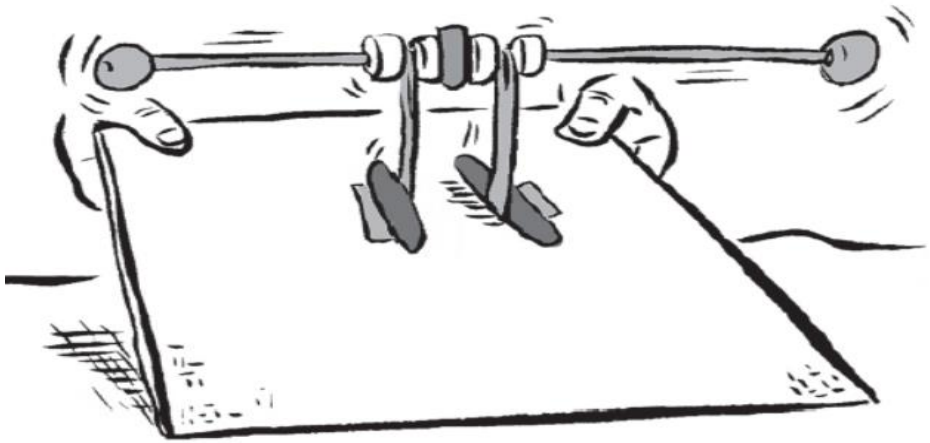


Next, slide one big bead or several small beads onto the skewer so that they are just touching the inside of the first leg. The bead(s) should cover about ½ inch of the skewer (1cm).

Now, slide on the second leg so that the front of the food is pointing in the same direction as the first foot. Slip another bead onto the the skewer to thold the legs in place, making sure there is just enough space for the legs to swing back and for the easily. If the outside beads are not staying in place, wrap a rubber band or a little piece of tape around the skewer to keep them from sliding around.

Stick a bead on each end of the skewer. It should be tight enough to stay on. If not, attach with tape. You can glue the beads on, but first make sure the legs are in the center of the skewer and your mini-walker is balanced. Avoid getting any glue on the legs.

Stand the walker on its feet. Glue a mini craft stick onto each foot, right next to the leg.



Make a test ramp with a long flat surface that you can tilt slightly, like a big book or a sheet of stiff cardboard or foam board. Foam core makes a nice walking surface.

For added traction put some strips of masking tape down the length of the ramp. To test each walker, set it at the top of the ramp and gently tap one end of the skewer. The walker should tip from side to side as it makes its way downhill.

Now, try other designs! Start with a robust, simple structure and expand! Can they lengthen the design? Add knees?

Animari: A New Form of Life?

- And to finish it up, we look where we going…which really we have no way of knowing, but it's fun to discover and ponder and see if we can guess what's going to be…
- And one of the guys who thinks he might know is a man named Theo, who makes herds that grow.
- A man who takes 'nature' and makes something new.
- And here is the question, can you do it too?

Kinetic Creatures

- Others have followed Theo, they think he's inspired, and built themselves creatures, of paper and wire.
- Then put them in motion like those that wander the edge of the ocean.

Soft Robots

Meet the Inflatable Robots of Pneubotics!

60,552 views

1.2K 13 SHARE

Soft Robots

Soft Robots

279,132 views

2.2K 72 SHARE

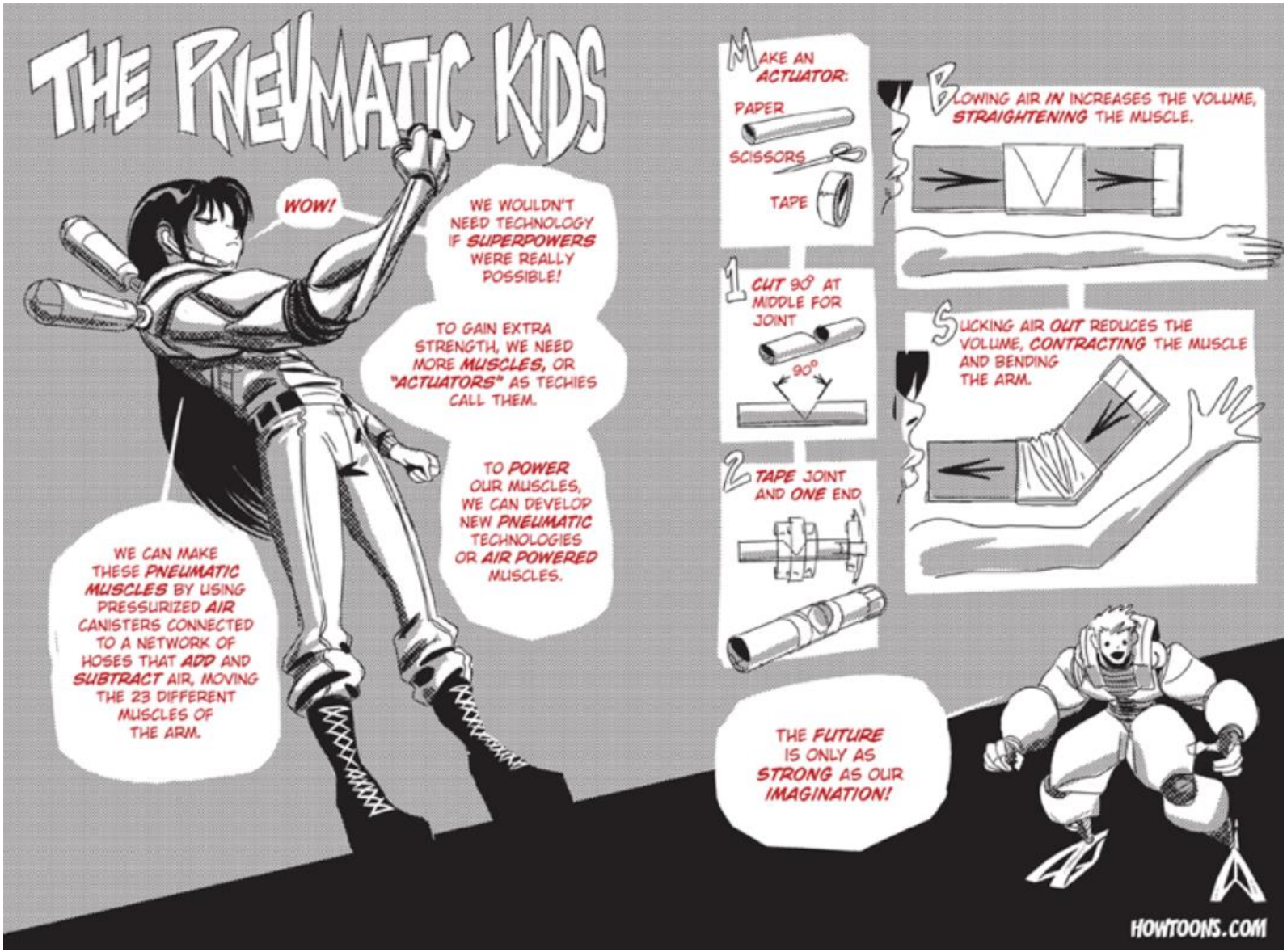
Soft Robots

Stanford researchers develop vine-like, growing robot

648,077 views

5.8K 590 SHARE

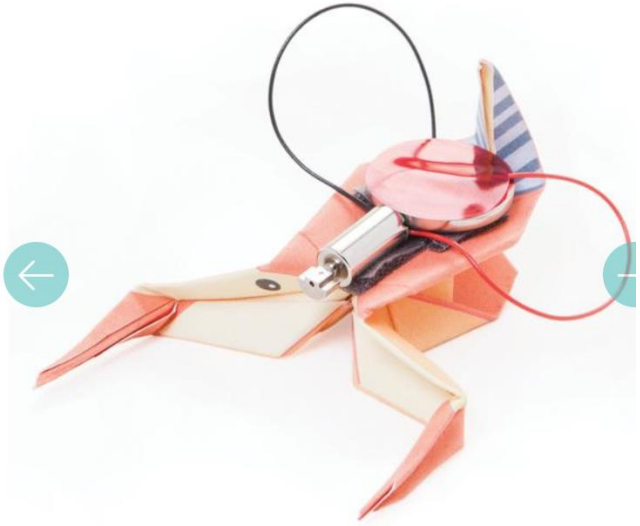
ACTUATORS


THE PNEUMATIC KIDS
WOW!
WE WOULDN'T NEED TECHNOLOGY IF SUPERPOWERS WERE REALLY POSSIBLE!
TO GAIN EXTRA STRENGTH, WE NEED MORE MUSCLES, OR "ACTUATORS" AS TECHIES CALL THEM.
TO POWER OUR MUSCLES, WE CAN DEVELOP NEW PNEUMATIC TECHNOLOGIES OR AIR POWERED MUSCLES.
WE CAN MAKE THESE PNEUMATIC MUSCLES BY USING PRESSURIZED AIR CANISTERS CONNECTED TO A NETWORK OF HOSES THAT ADD AND SUBTRACT AIR, MOVING THE 23 DIFFERENT MUSCLES OF THE ARM.
MAKE AN ACTUATOR:
PAPER
SCISSORS
TAPE
1 CUT 90° AT MIDDLE FOR JOINT
90°
2 TAPE JOINT AND ONE END
BLOWING AIR IN INCREASES THE VOLUME, STRAIGHTENING THE MUSCLE.
SUCKING AIR OUT REDUCES THE VOLUME, CONTRACTING THE MUSCLE AND BENDING THE ARM.
THE FUTURE IS ONLY AS STRONG AS OUR IMAGINATION!
HOWTOONS.COM

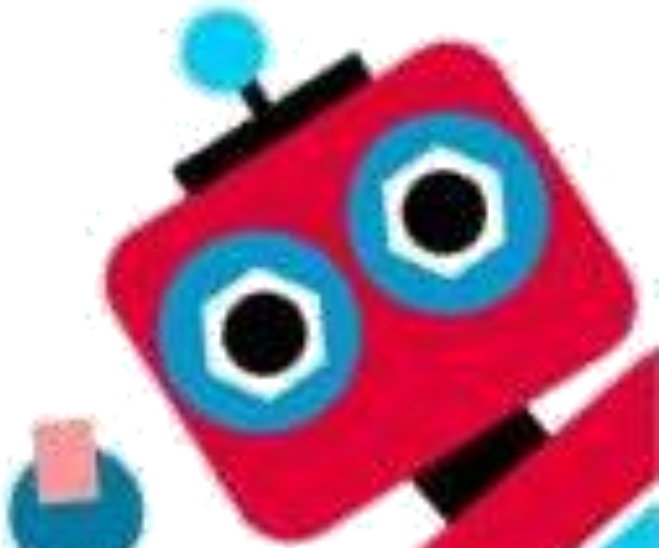
GAMIBOTS


HOWTOONS
BUILT FOR BATTLE | GAMI-BOTS
INTERVIEW WITH
ROBOTICIST
KEVIN ALBERT
HT

GamiBots



ROBOTS



PAGING DR. NAN O. BOT!

ROBOTS TO THE RESCUE?

Nanotechnology

Nanotechnology

YOUR A-MAZE-ING BODY!

In this activity we'll use play materials you already have like Lego bricks, Magna-Tiles®, and even old wrapping paper and paper towel tubes or straws to create mazes and obstacles for the Hexbug Nano.

This activity is an absolute hit with kids and promotes all kinds of learning: planning, problem solving, engineering and building, creativity and more!

Nanotechnology

Sample Goal Levels:

Level One: Can students build a maze that their hexbug can successfully travel from one end to the other in order to 'apply its medicine' to the target?

Level Two: Can students build a/expand on/modify their maze and make sure that that their hexbug can successfully travel from one end to the other in order to successfully 'apply its medicine' without getting stuck a single time? If it gets stuck 'tissue' could be damaged by the medicine being delivered to the wrong spot!

Level Three: Can students build a maze that demonstrates a special skill that their hexbug nanobot has?

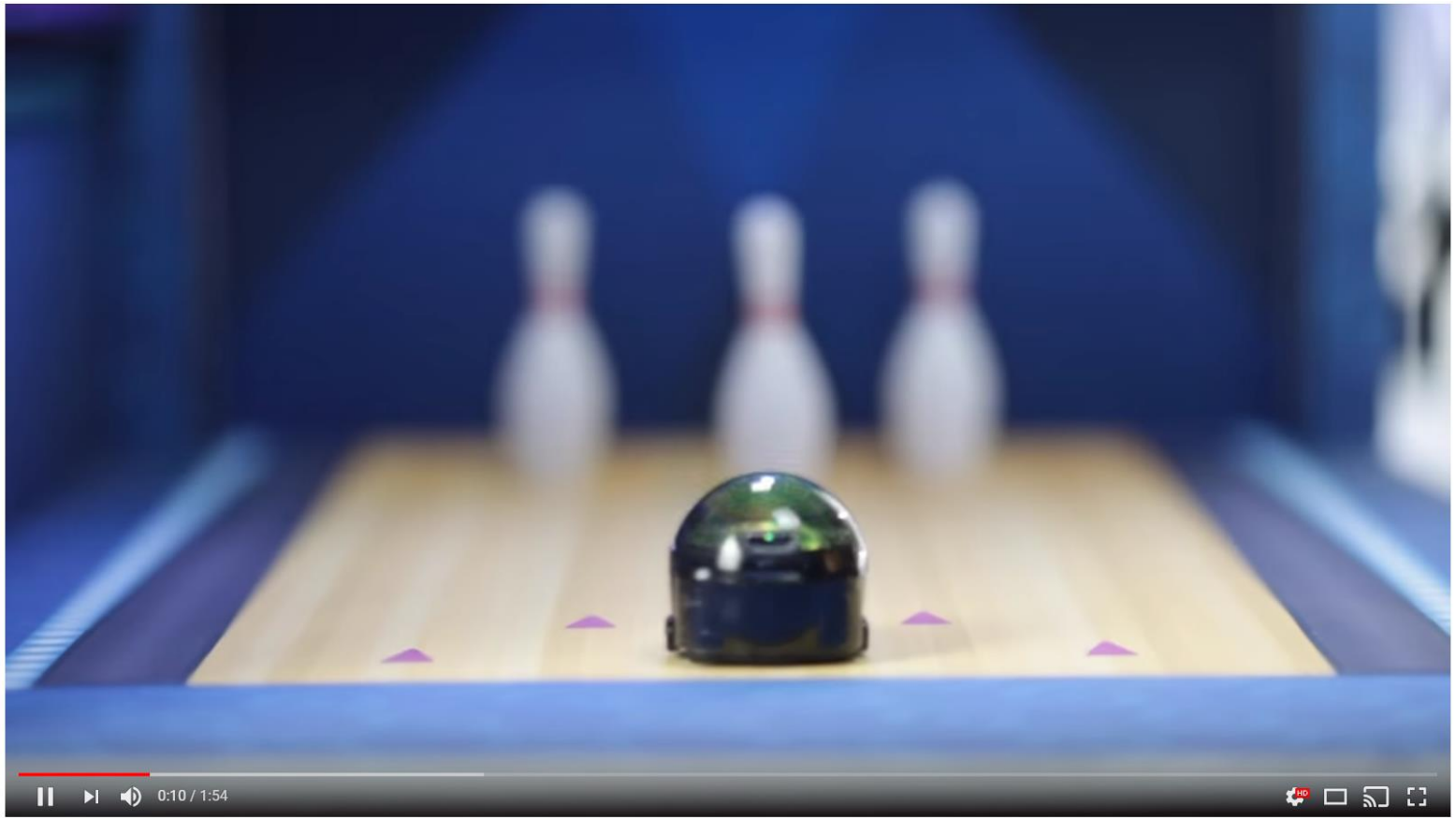
OZOBOT

CURING CARDIO KID WITH DR. OZOBOT!

COLOR CODED CURES!

Ozobot reads lines and color combinations on a page, following them almost like a road or a path. Certain color combinations make the Ozobot do tricks, speed up, slow down, among other things. You can see all of the different color codes the Ozobot knows HERE. It also works as a great reference guide.

OZOBOT

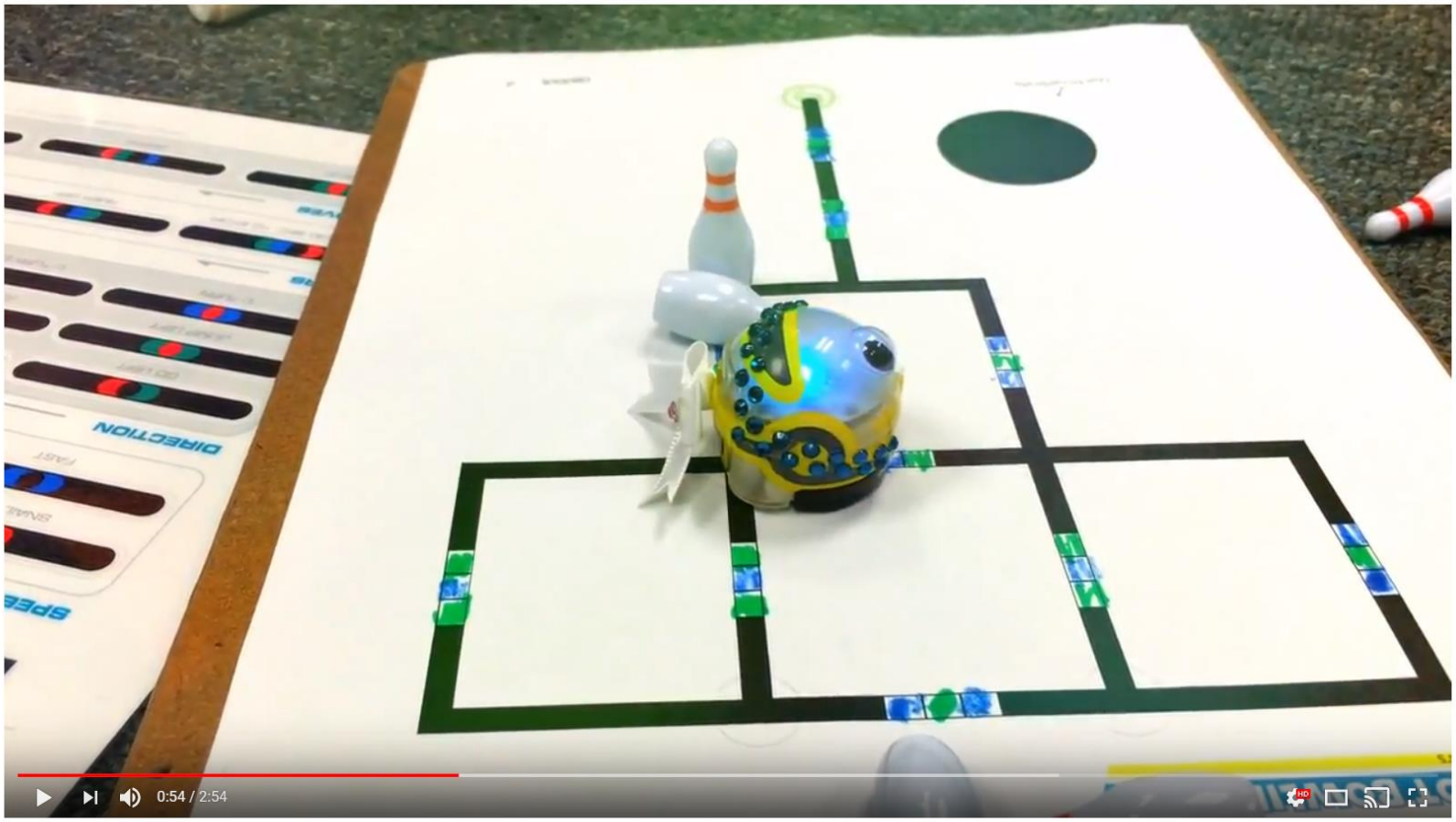


OZOBOT BIT ADVENTURES

199,236 views

236 11 SHARE

OZOBOT DROPPING THE PINS



Ozobot Bowling Challenge

22,344 views

28 8 SHARE

COLOR CODES

bit evo by ozobot

SPEED


SNAIL DOSE


SLOW

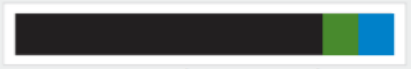

CRUISE

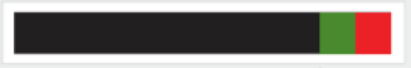

FAST


TURBO


NITRO BOOST

WIN/EXITS


WIN/EXIT (PLAY AGAIN)


WIN/EXIT (GAME OVER)

DIRECTION


GO LEFT


GO STRAIGHT


GO RIGHT


LINE JUMP LEFT


LINE JUMP STRAIGHT


LINE JUMP RIGHT


U TURN


U TURN (LINE END)

COUNTERS

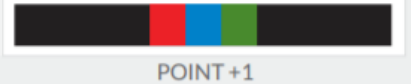
FIVE DOWN TO STOP

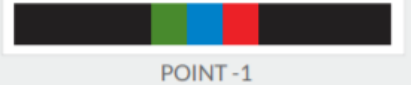

ENABLE X-ING COUNTER


ENABLE TURN COUNTER


ENABLE PATH COLOR COUNTER

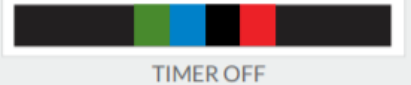

ENABLE POINT COUNTER


POINT +1


POINT -1

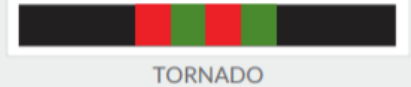
TIMERS

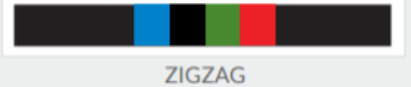

TIMER ON (30 SEC. TO STOP)

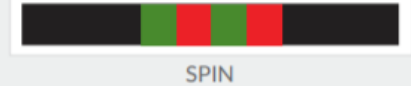

TIMER OFF


PAUSE (3 SEC.)

COOL MOVES

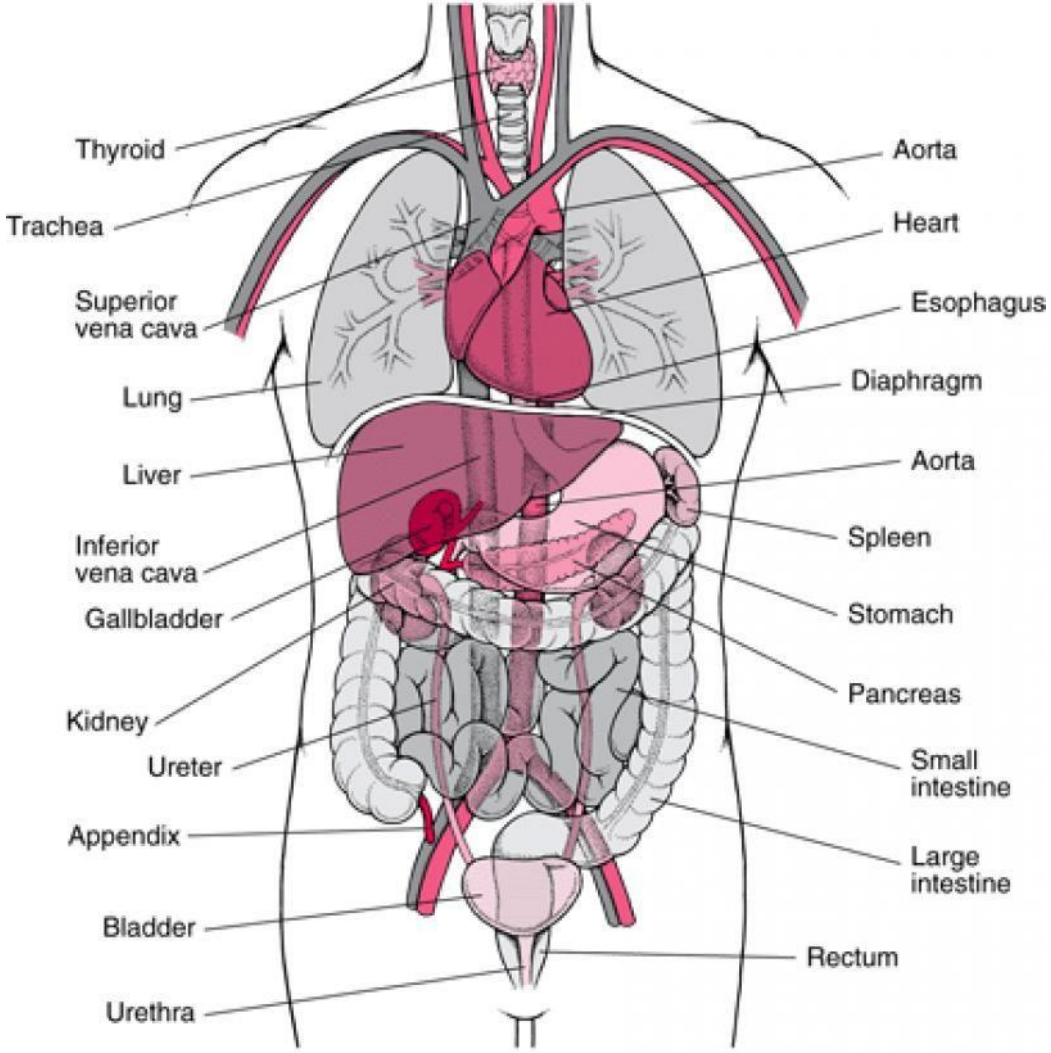

TORNADO


ZIGZAG


SPIN


BACKWALK

Cardio Kid


Thyroid
Trachea
Superior vena cava
Lung
Liver
Inferior vena cava
Gallbladder
Kidney
Ureter
Appendix
Bladder
Urethra
Aorta
Heart
Esophagus
Diaphragm
Aorta
Spleen
Stomach
Pancreas
Small intestine
Large intestine
Rectum

OZOBOT

LEVEL ONE: CODING COLORFUL CURES

1. The Ozobot needs to start at 'Injection Site' and go to a specified organ or 'tumor' on your Cardio Kid.
2. There should be at least three working codes
3. There should be at least one cool move among those codes.

LEVEL TWO: HUMAN TRIALS

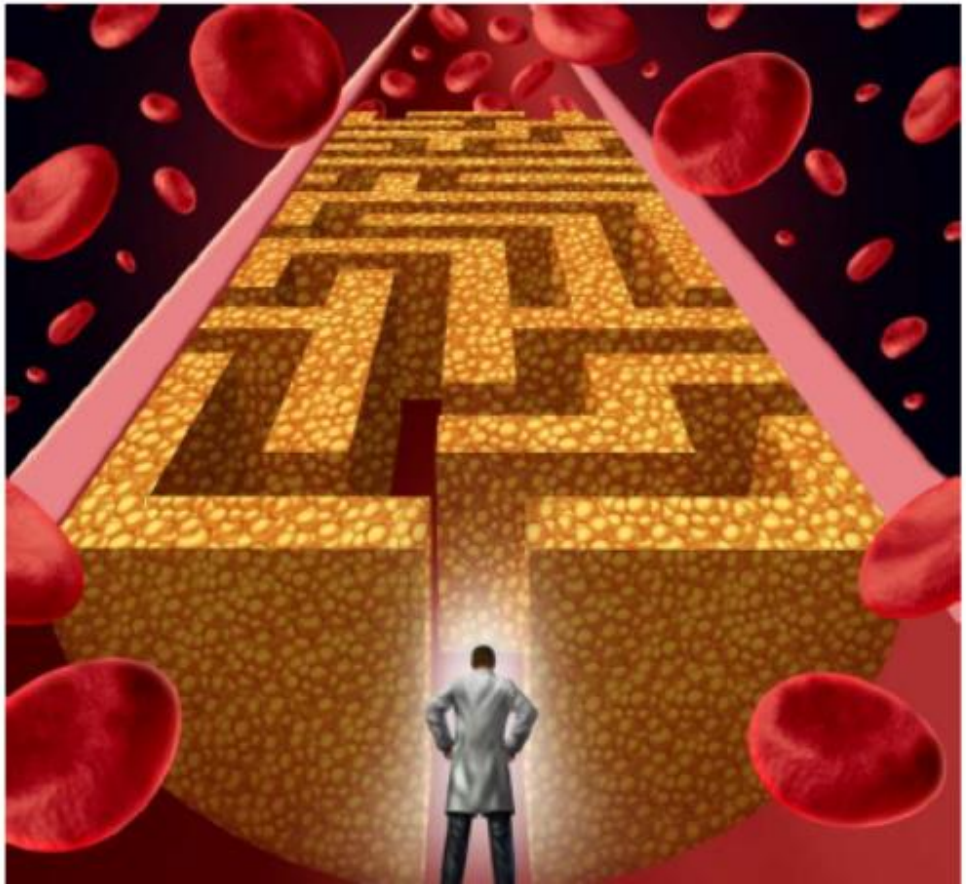
At this stage Lab Assistants are ready to incorporate more engineering design thinking. We will still keep all the challenges from the first level, but you'll add in more challenges:

4. The bot must spin to deliver its medicine once it reaches its destination.
5. Build an arterial bypass a.k.a. a bridge or ramp the Ozobot can travel over on your Cardio Kid's circulatory system, preferably near the heart. (Note: the Ozobot is not very powerful so the incline must be very smooth and low. Watch to see if students deduce that if Ozobot has enough momentum, it can navigate the bridge better. They might add a "turbo boost" code just before the ramp.)
6. Create a tunnel tall and wide enough for the Ozobot to pass through somewhere on the body.

OZOBOT

LEVEL THREE: GOING WITH THE FLOW

7. Challenge students to create a route that has the bot follow the circulatory system flow in the correct order and direction from the injection site, to the heart, through the body, and/or around the circulatory system.
8. Have the bot 'apply medicine' at multiple spots in the body along the route.



Tip: Demonstrate that to edit codes students can use pieces of white paper to stick over any errors or areas they want to debug or improve. If you use sentence strips in writing, you could compare these to them and perhaps call them "debugging strips" or "gauze strips".

LED Throwies

LED throwies are cheery glow-dots (a.k.a. magnetic, closed circuits that stay lit for weeks!) students can make in seconds from simple components and they stick to any ferro-magnetic surface.

On Off Switch

Once we make a basic throwie it stays lit, until it uses up the whole battery. To modify it so that we can turn it on and off whenever we want, we need a circuit breaker.

DrTechniko

www.facebook.com/drtechniko

ROBOT LANGUAGE DICTIONARY

Dr

	LEFT	RIGHT
LEG FORWARD		
LEG BACKWARD		
BODY ROTATE		

Robot, Or Not?

Procedure:

1. Set up an obstacle course
2. Divide students into pairs
3. Introduce the game:

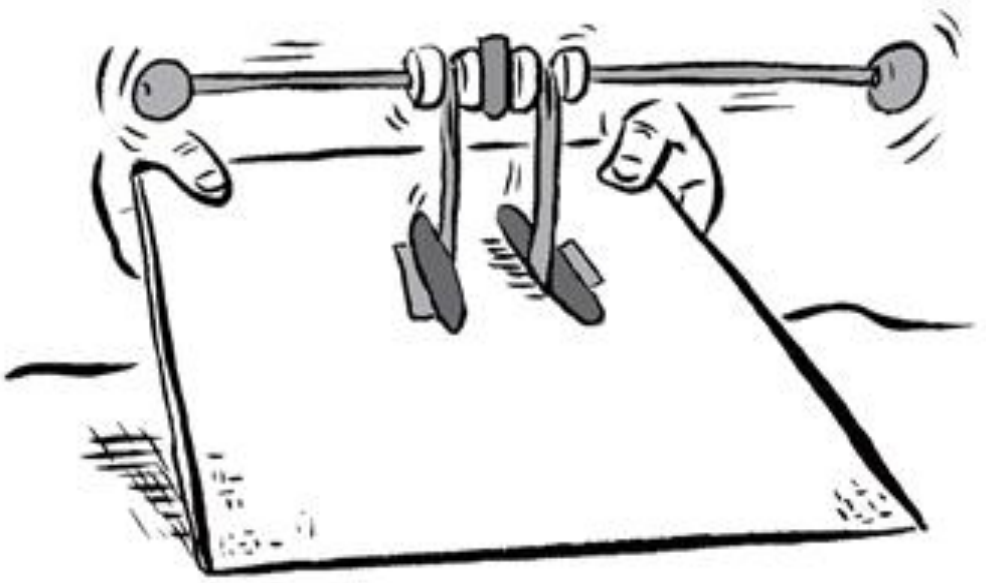
So now that we've learned a bit how robots work, you will get to train your own robot! But, wait. Do you guys see any robots around here? Well, I do. Your partner! Let's turn your partner into your own personal robot. Imagine you are on the planet Mars and you cannot go out of your station. There is a very precious element called B-Rainium that you want to retrieve.

Your mission is to write a program that will send your robot around these obstacles retrieve the ball of B-Rainium and bring it back to the station.

But your robot doesn't understand a human language. It only understands the Robot Language. Here is the Robot Language Dictionary. Let's all practice the moves and then you can use these moves to tell your robot what to do!

Passive Dynamic Mini-Walker

- We'll take the laws of Newton and give them a twist and hope that gravity will give an assist…and now that's enough of us talking.
- It's time for some robots to get started walking.



That about Sums it up