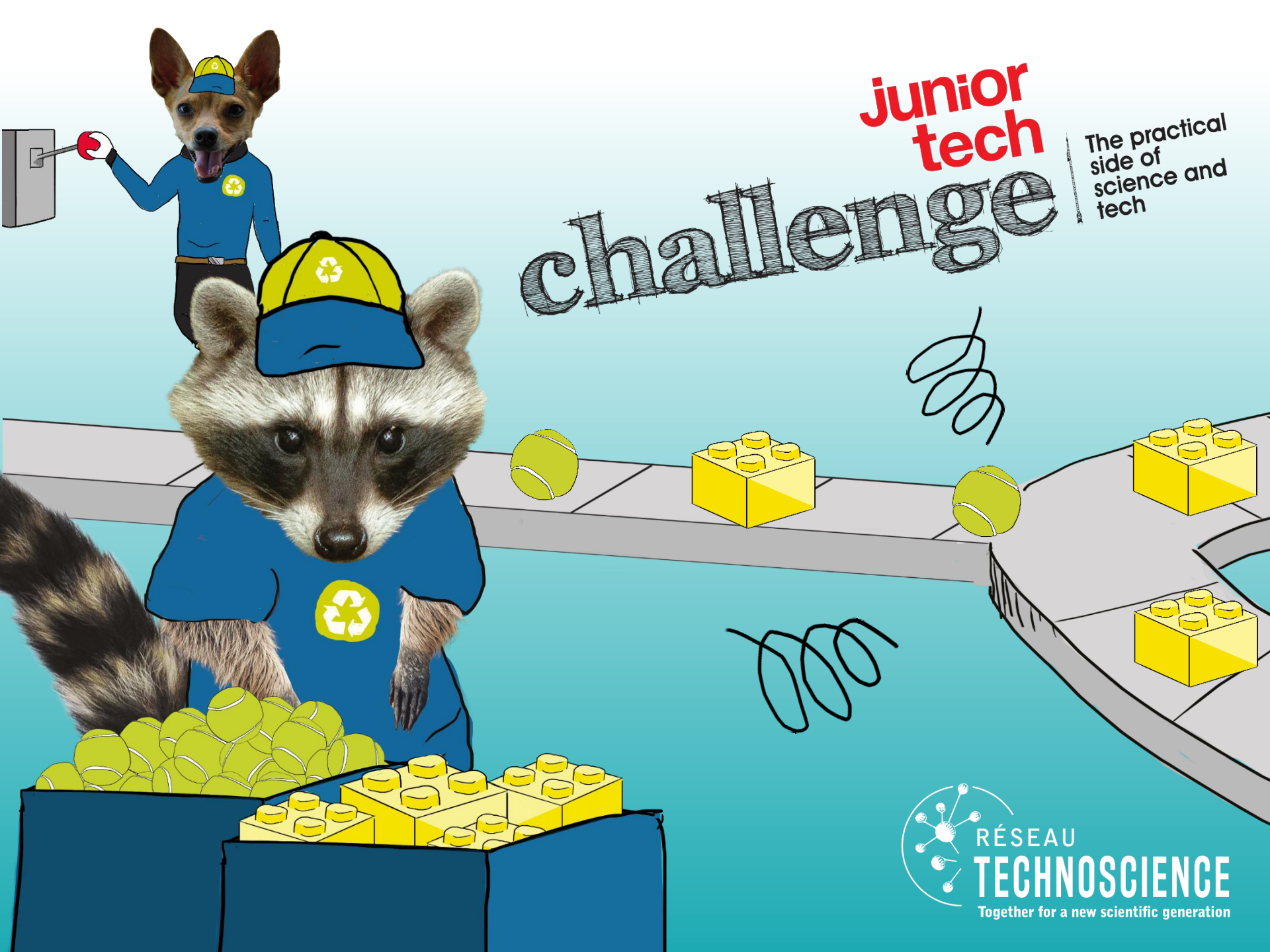
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challenge
The practical side of science and tech
RÉSEAU
TECHNOSCIENCE
Together for a new scientific generation

Setting the stage

The Challenge

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Setting the stage

The Challenge

Setting the stage

The Challenge

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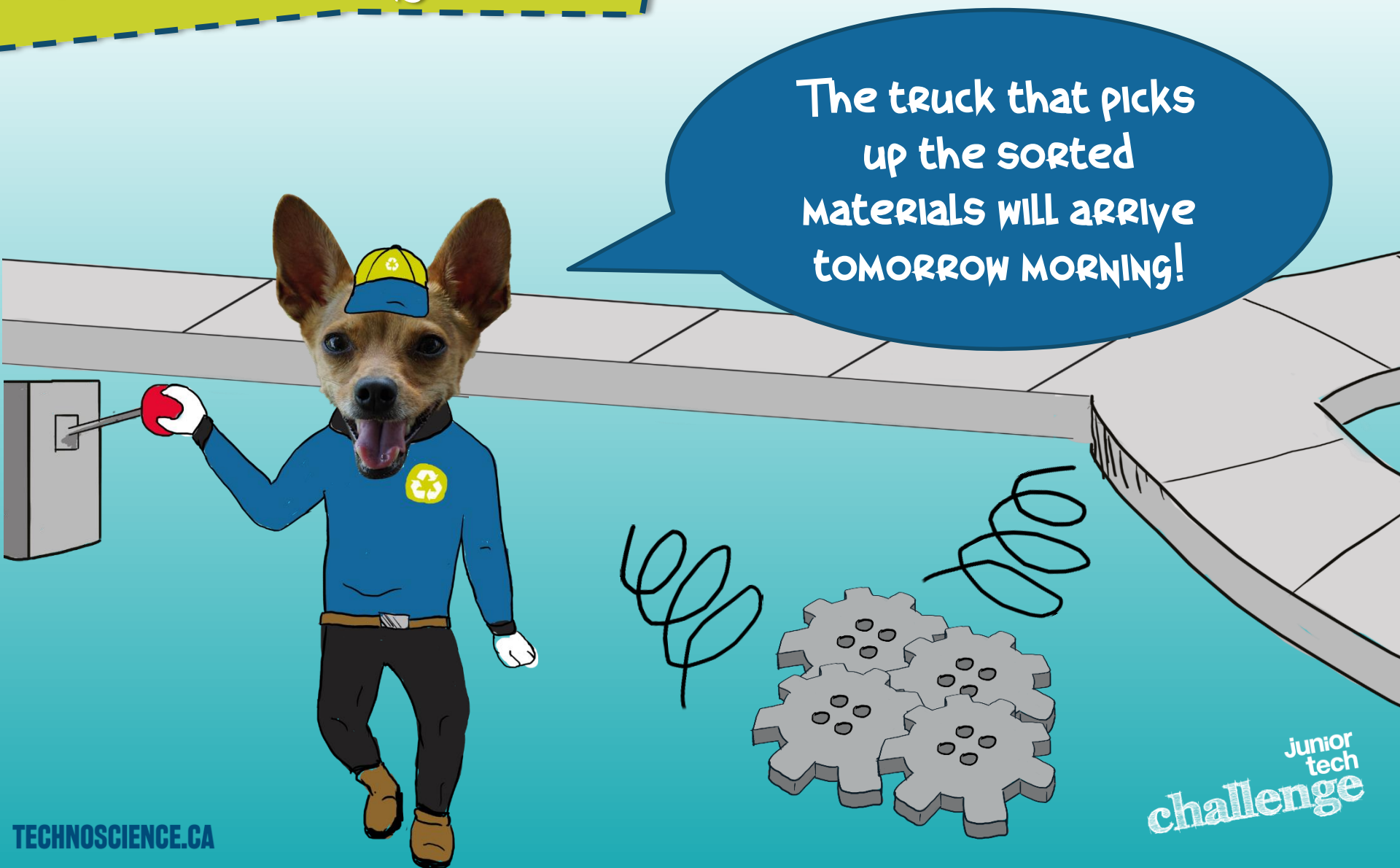
Setting the stage

The Challenge



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Setting the stage

The Challenge

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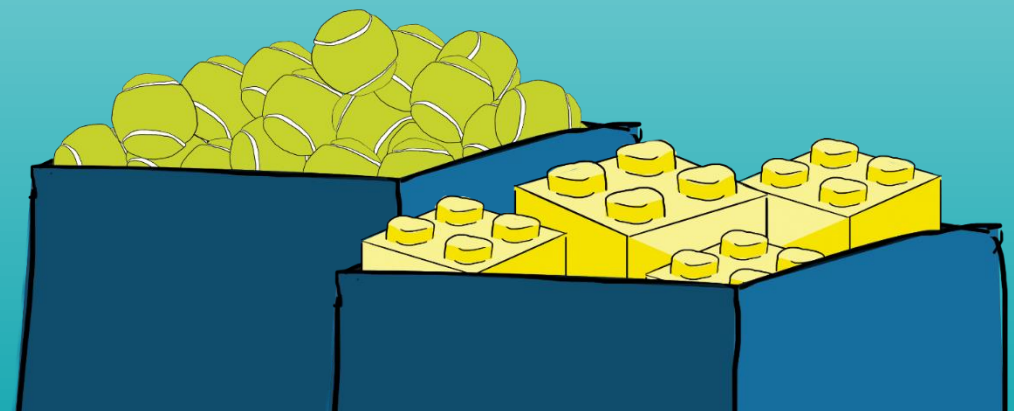
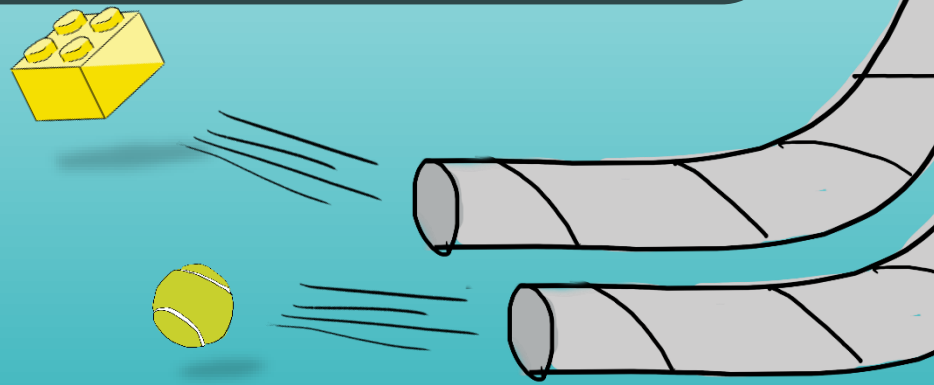
Setting the stage

The Challenge

By choosing materials from the list of permitted materials, design and produce a prototype that allows you to sort different types of objects and distribute them into assigned recovery containers.





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Setting the stage

The Challenge

Each objet that is sorted correctly is worth 100 points.

Cycle 1

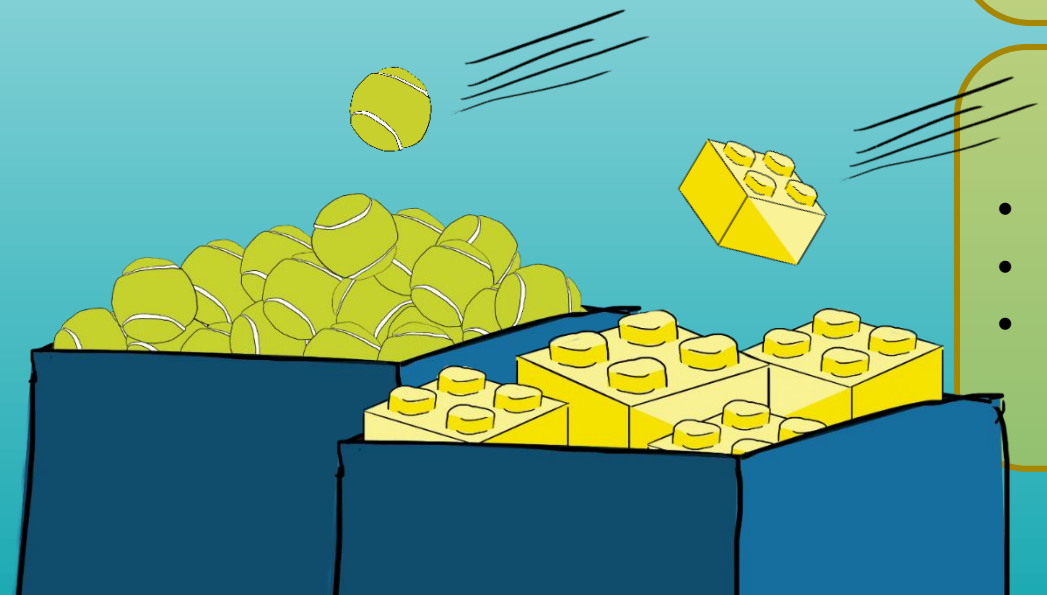
- 5 macaronis
- 5 marbles
- 5 ping pong balls

Cycle 2

- 5 marbles
- 5 centicubes
- 5 metal washers ½''
  (12,7 mm inside diameter and 34,93 mm outside diameter)

Cycle 3

- 10 marbles
- 10 centicubes
- 10 metal washers ½''
  (12,7 mm inside diameter and 34,93 mm outside diameter)



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Activity 1

Activity 1

Strategic Sorting

Source : https://www.youtube.com/watch?v=8AFQ-CHPNKY

Activity 1

Strategic Sorting

- What is this machine used for?
- How does it separate (sort) objects?

Source : https://www.youtube.com/watch?v=8AFQ-CHPNKY

Activity 1

Strategic Sorting

Source : https://www.youtube.com/watch?v=_k_gkelQtts

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Activity 1

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Source : https://www.youtube.com/watch?v=Do_BPfDt1nI

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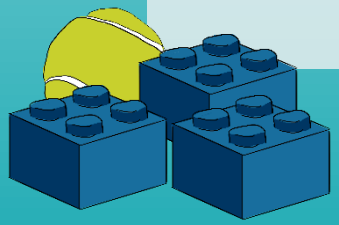

Source : https://www.youtube.com/watch?v=Do_BPfDt1nI

Activity 1

Strategic Sorting

Source : https://www.youtube.com/watch?v=ya9zTstjOIU

Activity 1

Strategic Sorting

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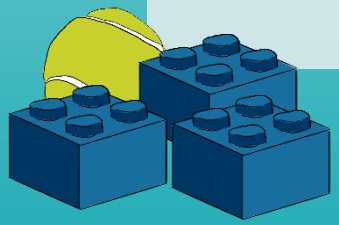

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Activity 1

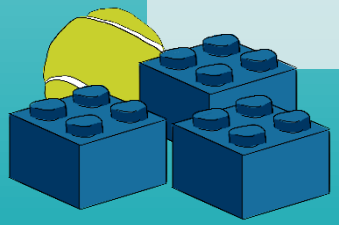
Strategic Sorting

Source : https://www.youtube.com/watch?v=-HiJHaPqblM

Activity 1

Strategic Sorting

- What is this machine used for?
- How does it separate (sort) objects?



Source : https://www.youtube.com/watch?v=-HiJHaPqblM

Activity 2

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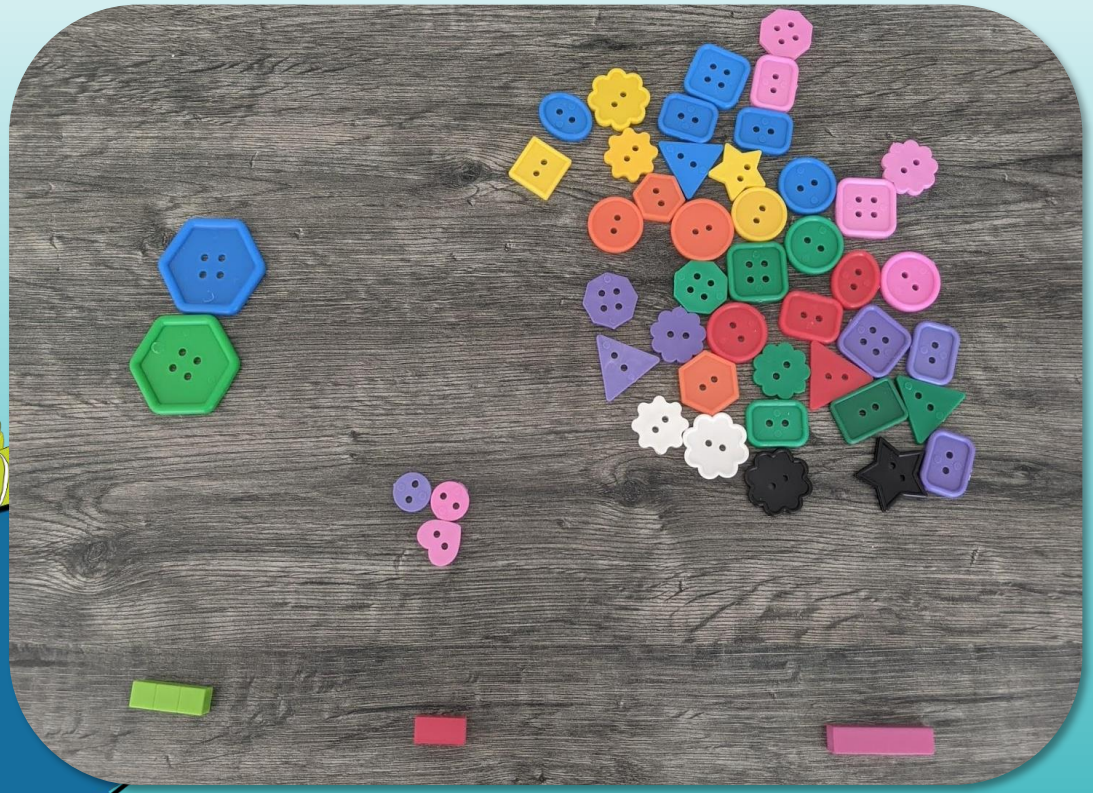
Activity 2 – Part A

Birds of a Feather…!



What is the sorting criterion used?
Which categories are used?

Activity 2 – Part A

Birds of a Feather…!

What is the sorting criterion used ?
Which categories are used?

Activity 2 – Part A

Birds of a Feather…!

What is the sorting criterion used ?
Which categories are used?

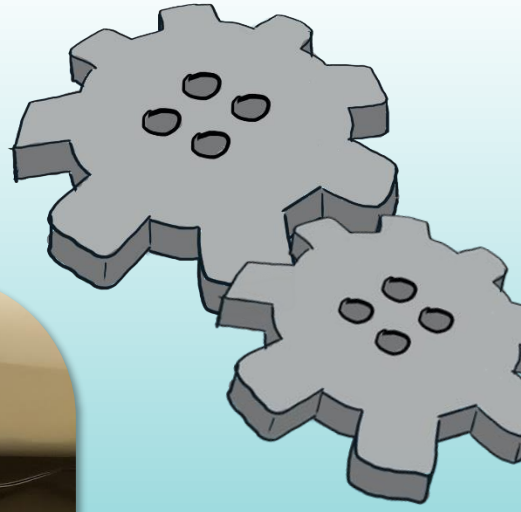
Activity 2 – Part A

Birds of a Feather...!

What could the sorting criterion be?
Which categories can be used to sort these objects?

Activity 2 – Part A

Birds of a Feather…!



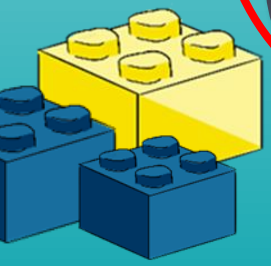
Non-recyclable plastics

Compostable (biodegradable) Materials

Recyclable plastics

Metals

Materials destined for the sorting center



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Activity 2 – Part A

Birds of a Feather…!

Source : https://www.youtube.com/watch?v=XvkZa6pr0QE

What is the criterion used to sort the LEGO?
What are the limitations of using this criterion?

Activity 2 – Part B

Birds of a Feather...!

Let's exchange bags and criteria!

Are the results the same?
Are the results different?
Which objects were sorted differently?
Were your categories clearly defined?

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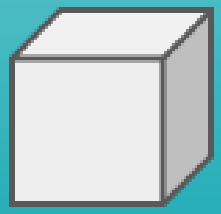
Activity 3

Activity 3 – Part A

Let's Make an Impression!

What impressions will these objects leave in plasticine?



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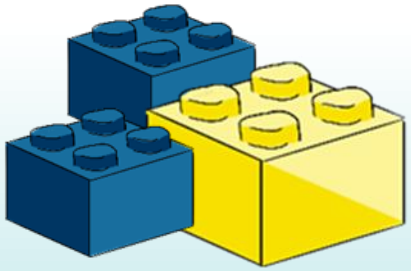
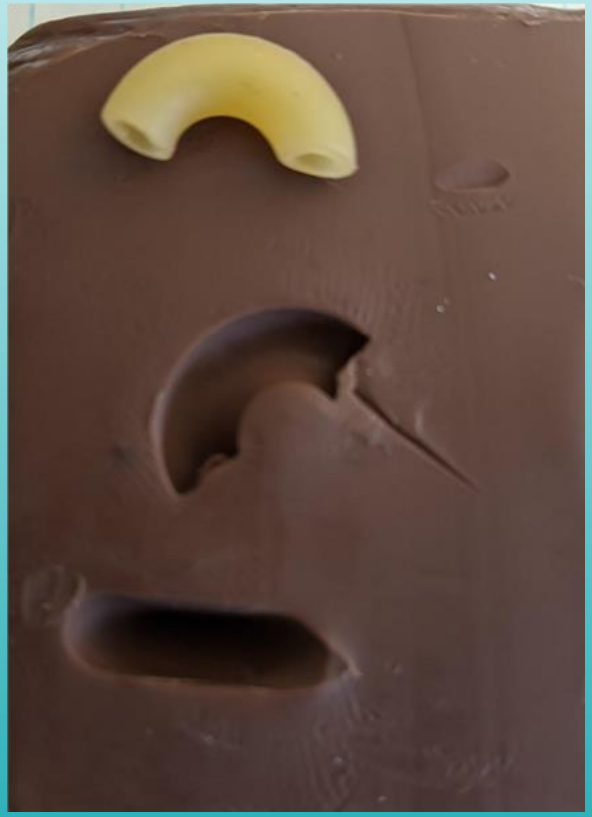
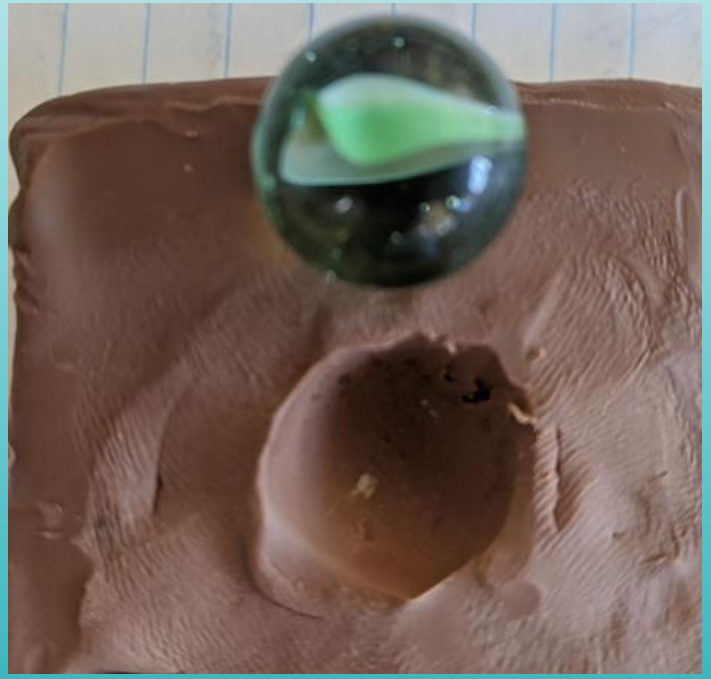
Activity 3 – Part A

Let's Make an Impression!



Examples of impressions





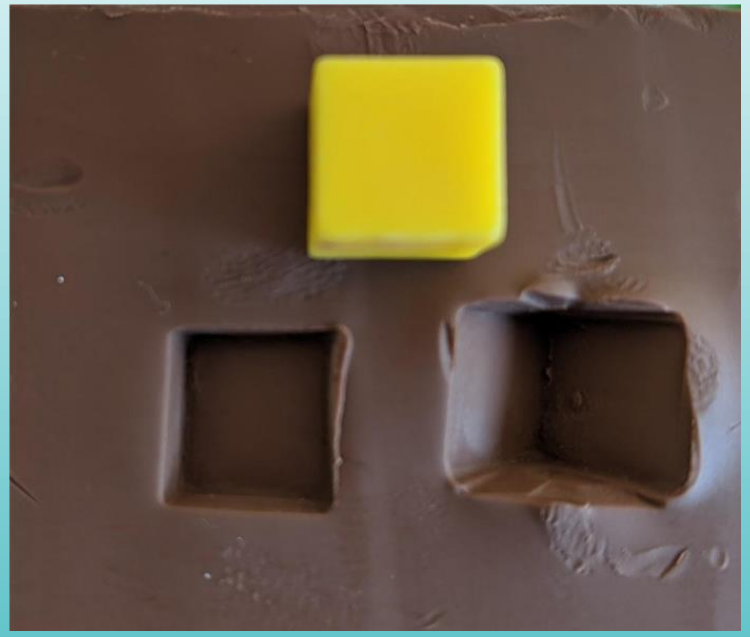
Activity 3 – Part A

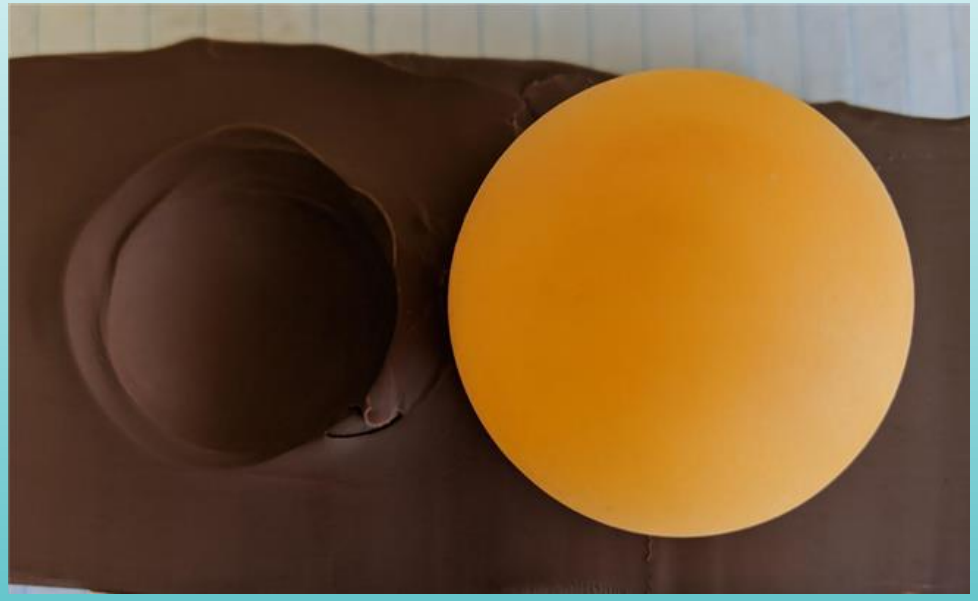
Let's Make an Impression!

Are there any impressions that look the same?

Activity 3 – Part A

Let's Make an Impression!





Why is it important to recognize the different impressions that are left by the objects to be sorted?

Activity 4

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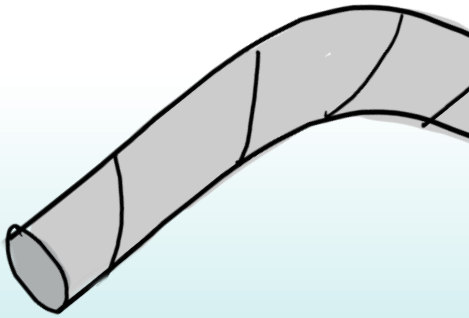
Activity 4 – Part A

Push, Pull, Turn!



Force and Motion

Applying a Force → **Examples of Action**

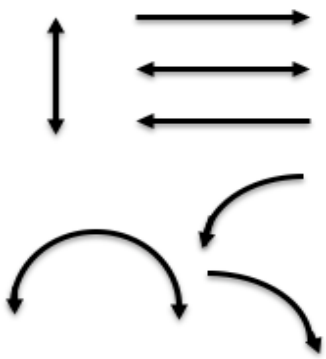
Push
Pull
Turn
Press

Symbols of Force

Producing a motion → **Examples of Motion**

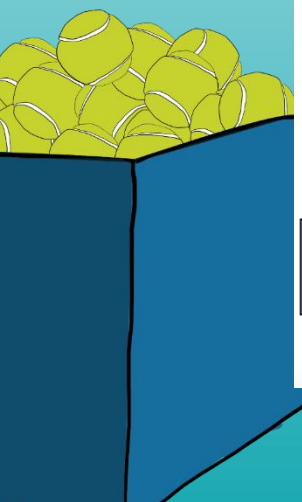
- **Turn** (complete or partial rotation)
- **Move horizontally** (left, right or inverse translation)
- **Move vertically** (up, down or inverse translation)
- **Do both simultaneously** (helical)

Symbols of Motion



Obtaining a result → **Examples of Results**

Roll, advance, reverse
Throw, propel
Whip, mix, cut
Swing, sway, pivot



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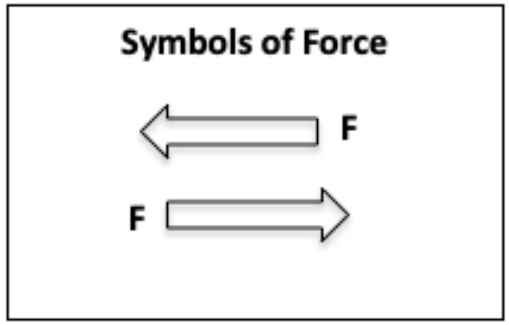
Activity 4 – Part A

Push, Pull, Turn!



Applying Force

I must apply a force to a technological object to set it in motion.

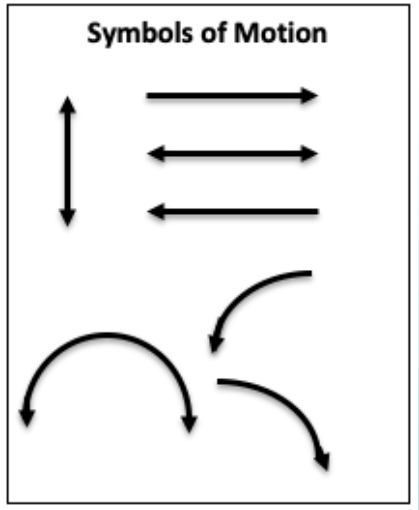
When I apply a force to an object, it can produce several results. We will focus on two of them.

When I push: the result is **compression**.

When I pull: the result is **traction**.

Activity 4 – Part A

Push, Pull, Turn !

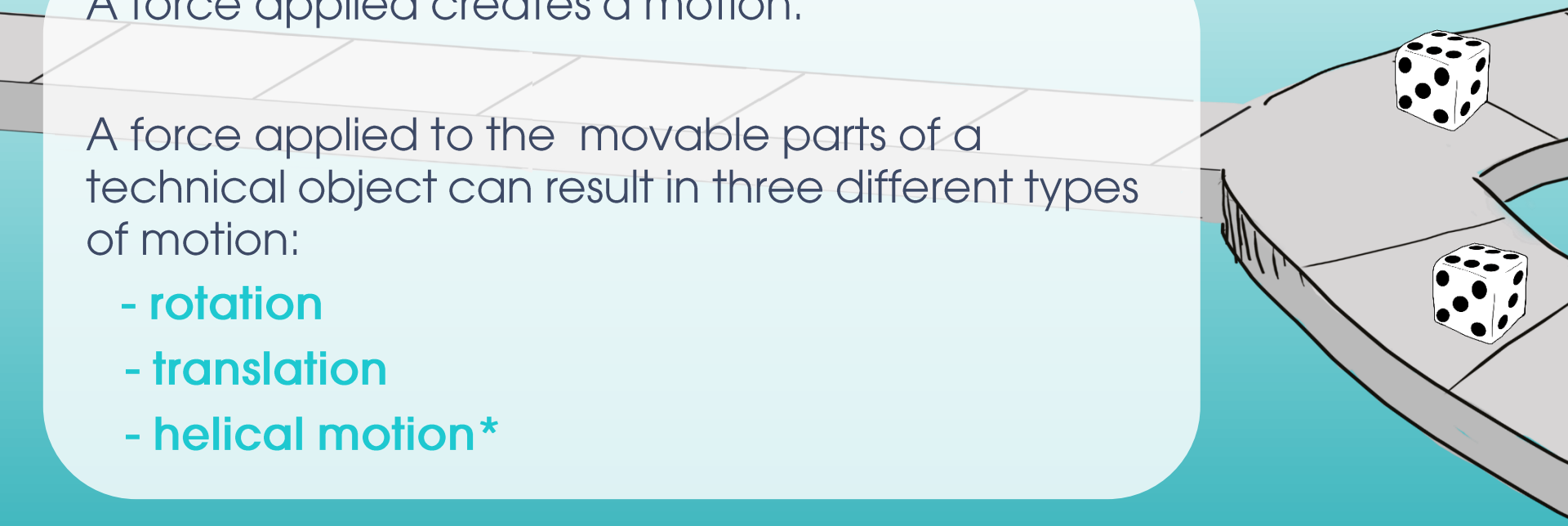


Motion

A force applied creates a motion.

A force applied to the movable parts of a technical object can result in three different types of motion:

- rotation
- translation
- helical motion*



Activity 4 – Part A

Push, Pull, Turn!

Some inspiration…

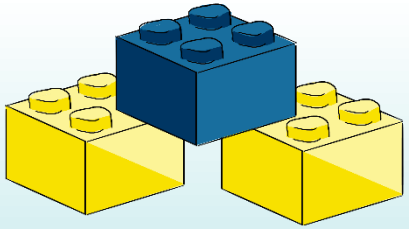
Decide which kind of motion the following objects represent: **translation** or **rotation**.

In your student handbook, draw an arrow that represents:

- where the force must be applied to displace the movable part;
- the resulting motion.

Activity 4 – Part A

Push, Pull, Turn!



1. Indicate whether the movable part makes a **translational** or a **rotational motion**.

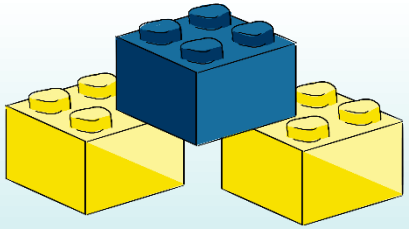
2. In your student handbook, draw an arrow that represents: where the force must be applied to displace the movable part; the resulting motion.

Identify the type of motion…

Rotation or translation ?

Activity 4 – Part A

Push, Pull, Turn!



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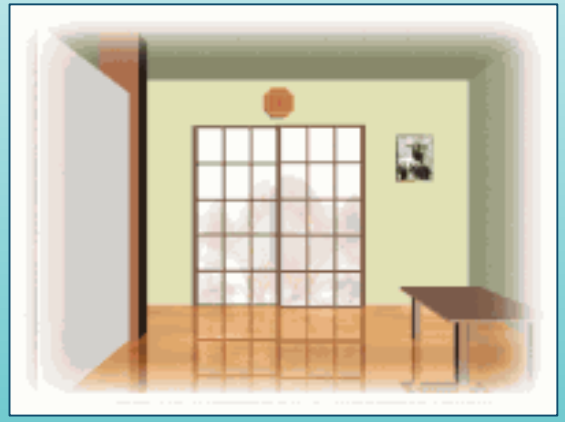
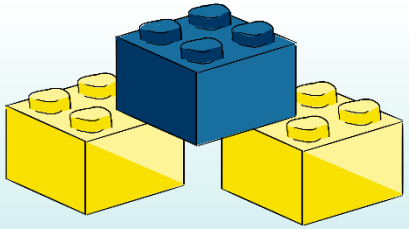


Identify the type of motion …

Rotation or translation ?

Activity 4 – Part A

Push, Pull, Turn!



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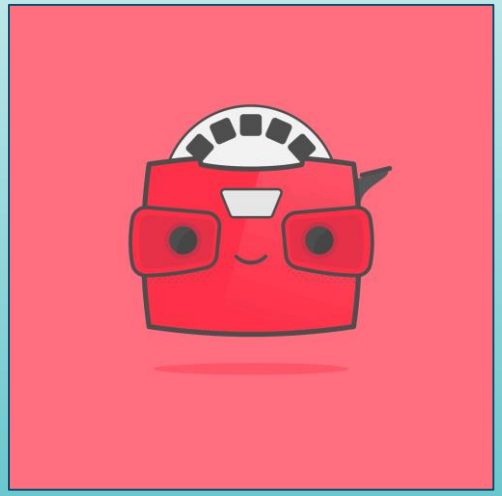
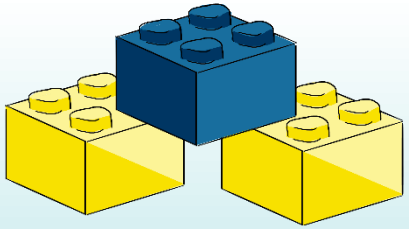


Identify the type of motion …

Rotation or translation ?

Activity 4 – Part A

Push, Pull, Turn!



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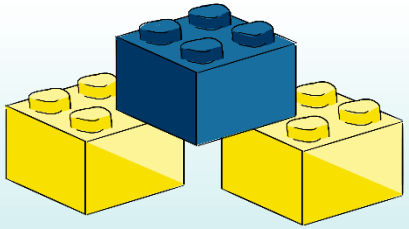

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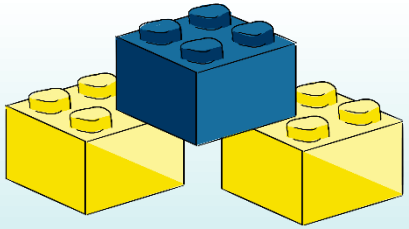
Rotation or translation ?

Activity 4 – Part A

Push, Pull, Turn!



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2. In your student handbook, draw an arrow that represents: where the force must be applied to displace the movable part; the resulting motion.

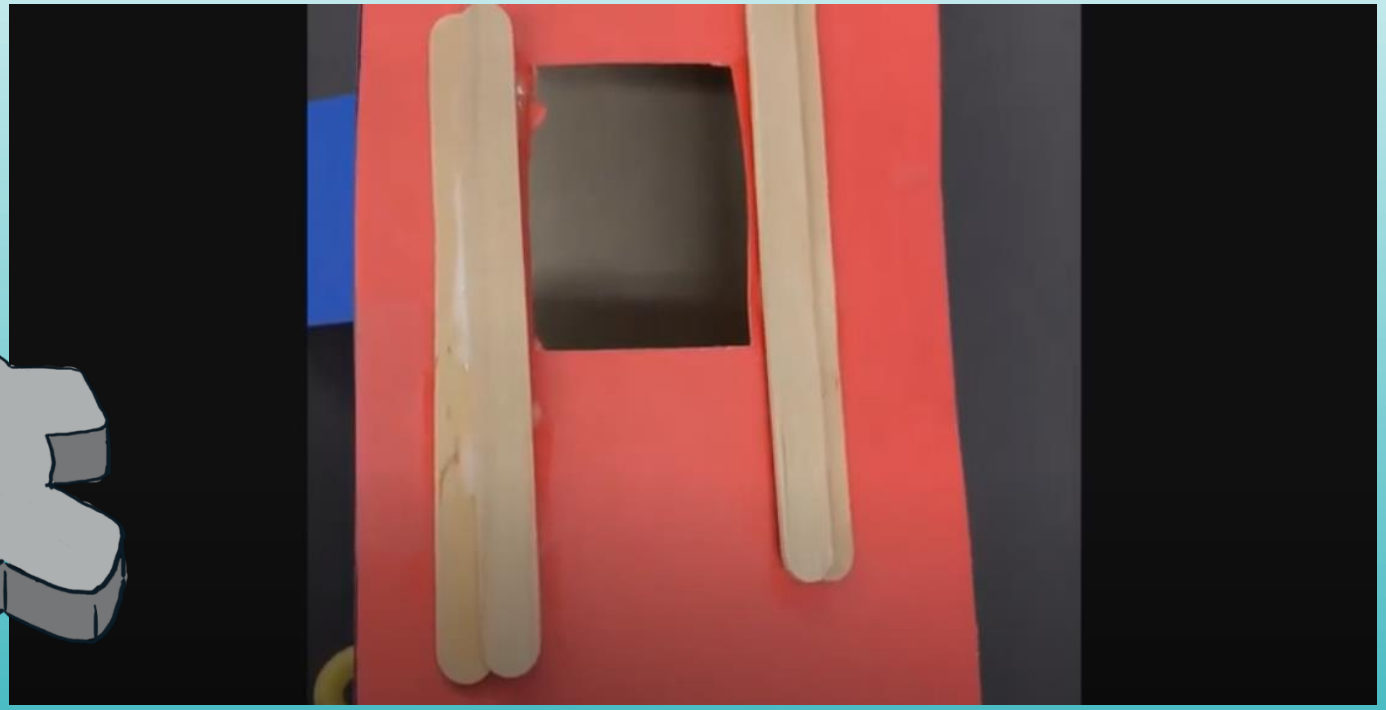
Identify the type of motion …

Rotation or translation ?

Activity 4 – Part B

Push, Pull, Turn!

Translation: With 4 popsicle sticks



Source : https://www.youtube.com/watch?v=CXBQ_81wfHo

Activity 4 – Part B

Push, Pull, Turn!

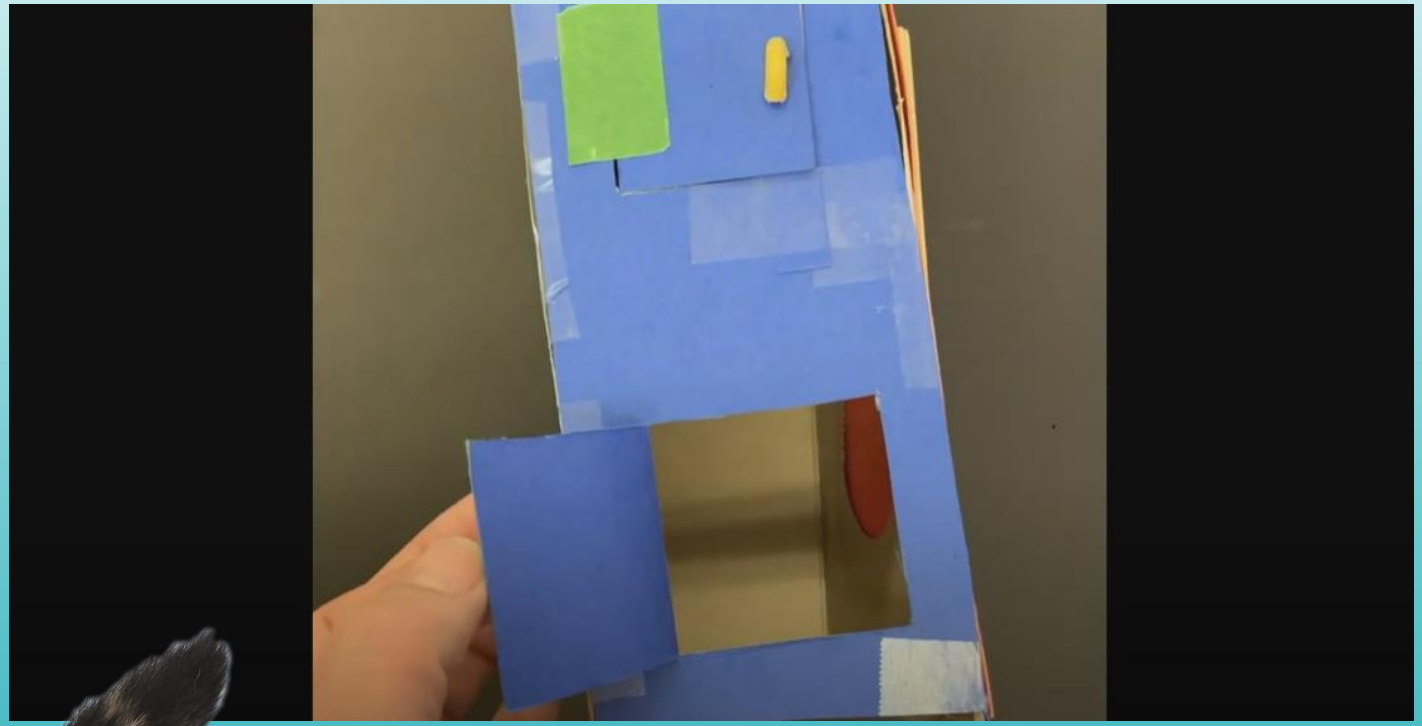
Translation: With 4 popsicle sticks

Since we can open the door by pushing on it or by pulling it, the force will not be applied at the same place. The motion will remain the same.

Activity 4 – Part B

Push, Pull, Turn!

Rotation : Three-sided cut-out (hinged door)



Source : https://www.youtube.com/watch?v=7iod7hyTrjQ

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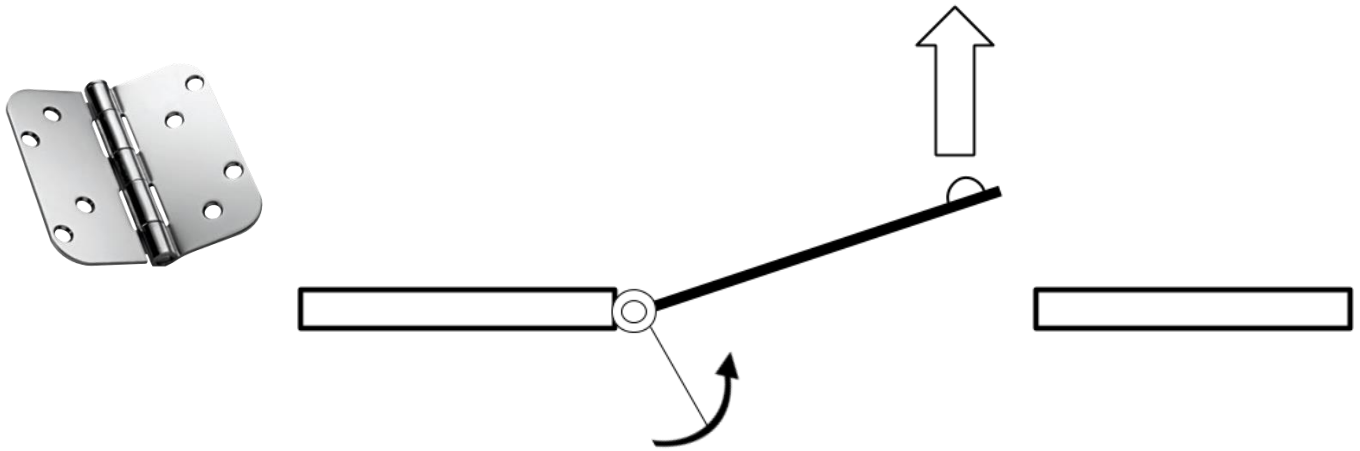
Activity 4 – Part B

Push, Pull, Turn!

Rotation : Three-sided cut-out (hinged door)



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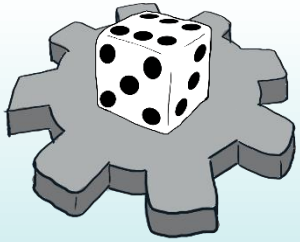
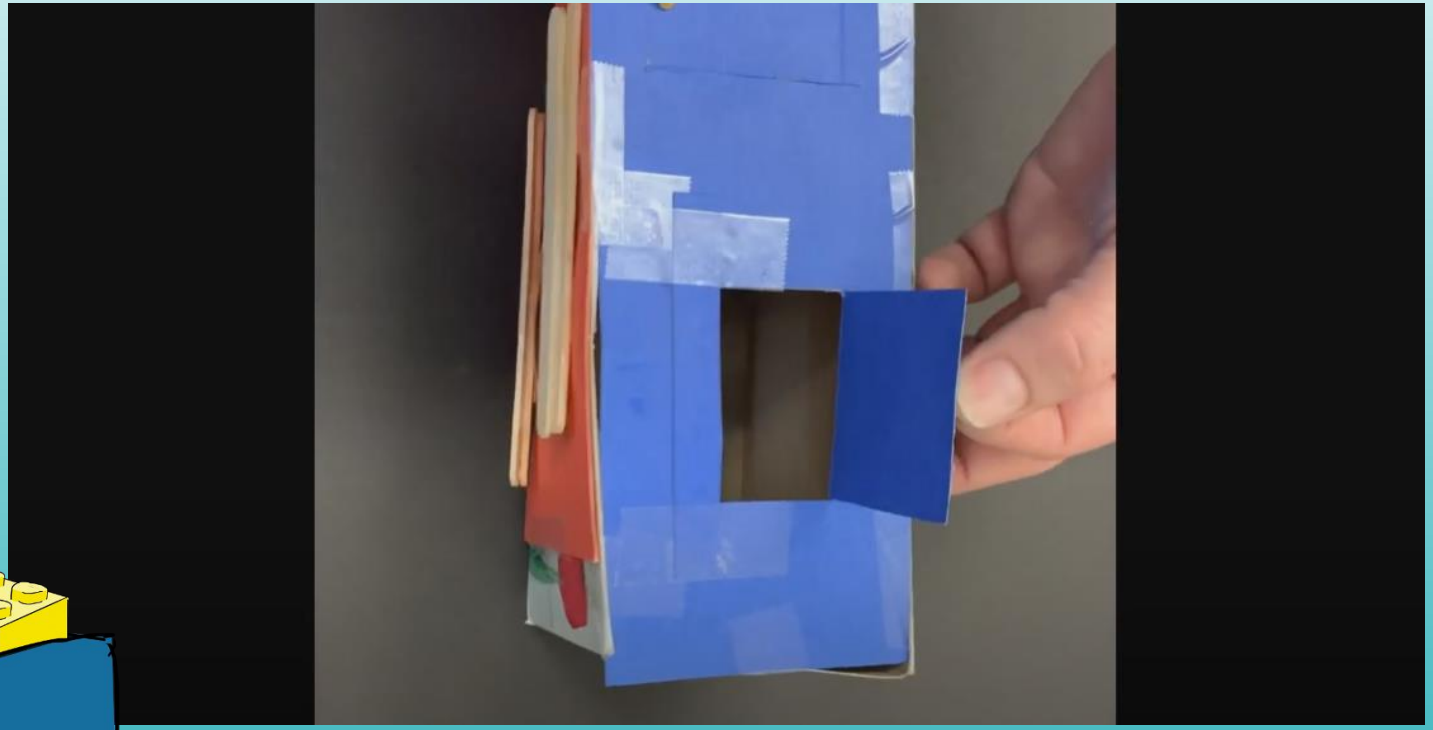
Activity 4 – Part B

Push, Pull, Turn!



Rotation : Four-sided cut-out (hinged door)



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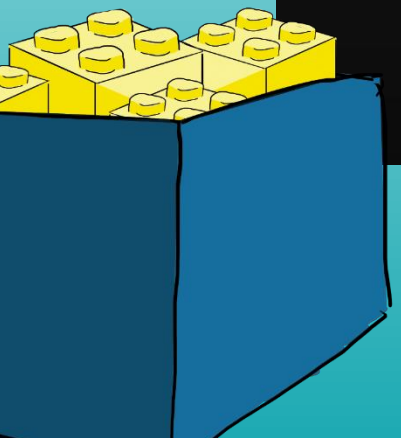

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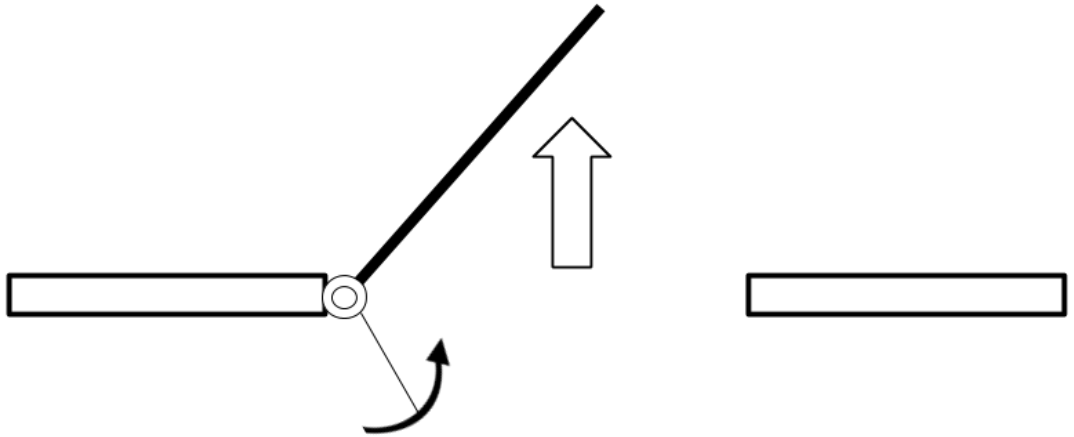
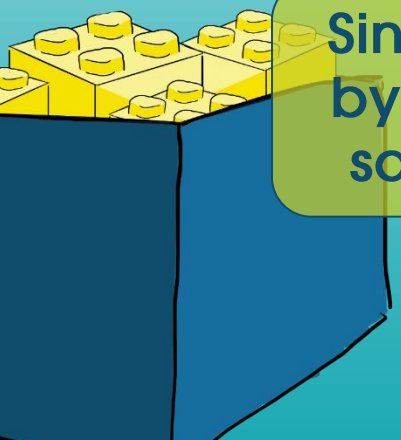
Activity 4 – Part B

Push, Pull, Turn!

Rotation : Four-sided cut-out (hinged door)





Since we can open the door by pushing on it or by pulling it, the force will not be applied at the same place. The motion will remain the same.

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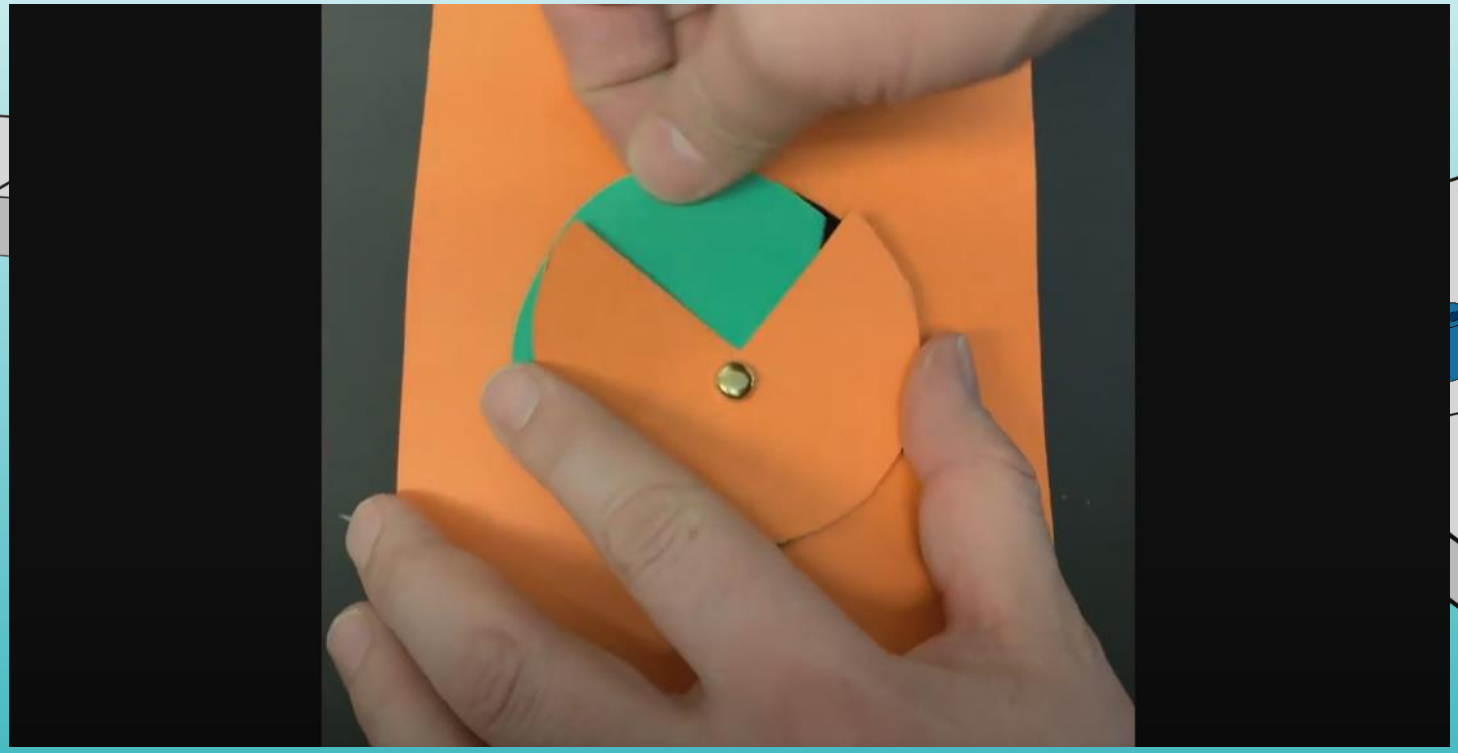
Activity 4 – Part B

Push, Pull, Turn!

Rotation: Circle with an opening (3/4)

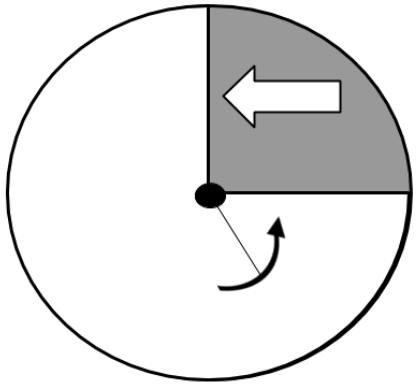


Source : https://www.youtube.com/watch?v=eFgaSOU7zmg

Activity 4 – Part B

Push, Pull, Turn!

Rotation: Circle with an opening (3/4)

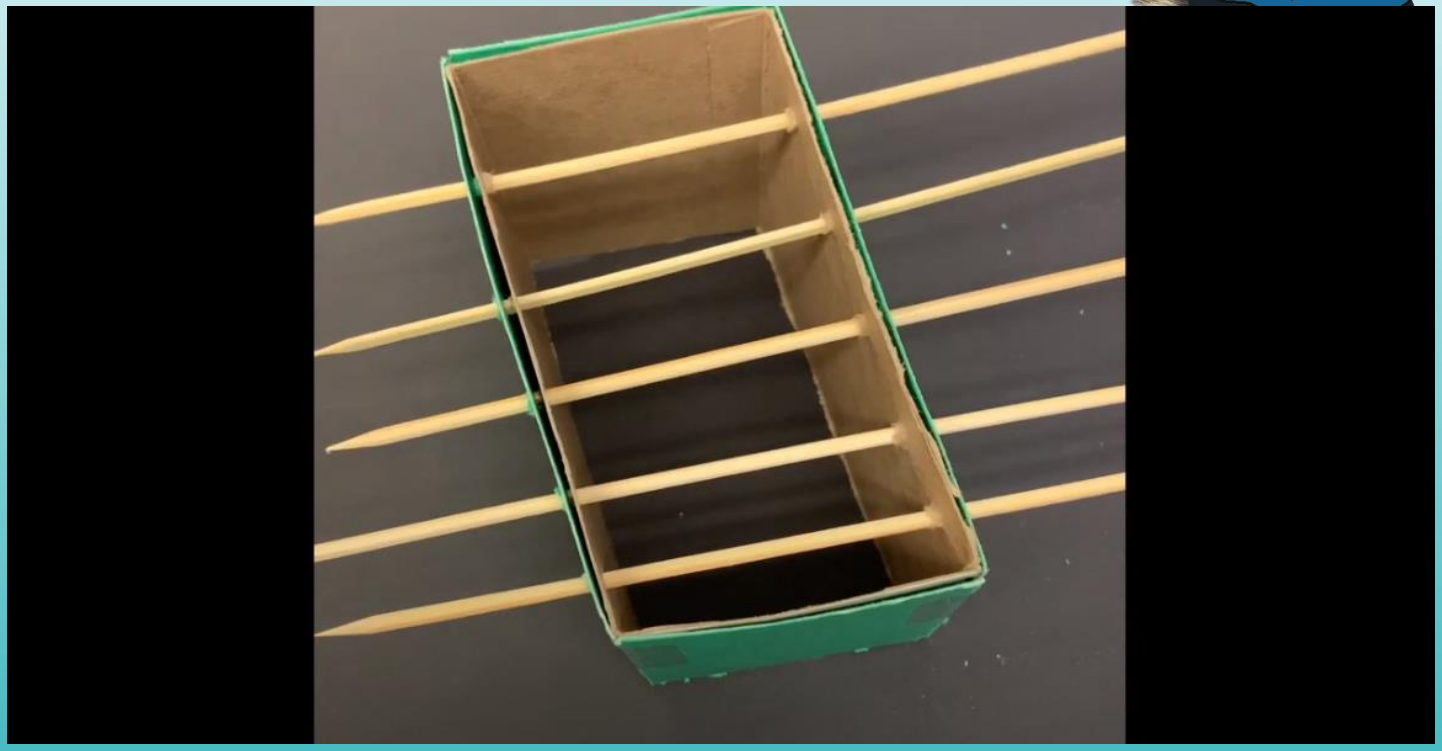


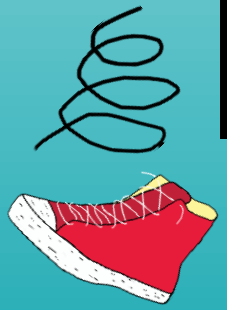
Since we can open the door by pushing on it or by pulling it, the force will not be applied at the same place. The motion will remain the same.

Activity 4 – Part B

Push, Pull, Turn!

Translation: Brochette sticks





Source : https://www.youtube.com/watch?v=kYkhGmB3kes

Activity 4 – Part B

Push, Pull, Turn!

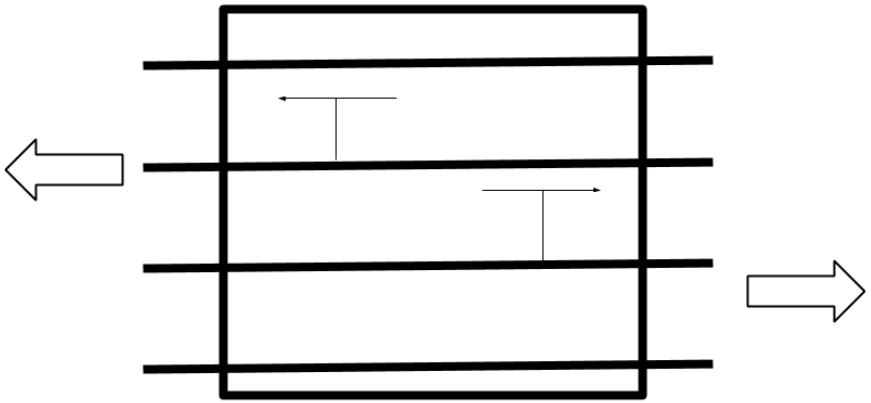
Translation: Popsicle sticks

Source : https://www.youtube.com/watch?v=-sDdIxHMXg8

Activity 4 – Part B

Push, Pull, Turn!

Translation: Brochette sticks or popsicle sticks

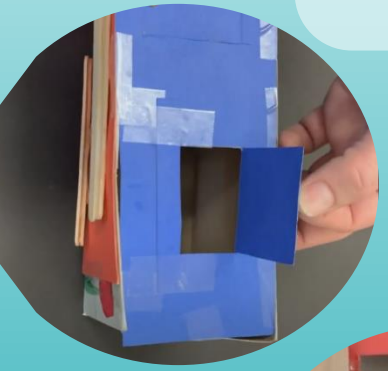


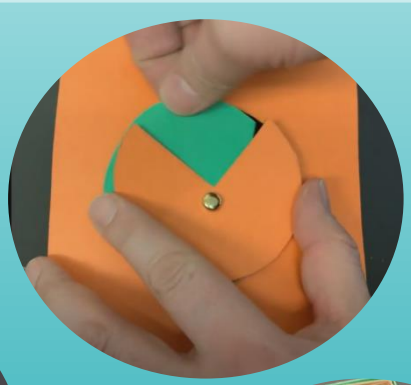
Since we can open the door by pushing on it or by pulling it, the force will not be applied at the same place. The motion will remain the same.

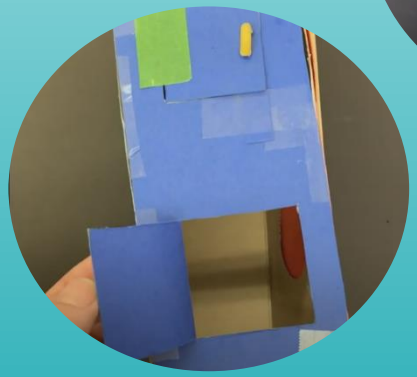
Activity 4 – Part B

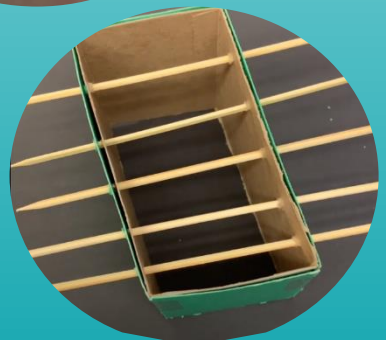
Push, Pull, Turn!

What are the advantages and the disadvantages of each of the systems?









Activity 5

Activity 5 – Part A

The Laws of Attraction!

How will each object react to the magnet?

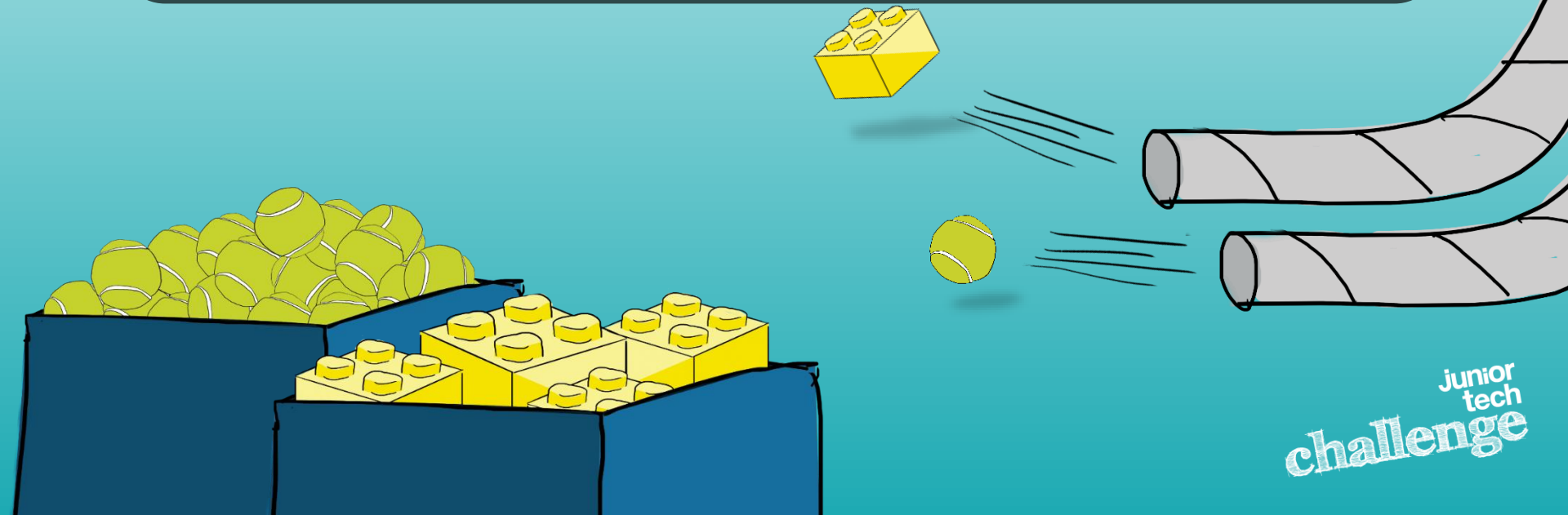
- Attract (A)
- Repel (R)
- No reaction (X)

junior tech challenge

Preparing to Meet the Challenge

Preparing to Meet the Challenge

By choosing materials from the list of permitted materials, design and produce a prototype that allows you to sort different types of objects and distribute them into assigned recovery containers.



junior tech challenge

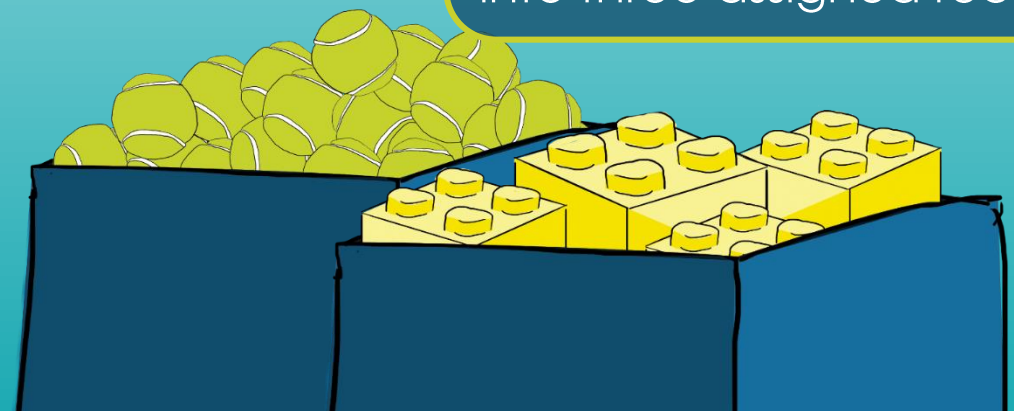
Preparing to Meet the Challenge

Cycle 1

Sort three different types of objects and distribute them in at least two assigned recovery containers. One of the types of objects can remain in the sorter.

Cycles 2 & 3

Sort three different types of objects and distribute them into three assigned recovery containers.



junior tech challenge

Preparing to Meet the Challenge

Each objet that is sorted correctly is worth 100 points.

Cycle 1

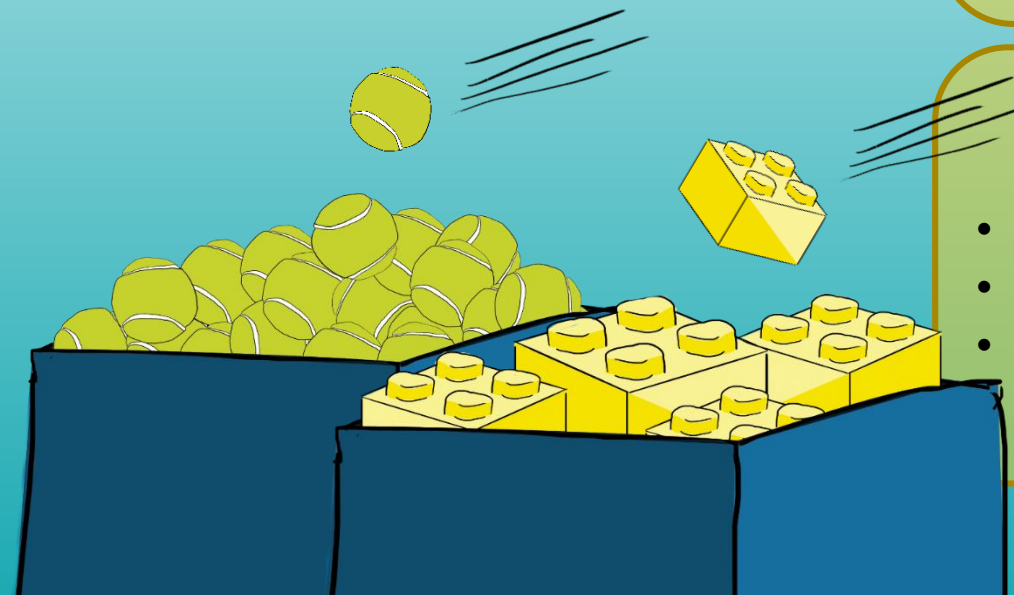
- 5 macaronis
- 5 marbles
- 5 ping pong balls

Cycle 2

- 5 marbles
- 5 centicubes
- 5 metal washers ½''
  (12,7 mm inside diameter and 34,93 mm outside diameter)

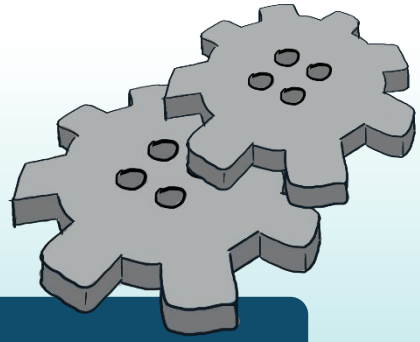
Cycle 3

- 10 marbles
- 10 centicubes
- 10 metal washers ½''
  (12,7 mm inside diameter and 34,93 mm outside diameter)



junior tech challenge

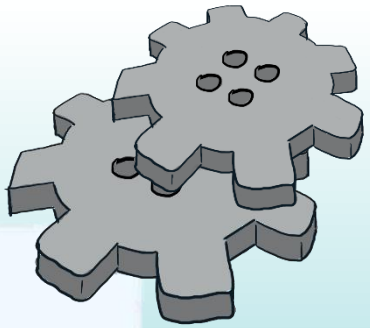
Preparing to Meet the Challenge



Rules – Construction

1. The sorter should fit into a cardboard box designed to hold 5,000 letter-sized sheets of paper.
2. The sorter must be made solely of materials that are on the list of permitted materials (see next slide).
3. The sorter must have an opening that allows the teacher to easily place the objects in it.
4. The sorted objects must be distributed in the designated recovery containers. The team can place the containers in any order they want.

Preparing to Meet the Challenge

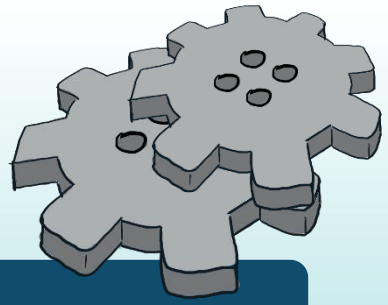


Materials to be Used for the Design of the Prototype

- Cardboard or a cardboard box (cardboard must be easily cut with scissors)
- Aluminium container or aluminium tray (any type)
- Paper (any type)
- Aluminium foil
- Popsicle sticks
- Pipe cleaners
- Paper clips
- Thumbtacks
- Wooden sticks
- String
- Felt
- Rubber bands
- Paper fasteners
- Nails
- Magnets
- Sticky tack
- Adhesive tape (any type)
- Liquid glue, glue stick, hot glue

Any other material is prohibited!

Preparing to Meet the Challenge



Rules – Schedule of events

1. The competition consists of two identical rounds. The best of the two rounds will be selected for ranking. In the event of a tie, the other round will be counted as well.
2. Each team must designate an operator to manipulate the sorter throughout the sorting process.
3. Only the teacher places the objects in the sorter.
4. The stopwatch starts when the teacher places the objects in the sorter at the location indicated by the student.

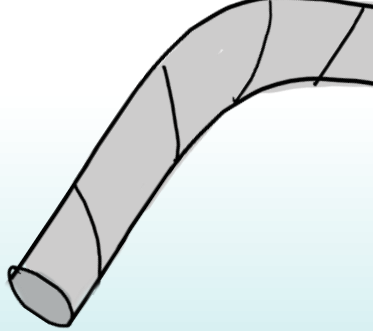
Preparing to Meet the Challenge

Rules – Schedule of events

5. The stopwatch stops when the student announces that the sorting is complete.

6. During the sorting, it is forbidden to touch the objects to be sorted with your hands or with any other object.

Preparing to Meet the Challenge



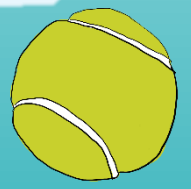
Scoring

The team's prototype must sort as many objects as possible in the shortest time possible.

100 points per sorted item - Sorting time in seconds = Final score

Objects outside the recovery container will not be counted.

An object that is found in the wrong recovery container will not be counted.



junior tech challenge

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