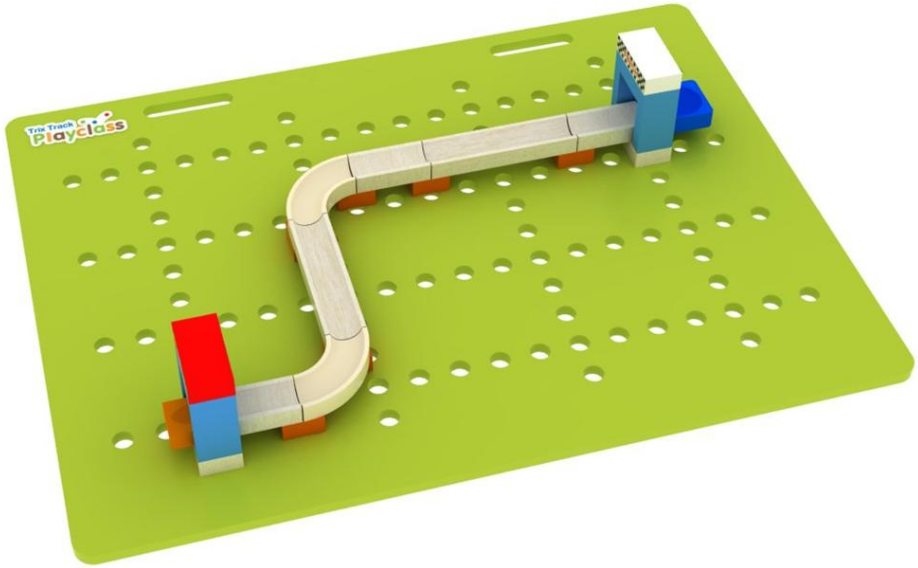
Lesson Plan (Level 1)

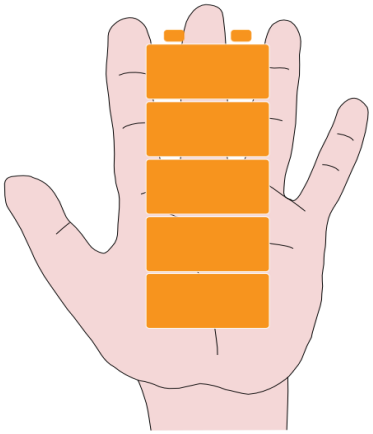
Lesson 01 - What is distance?

What is distance?

1. Teach kids the centimeter and how to use a ruler, the classroom can measure:
    a. Their Hand
    b. Their Feet
    c. Trix Track Parts
2. Build a Track

    Measure TrixTrack track with a string or other equipment around them
    - Ruler
    - Rope
    - Ice Cream Stick
    - Tape measure
    - Paper clip





Worksheet

Measurements of	*Length in Centimeters*
My Hand	
My Feet	
Trix Track Straight - A	
Trix Track Straight - B	
Trix Track Straight - C	
Trix Track exercise – Challenge 1	

A B C

How long is my track?

We can use math to help calculate your designs.

Can you find the distance of:

1. Track with 4 straight pieces (C):

2. Track with 1 straight (B) long and 2 straight short (C):

3. Track with 2 straight long (A), two straight short (A) and 2 small curves.

A	B	C
16	12	8 cm.

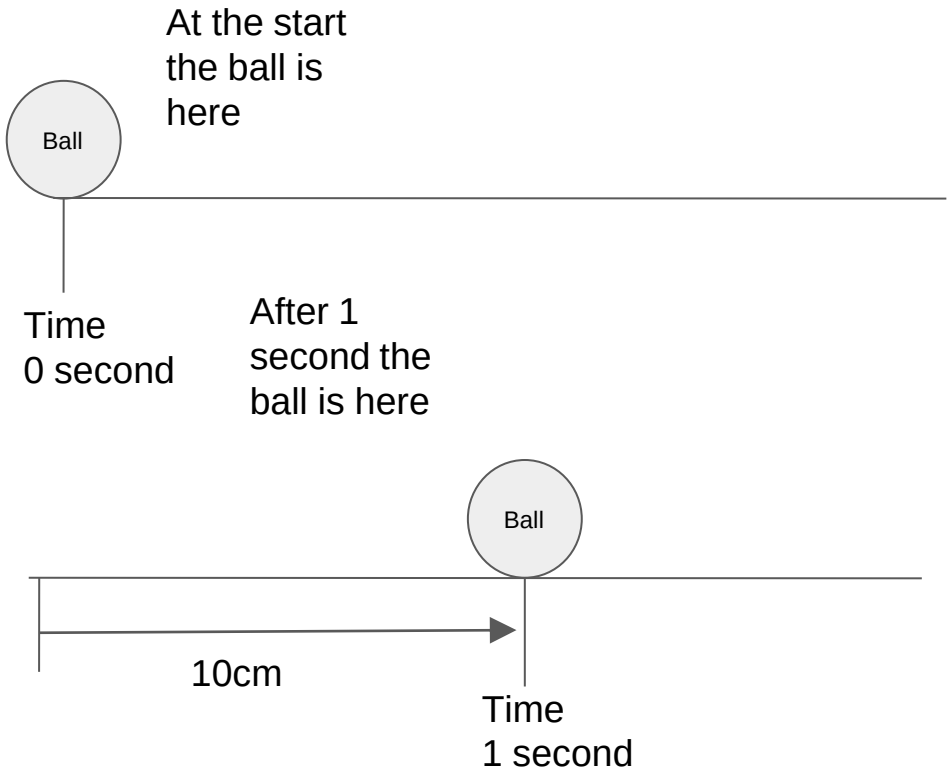
CL. 25cm.

CS. 12cm.

Lesson 02 - What is speed?

What is speed?

Speed is how fast something is moving. If something is moving fast then it has a lot of speed. If something is moving slowly then it has not so much speed. When we think about speed we can think it as the distance you travel within one second of time.



The speed of the ball is 10 cm. per second.

This is because in one second the ball has moved 10 centimeters.

Lesson 02 - What is speed?

- If the students are not sure what time and seconds is, spend 10 minute of class time learning about time.
- Get a clock or stopwatch and count the seconds altogether with the class. Learn that 1 minute has 60 seconds and that 1 hour has 60 minutes.

Experiment: measure speed of the ball

Push the ball along the track. See who can make the ball travel with the fastest speed. The ball that takes the least time to reach the end of the track is the fastest ball. Get a stopwatch out to measure the time of each ball takes. Record the time taken in a table. Ask the students to make a list to rank which ball was the fastest.

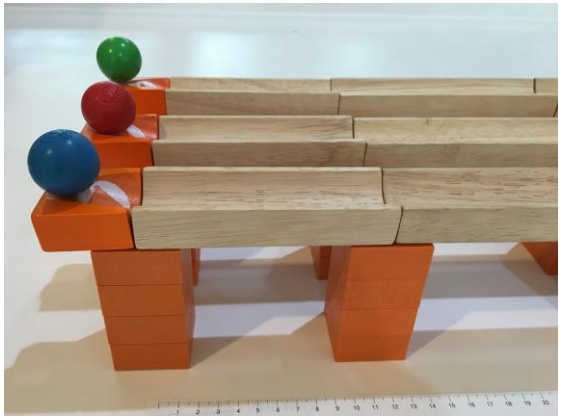
	Time Taken
……..	3.2 second
……..	4.0 second
……..	2.7 second
……..	3.0 second

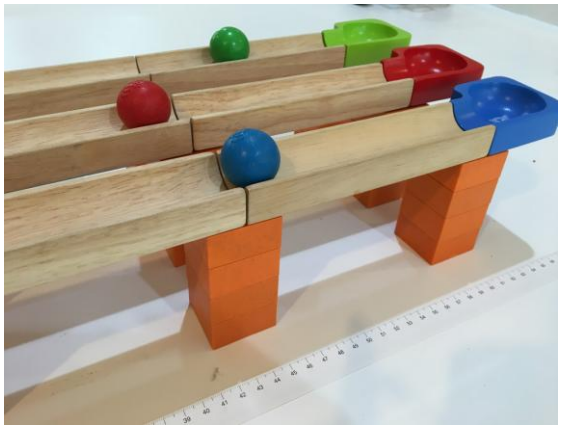
Winner List
1. Clark
2. Susan
3. John
4. Mary

Lesson 02 - What is speed?

Let’s have some experiments and see a ball with high speed compared to a ball with low speed. Which one moves further in the same amount of time?

For older children they can learn that the speed is distance over time, they can experiment by measuring the distance of a track and the time the ball takes to move from start to finish, then use division to calculate the speed.

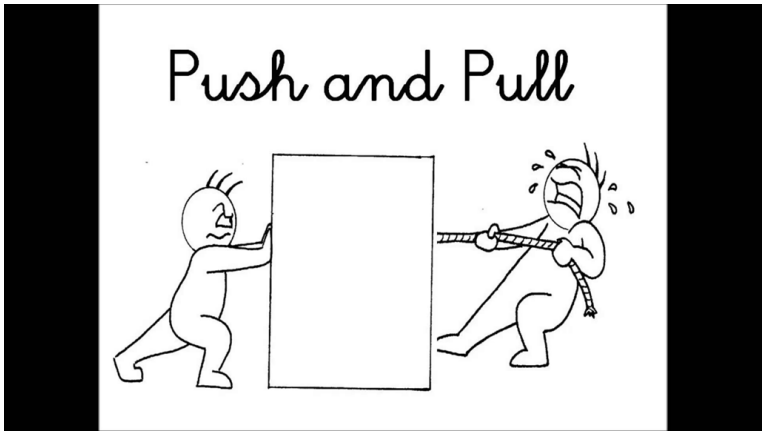




Lesson 03 - Force

What causes movement and speed?

Movement is caused by a force. What is a force? A force is when you push or pull something.

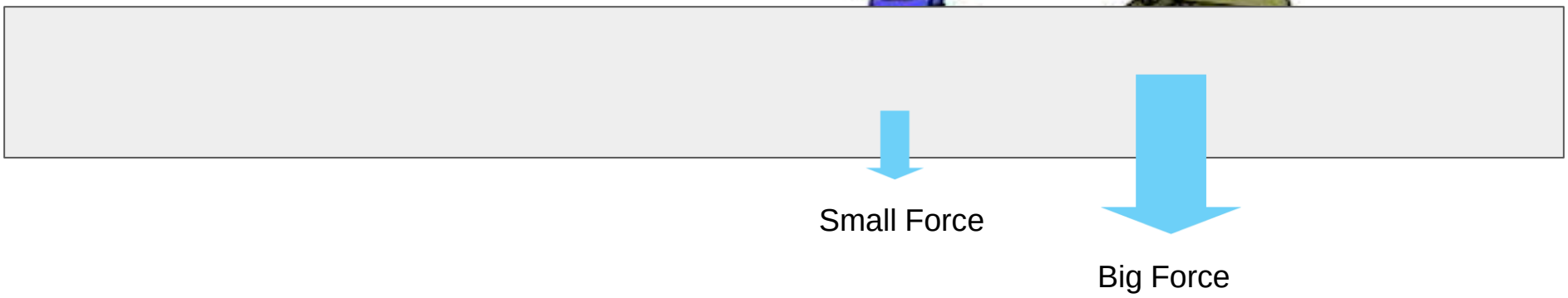


If we leave the ball still, it will not move. The ball will only move if you push or pull it.
Try pushing the ball and see what happens. A force can make something go faster or slower.

Try pushing the ball softly, what happens? Is the ball fast or slow?
Try pushing the ball hard, what happens? Is the ball fast or slow?

Weight is a force

Your weight is a force pushing on the floor.



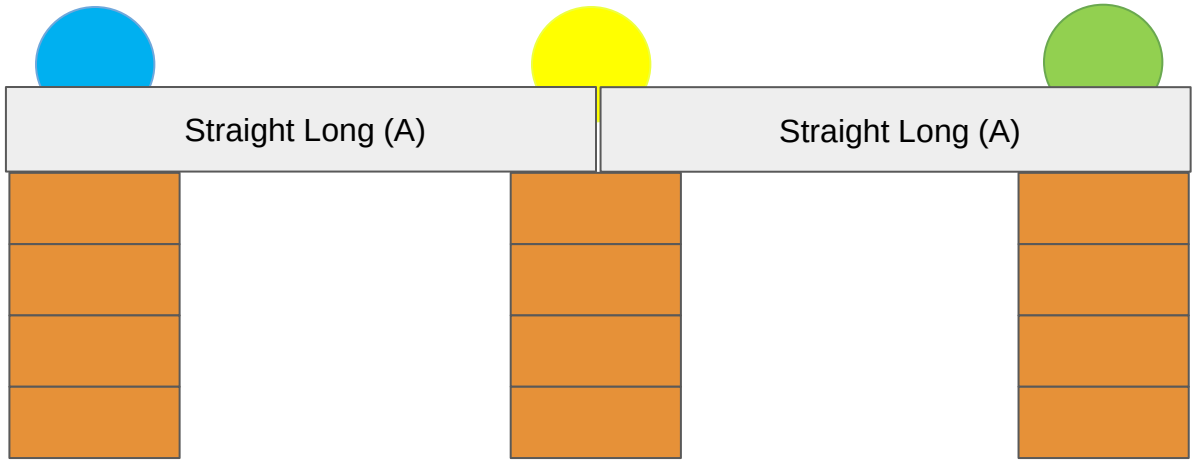
Force experiment

See how much force can you give to the ball.

How many balls can you get to move from pushing one ball?

Let’s make an experiment and see who can push with the most force.

Make a table to record and a list of who is the winner.



Lesson 03 - Force

Experiment: Count number of the balls bounced after the first ball is being pushed

Here, the students will learn about the origin of the force itself, in the first round let them push the ball using their hands, then in the next round, change the sources of the force, for example, small fan or blowing from the mouth

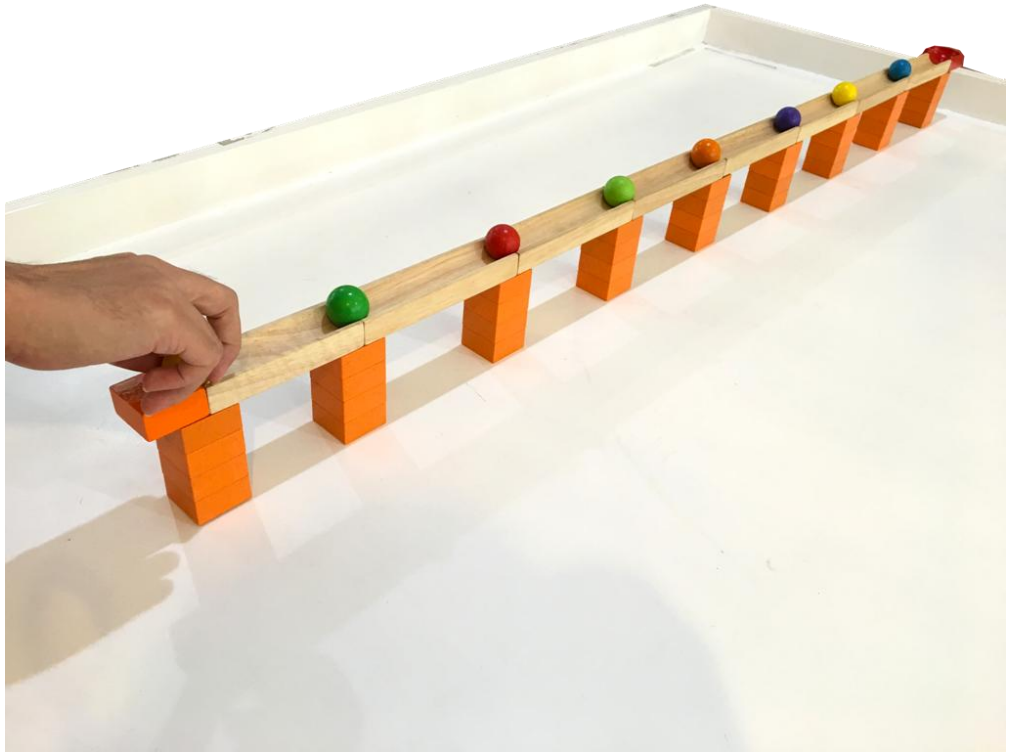
	(Using Hand) Number of Balls Bounced
…….	
…….	
…….	
…….	

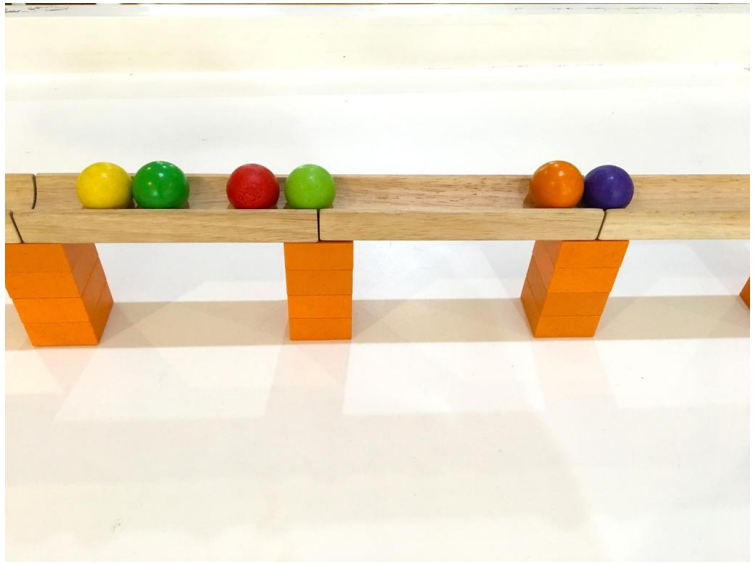
Who has the most force? (Using Hands)
1.
2.
3.
4.

Lesson 03 - Force

Push it and see how many balls you can bounce!

This experiment can be repeated, but this time ask the students to blow the ball instead.



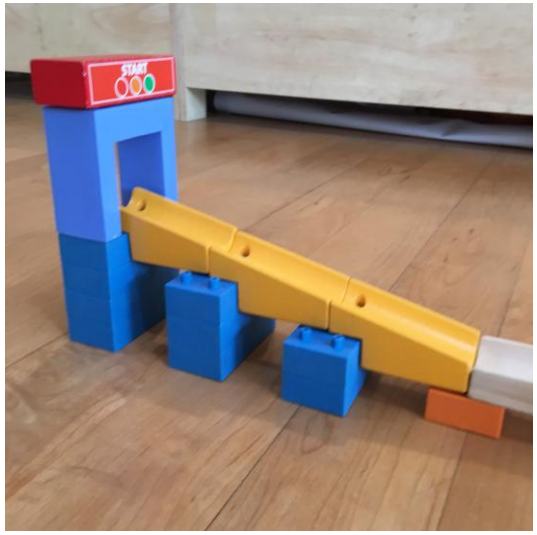


Lesson 04 – Gravity Force

The more things fall down, the more gravity force is pushing it. Will something falling more move more? Let's experiment!

Step 1: Release the ball from the first level height
Step 2: See where the first ball stop, mark it with "Finish"
Step 3: Release the next ball from the second, and repeat this till the last level height

See how far each ball traveled and record the measurements. Discuss with the classroom the result of the experiment.



Lesson 04 – Gravity Force

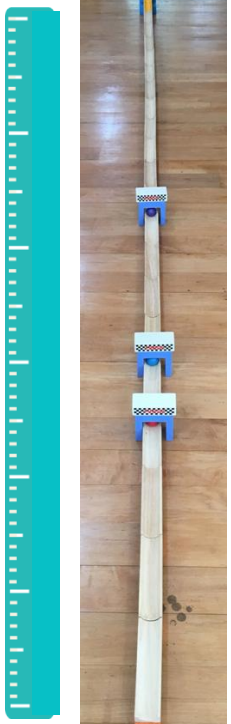
Experiment See how far the balls travel at different height.

Set the starting point at three different level heights, and see how far each all goes, measure the travel length of each ball. For older, try discuss “why”.

180 cm.

246 cm.

265 cm.

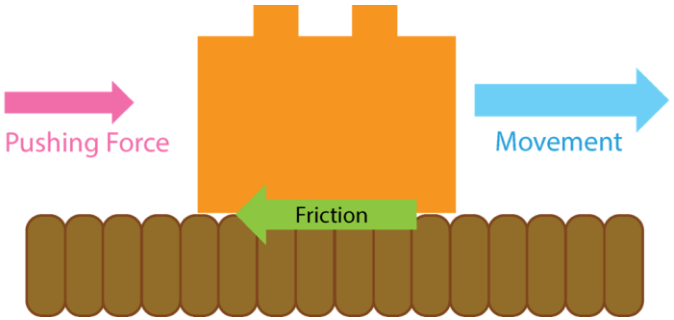


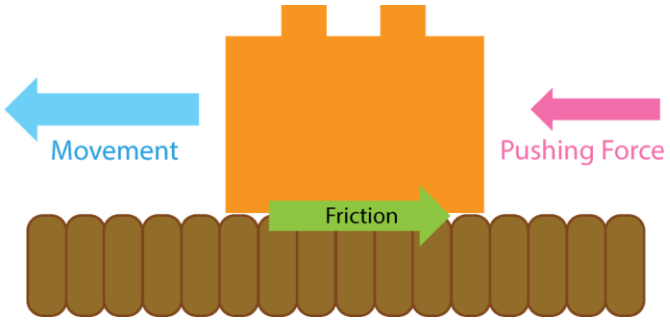
Level Height	Travel Length (using a ruler)
First Level	180 cm.
Second Level	246 cm.
Third Level	265 cm.

The ball traveled farthest at which level?
The 3rd level height.

Lesson 05 – Why do things stop? (Friction Force)

Friction is a force that stop things from moving. When things rub or slide against each other the friction force will act against the pushing force.





Let’s experiment with friction. Try sliding across the floor with your shoes on, is it easy or hard to slide? Can you slide far?

Now take your shoes off and try sliding with your socks? Can you travel farther?

So what is the explanation of this experiment? We can slide farther with our socks than with the shoes because socks have less friction against the floor. This is because the sock has a smoother surface.

Lesson 05 – Why do things stop? (Friction Force)

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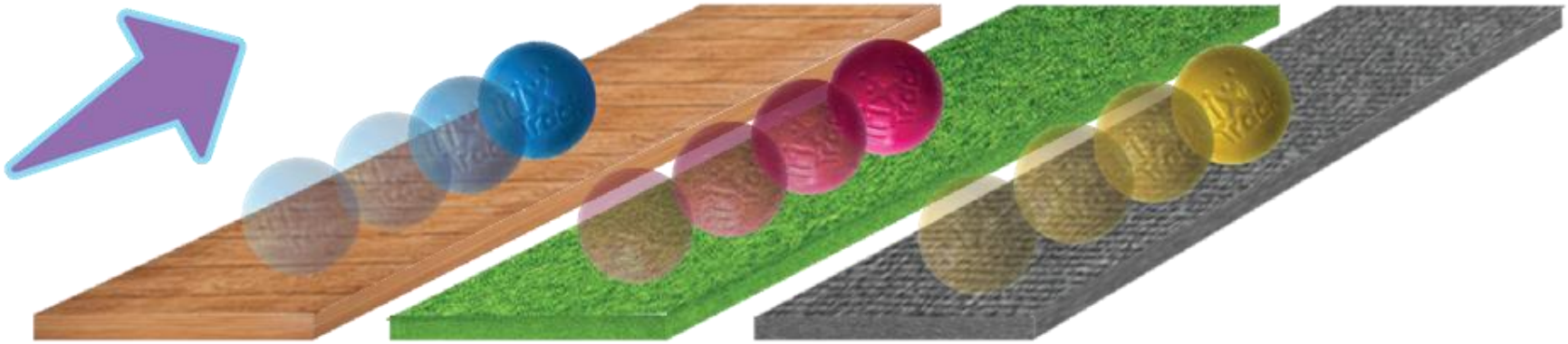
Lesson 05 – Why do things stop? (Friction Force)

Let’s experiment with friction using the Trix Track balls.

1. On which surface will the ball travel the furthest?

2. Which surface has the most friction?



Lesson 06 – Energy

Lesson 6 – Energy

For things to move they need Energy. You may remember from Lesson 3 and Lesson 4 that things need force to move. This is because force and energy are related. The more force there is the more energy as well.

You can try to think about energy as the fuel to make things move. For example how do you move? Where do you get energy from? The energy you use comes from the food you eat. When you move and run around you use up that energy that you got from your food.

Eating gives you energy.

Your energy comes from the food you eat.

Moving uses energy.

Lesson 06 – Energy

Scientific Terms	PlayClass Terms
Potential Energy	Gravity Energy
Kenetic Energy	Movement Energy
Moment / Torque	Turning Force

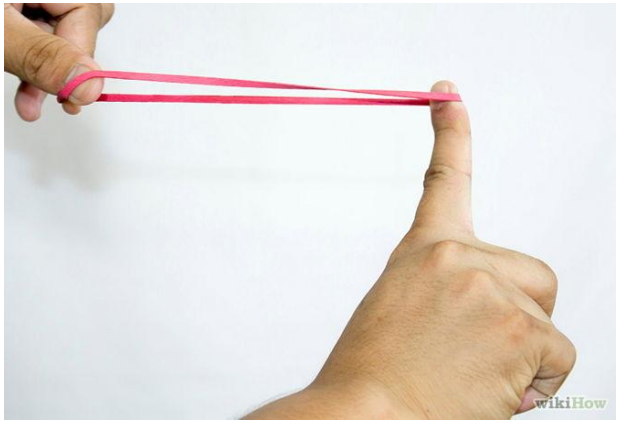
Lesson 06 – Energy

Cars get the energy they use for moving from petrol. The cars get filled up with petrol at the petrol station.

At the petrol station cars get energy from petrol.

Cars energy come from petrol.

Cars change chemical energy from petrol into movement energy.



When we stretch the rubber we give it elastic energy.

What happens if you release the rubber band?

The rubber band will fly off! This is because elastic energy is converted into movement energy.

Lesson 06 – Energy

Why does the ball stop moving after some time? We have learnt that is this because of friction. When things slide they rub against each other which is what we call friction force.

When things move, they have movement energy (kinetic energy). When they are fast they have lots of movement energy. When they are slow they have little movement energy.

Fast Ball
Lots of movement energy

Slow Ball
A little movement energy

Ball not moving
No movement energy

When you first push a ball it moves fast. Then it will slow down. Then it will stop. The ball is losing movement energy because the friction pushing back on the ball. This friction makes movement energy change into heat energy.

Heat Energy

Try rubbing your hands together fast and hard. What happens?
Does it get hot?

The movement energy of your moving hands is changed into heat energy.

Lesson 07 – Conservation of Energy

Energy Conservation: Energy can not be created or destroyed. Energy can only change form.

Things that are up high has more energy. This is called potential energy which comes from the gravity. We will call it gravity energy.

When things fall down they lose the gravity energy but gain movement energy. Some of the movement energy will be lost to friction, this part of energy is changed into heat. The ball will not have enough energy to go all the way back up the hill.

10 Gravity Energy
0 Movement Energy

0 Gravity Energy
2 Movement Energy
1 Heat Energy

2 Gravity Energy
0 Movement Energy
1 Heat Energy

Height
3 blocks

The ball gets faster as it rolls down.

<u>NO</u> Gravity Energy
0 Gravity Energy

Height
2
blocks

Height
3 blocks

Can the ball move back to the top of the hill? It cannot because some movement energy is lost to friction.

Lesson 07 – Conservation of Energy

Experiment, see energy in practice.

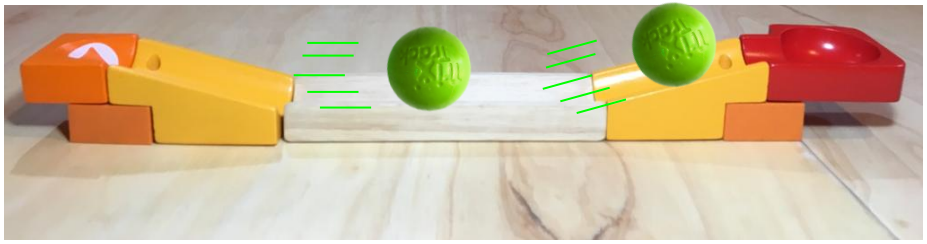
A: For the ball to move up one block, how many blocks does it have to move down?

B: For the ball to move up two blocks, how many blocks does it have to move down?

C: Why does the ball have to move down more than it can move up?

...This is because some of the energy is lost to friction.

A:



B:

C:

Start with just one down block, the ask the students to rebuild the track, this time add one more block, and see if the ball reaches the height we expected.

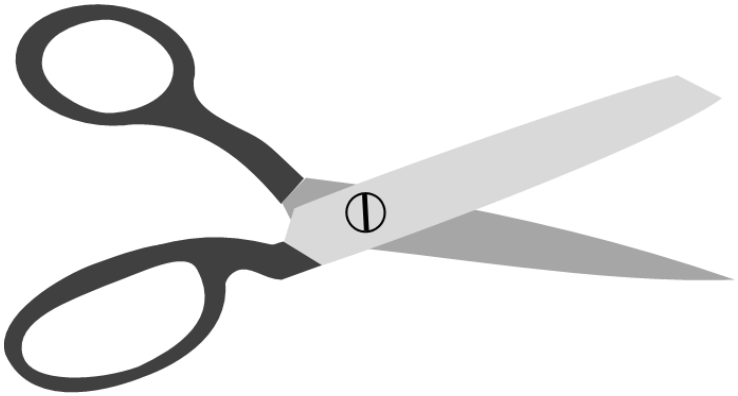
Now, expand the left track with more down blocks until the ball can reach the expected height.

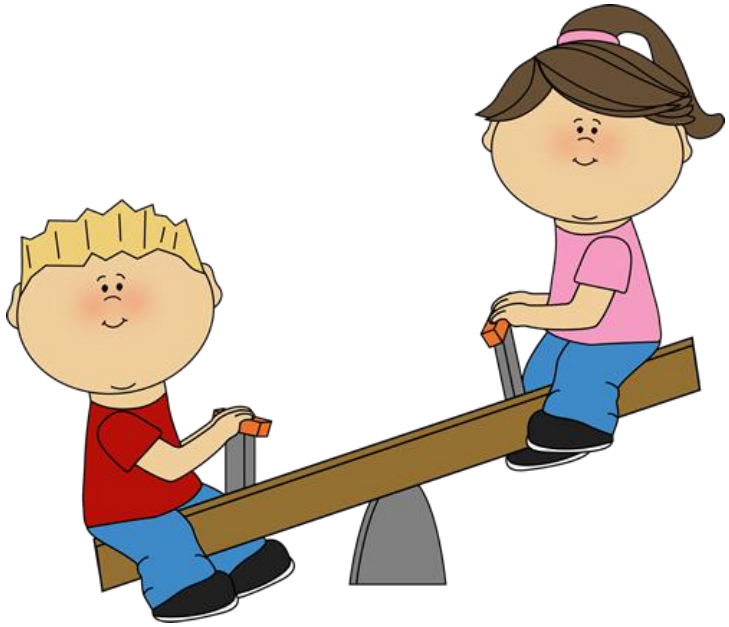
Lesson 08 – Pivot

What is a pivot?

A pivot is turning point. The turning point is where something can rotate.

Look at the scissor and a seesaw, can you tell where the pivot is?

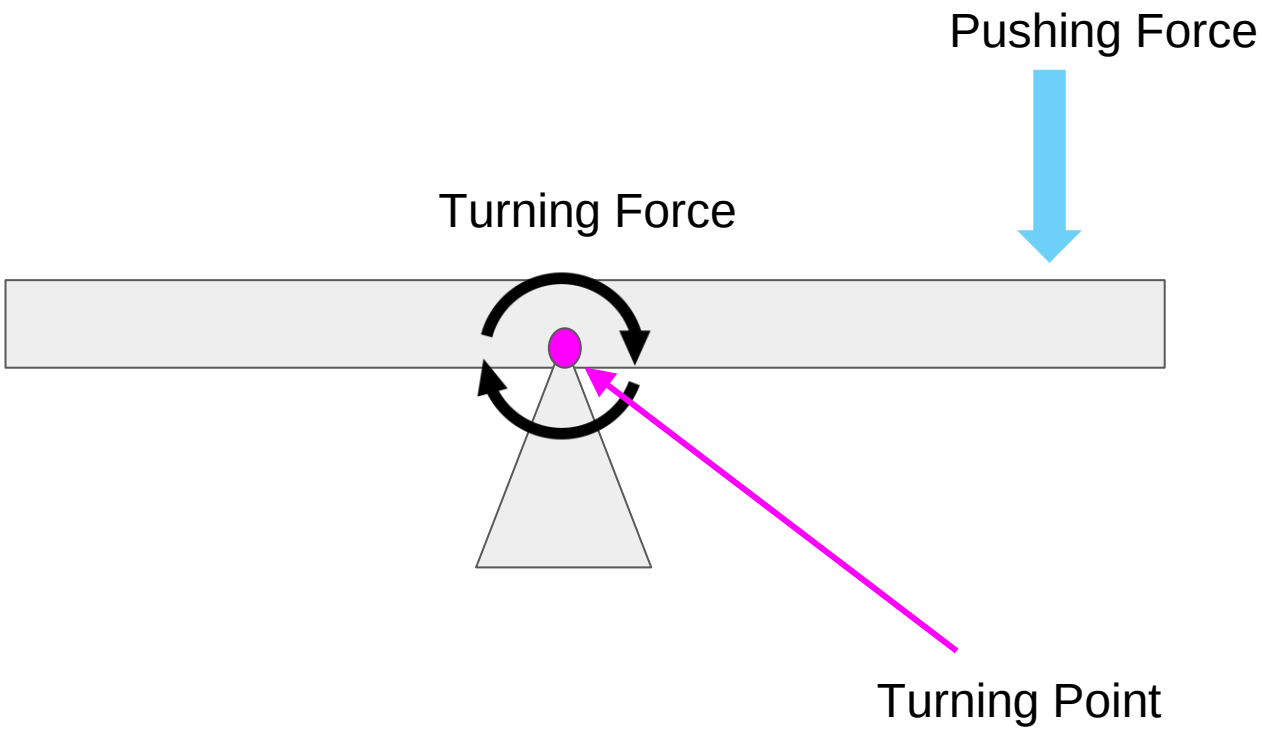




Lesson 08 – Pivot

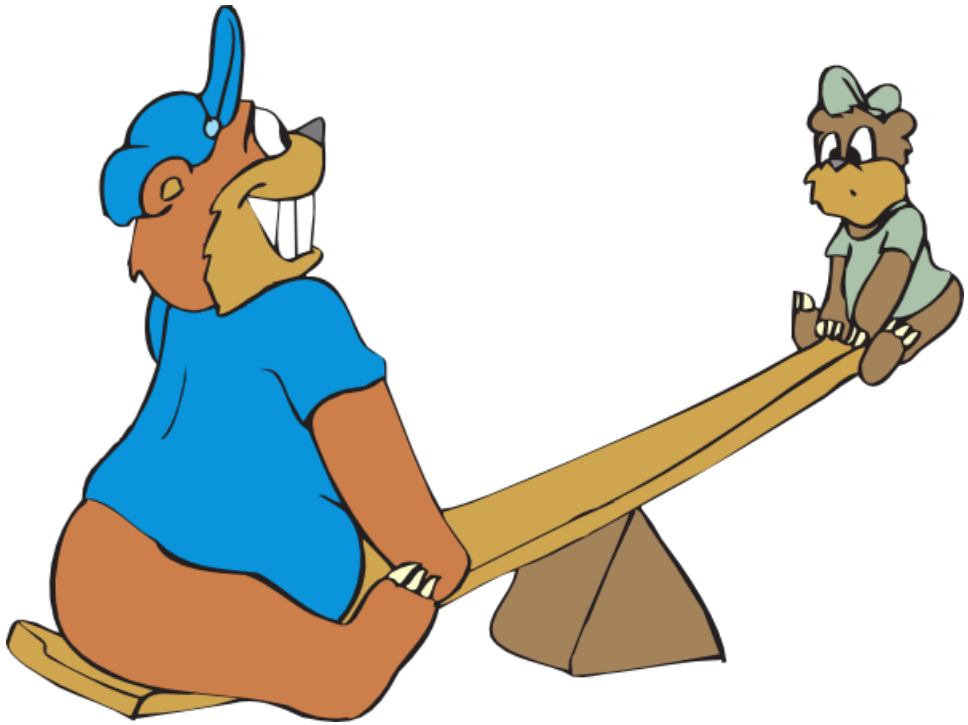
Force pushing on one side of the bar causes the turning force. This turning force causes the bar to rotate!

Activity: ask the students to drawn the picture of this pivot bar, once there's a force on the right side of the bar.



Lesson 08 – Pivot

The pivot will fall to the side with more turning force.



Activity: DIY Paper Clip Pivot

Step 1: Cut out rectangular piece of cardboard paper

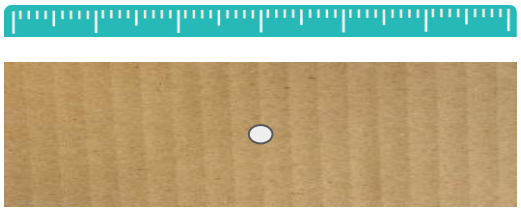
Step 2: Bend one end of the paperclip into a straight pin

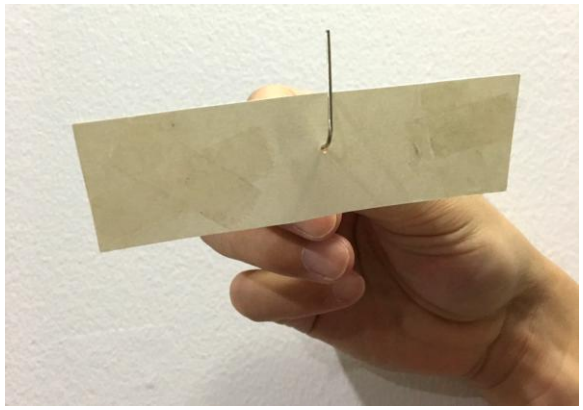
Step 3: Poke a hole into the middle

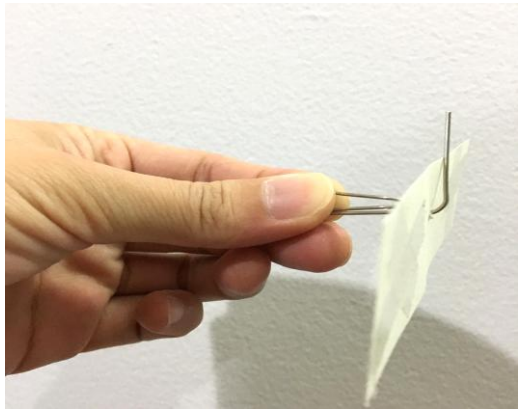
Step 4: See if the cardboard is balanced. If it is balanced,
it means the turning force from each side is equal.

Step 5: If it's not, keep adding the sellotape,

10 cm.



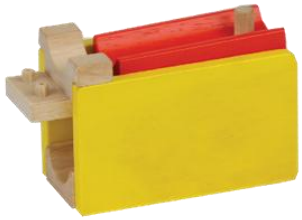




Lesson 09 – Inverse

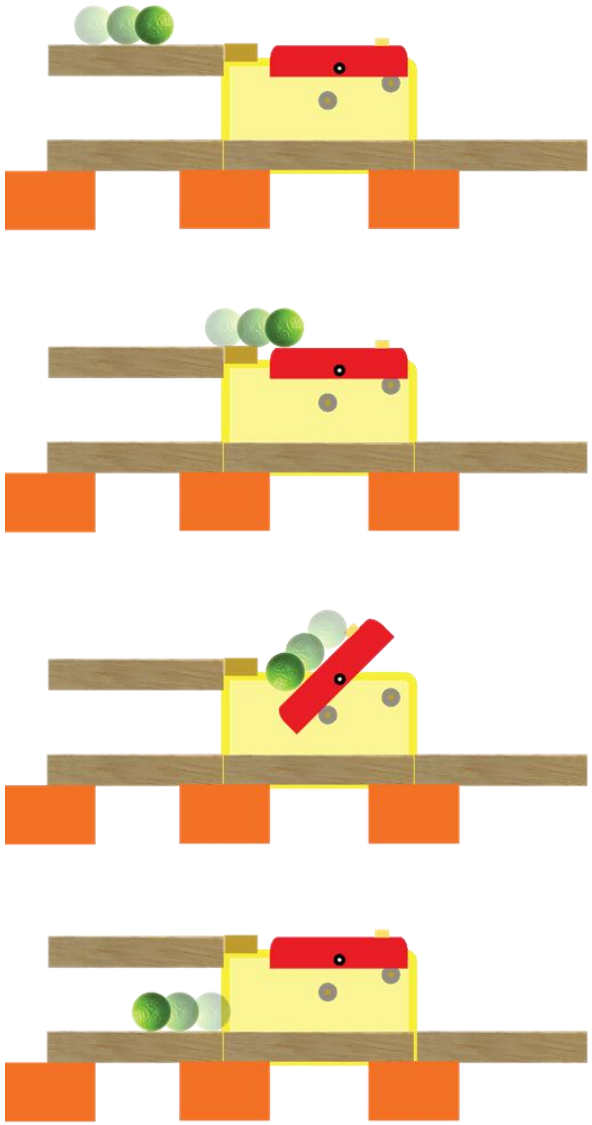
Activity: On a worksheet, ask the student to mark the pivot position, see if they know where it is!

Inverse (Pivot)



Where is the pivot?
Mark the position of the pivot.

Lesson 09 – Inverse

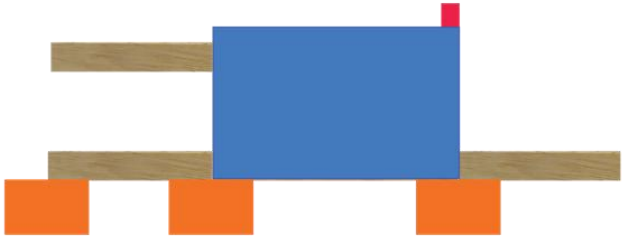


Lesson 10 – Two Way Flipper

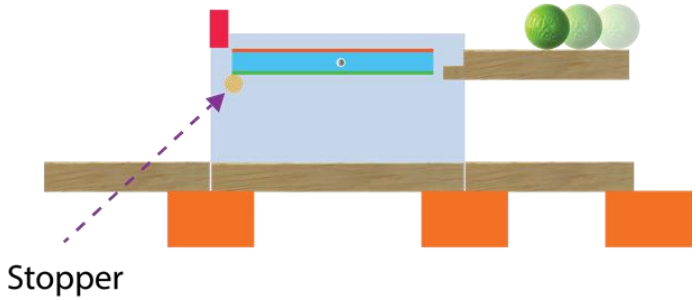
Activity: On a worksheet, ask the student to mark the pivot position, see if they know where it is!

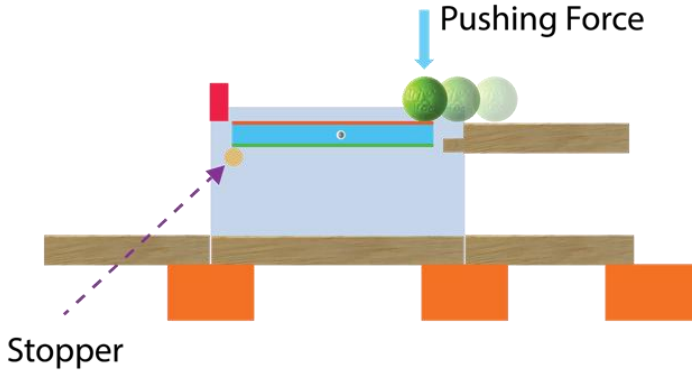
TWO WAY FLIPPER

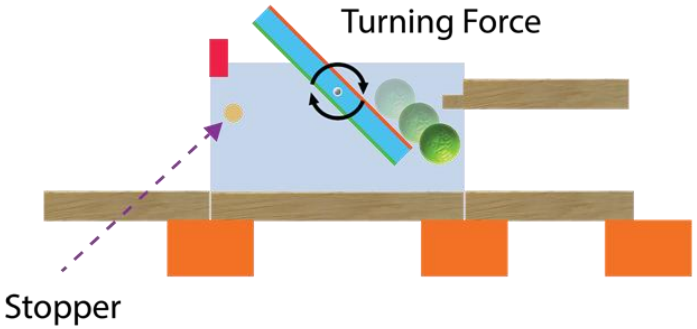
Where is th e pivot ?
Mark the position of the pivot.



Lesson 10 – Two Way Flipper







Lesson 10 – Two Way Flipper

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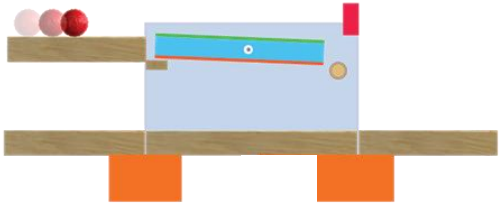

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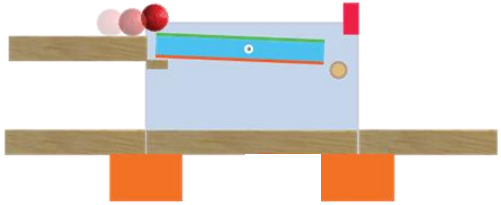

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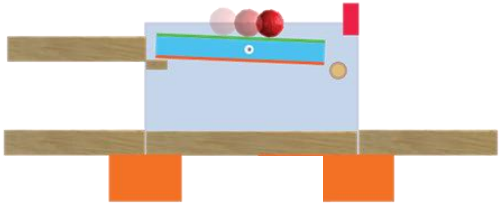

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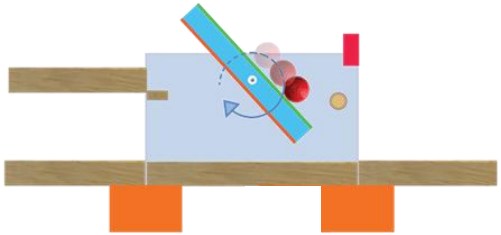

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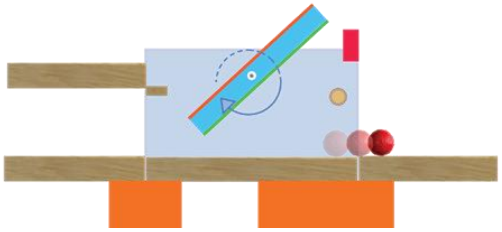

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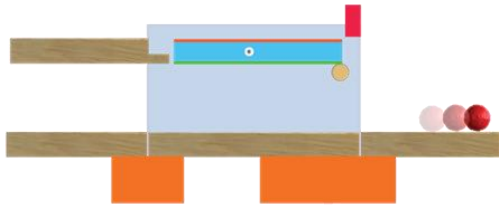

Lesson 10 – Two Way Flipper

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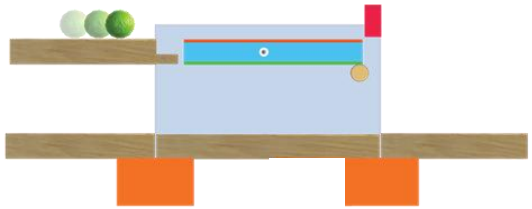

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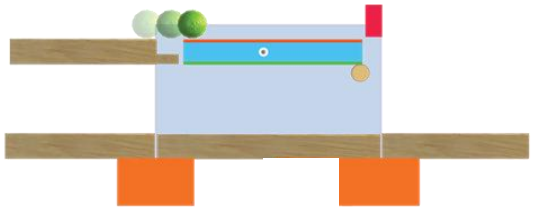

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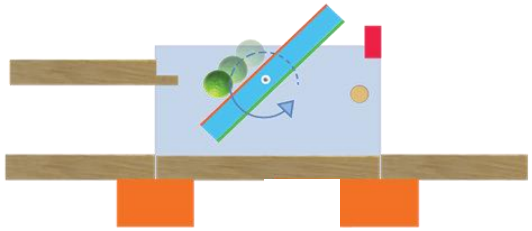

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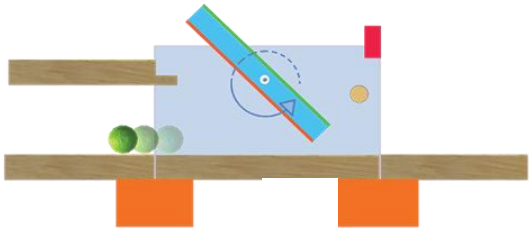

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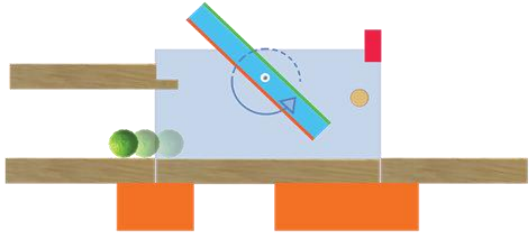

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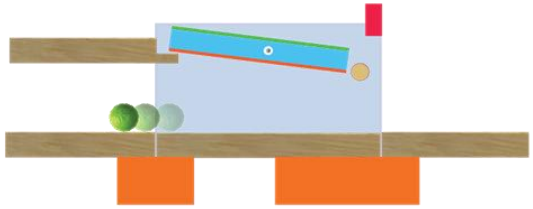
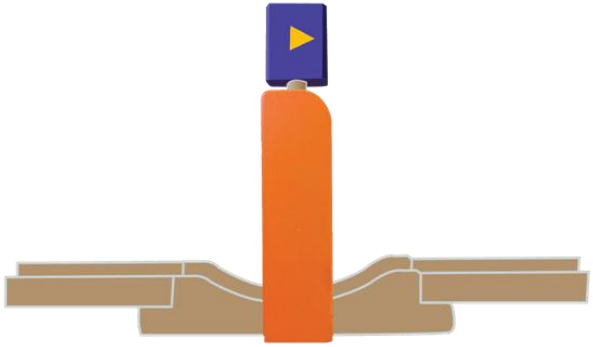


Lesson 11 – Power Booster

Activity: On a worksheet, ask the student to mark the pivot position, see if they know where it is!

Hammer #1 (Pivot)

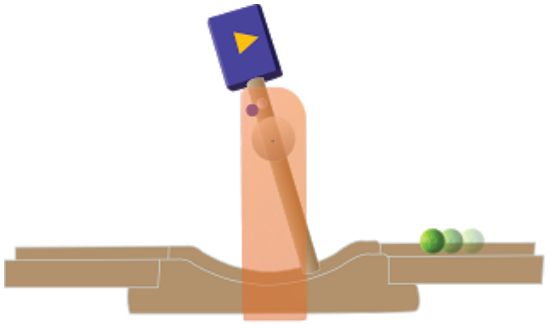
Where is the pivot?
Mark the position of the pivot.



Lesson 11 – Power Booster

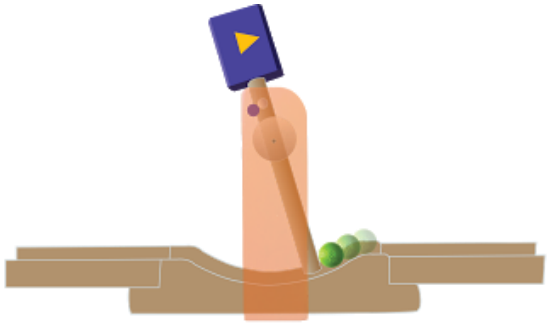
First, load the hammer up into a high position, give it gravity energy.

1



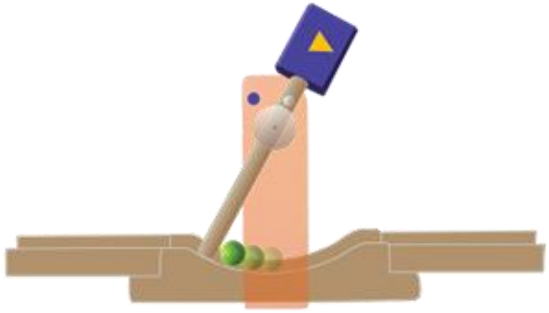
The ball hit the pivot bar. The pushing force causes the hammer to turn around the pivot.

2



The hammer falls down fast as gravity energy changes into into movement energy.

3

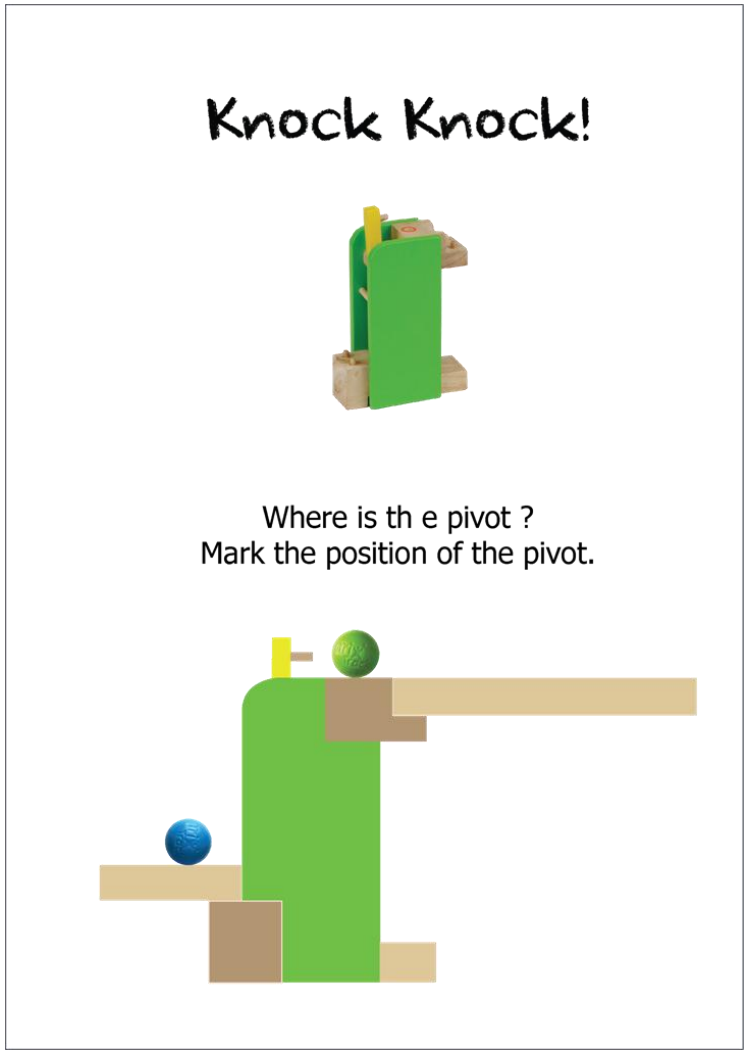


The hammer hits the ball hard. The big force causes the ball to move fast.

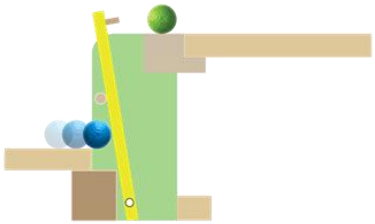
4

Lesson 12 – Knock Knock

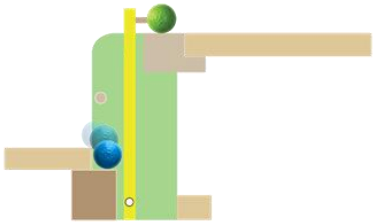
Activity: On a worksheet, ask the student to mark the pivot position, see if they know where it is!



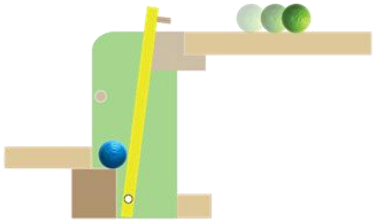
Lesson 12 – Knock Knock



First Knock: Blue ball hits yellow pivot bar.



Second Knock: Yellow pivot bar hits green ball.



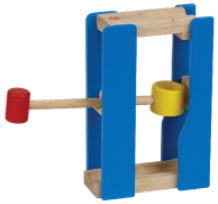
Green ball moves to the right.

Lesson 13 – Hammer Slammer

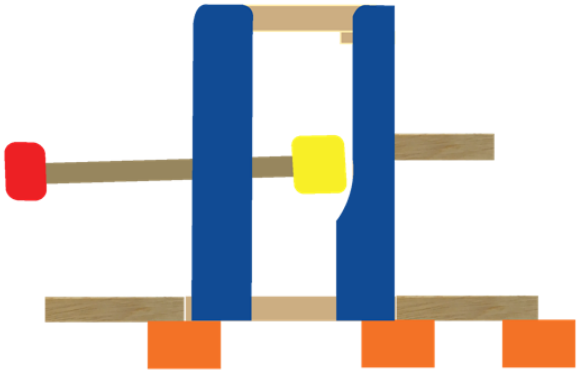
Activity 1: On a worksheet, ask the student to mark the pivot position, see if they know where it is!

Activity 2: Which side has more turning force? The red side or the yellow side

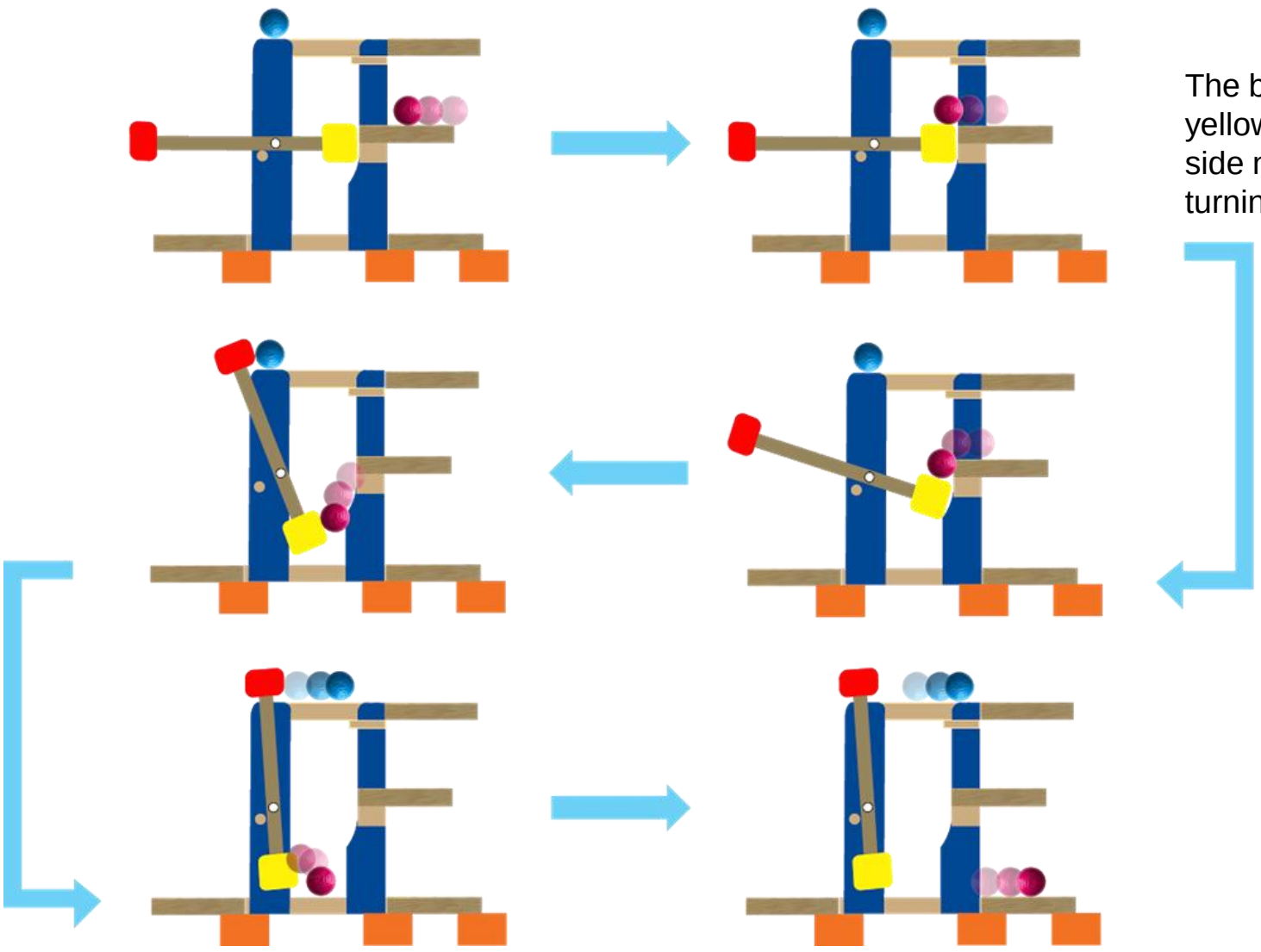
Hammer Slammer



Where is th e pivot ?
Mark the position of the pivot.

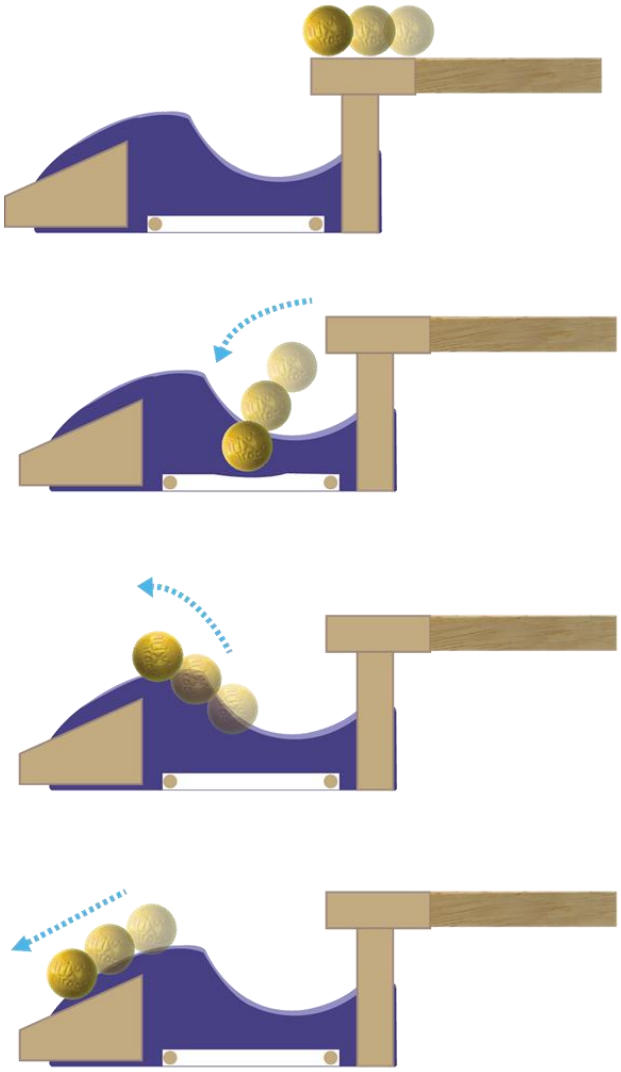


Lesson 13 – Hammer Slammer



The ball falls on the yellow side. Which side now has more turning force ?

Lesson 14 – Bouncing



The elastic band is not stretched

The ball hits the elastic band, this causes the elastic band to stretch. Movement energy from the ball is changed into elastic energy.

The elastic band releases the energy and pushes the ball up and out.