

PHYSICS TOYS FROM WASTE

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LEARNING HAS TRANSFORMED INTO A TEDIOUS TASK RATHER THAN A BELOVED ACIVITY.

WHY?

BECAUSE OF DRY, BLACK-AND-WHITE TEXTBOOKS AND MONOTONOUS TEACHING METHODS THAT REQUIRE CHILDREN TO ROTE LEARN THOUSANDS OF WORDS. HOW IS A CHILD, WHO'S MIND IS ATTRACTED ONLY TO THINGS THAT FASCINATE HER, EVER SUPPOSED TO IGNITE THE FIRE OF CURIOSITY INSIDE OF HER WHEN ALL CREATIVITY IS LOST.

REAL LEARNING IS WHEN CHILDREN SEE SOMETHING THAT THEY THINK IS IMPOSSIBLE...SOMETHING THAT IS OUT OF THIS WORLD. BECAUSE ONCE THEY START TRYING TO UNDERSTAND WHAT IS PRESENT IN FRONT OF THEIR EYES AND REALISE THAT THEY CAN LEARN ABOUT SUCH MAGNIFICENT THINGS, THEY BELIEVE THAT THEY CAN CONQUER THE WORLD. THEREFORE, IF WE WANT CHILDREN TO PUT THEIR HEART AND SOUL IN EDUCATION, WE MUST USE METHODS THAT REACH INTO THEIR BRAIN AND ATTRACT EACH OUNCE OF CURIOSITY AND CREATIVITY THEY HAVE IN THEM.

INSPIRED TO MAKE LEARNING MORE INNOVATIVE AND FUN, I DECIDED TO TAKE ON THIS PROJECT. I GATHERED TRASH MATERIALS LIKE STRAWS AND BICYCLE SPOKES AND CREATED TOYS THAT SIMPLY EXPLAIN COMPLEX PHYSICS CONCEPTS RANGING FROM STATIC ELECTRICITY TO MAGNETIC INDUCTION. MOREOVER, I USED THESE TOYS TO TEACH CHILDREN AND SAW AN IMMEDIATE SMILE ON THEIR FACES EACH TIME THEY PLAYED WITH A NEW TOY! SEEING THE POSITIVE EFFEECT THIS METHOD OF TEACHING HAS ON STUDENTS, I WOULD LOVE TO ENCOURAGE OTHER PEOPLE TO USE THESE TOYS AS WELL.

THEREFORE, I CREATED THIS BOOKLET THAT CAN BE USED BY WHOEVER IS READING IT TO CREATE SIMILAR TOYS AND USE THEM TO SPREAD THE LOVE FOR LEARNING IN CHILDREN EVERYWHERE!

(ACKNOWLEDGEMENT TO MR ARVIND GUPTA)

SPINNING COIN

The coin spinner is an excellent toy that can be used to help children learn the concept of magnetism. This toy can be made out of trash and requires very little material. To make this toy, you must have the following materials:

- 5 small ring magnets
- 5 coins
- 1 plastic straw

Procedure to make and use the toy:

1. First, start attaching the ring magnets in such a way so that they attract each other and stick to each other.



2. Then take the ring magnets to the coins one by one so that the coins hang off of each other.



3. Make sure the last coin is only connected to the previous coin through its edge.
4. The student can they take the straw and blow at the coin, seeing that it spins extremely fast without falling!

Explanation of the toy:

The ring magnets are permanent magnets, which means they attract other metallic substances. When put in front of the coin, the ring magnet's magnetic field causes the domains in the coin to align in one direction. This causes the coin to act like a permanent magnet temporarily. Therefore, the coin will now be able to attract other coins and create a chain of coins. This whole process is called inducing magnetism.

STATIC FAN

The static fan is a fascinating toy that can be used to help children learn the concept of static electricity. This toy can be made out of trash and requires very little material. To make this toy, you must have the following materials:

- 1 paper cup
- 1 pencil
- 1 paper rectangle cut out of dimensions 5cm by 3cm
- 1 plastic straw

Procedure to make and use the toy:

1. Place the paper cup upside down and use the pencil to make hole in the cup, placing the pencil in that hole.



2. Fold the rectangle paper cut out twice so that you can find the centre of the paper.
3. Place the paper so that its centre is on the tip of the pencil.



4. Rub the straw against your clothes and place in front of one corner of the paper. You will then see that the paper will rotate, following the straw!



Explanation of the toy:

When you rub the straw against your clothes, the electrons get transferred from the straw on to your clothes due to the friction. The straw now has a positive charge because it has lost electrons. When the positively charged straw is put in front of the paper, it attracts the electrons in the paper, making the paper rotate. This process is called the induction of static electricity.

FLYING ROTATOR

The flying rotator is an astonishing toy that can be used to help children learn the concept of design on air resistance. This toy can be made out of trash and requires very little material. To make this toy, you must have the following materials:

- 1 paper circle cut out of radius 1.5cm
- 1 paper rectangle cut out of dimensions 9cm by 3cm
- glue

Procedure to make and use the toy:

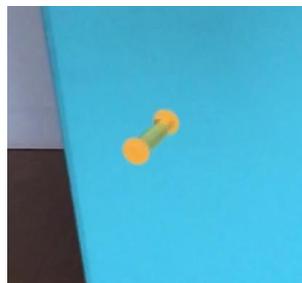
1. Bend the edges of the length of the rectangle paper slightly so that the paper looks like this:



2. Then use glue to stick the circles on both ends on the rectangle paper
3. Let it dry



4. When the child throws the toy in the air, they will see that the toy will fall down while rotating rapidly like a wheel!



Explanation of the toy:

When the toy starts falling in the air, the air hits the bent edges of the toy so that it starts rotating. This is called air resistance and the toy shows how design changes can be used to manipulate air resistance to create different types of motion.

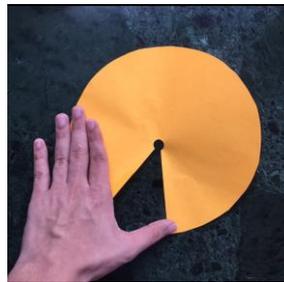
BLACK HOLE

The black hole is an amazing toy that can be used to help children learn the concept of black holes in our galaxy. This toy can be made out of trash and requires very little material. To make this toy, you must have the following materials:

- 1 paper cup
- 1 paper circle cut out of radius 13cm
- 1 small bead

Procedure to make and use the toy:

1. Cut a sector out of the circle in the following way



2. Now, tape the ends of the circle to make a cone
3. Place the cone in the cup



4. When the child throws the bead onto the toy, the bead will rotate in a helical pattern and fall into the cup, just like how objects in space do when they are sucked into black holes!



Explanation of the toy:

When a star or a planet comes close to a black hole, it gets sucked into the whole due to the large gravitational force of the black hole. The planets then move in helical objects again and again till they finally enter the black whole.

STRAW WINDMILL

The straw windmill is a brilliant toy that can be used to help children learn how wind energy can be turned to kinetic energy. This toy can be made out of trash and requires very little material. To make this toy, you must have the following materials:

- 2 straws
- One small roll of tape
- One pair of scissors

Procedure to make and use the toy:

1. Take one straw and tape both of its ends closed



2. Then cut small cuts at the ends of the straw as shown below



3. Bend this straw in half, and make another cut in the centre of the straw as shown below



4. Cut one edge of the second straw as shown below



5. Place the second straw into the first as shown below



6. Close one end of the second straw and blow into the other.
When the child does this, he will see that the first straw will start rotating rapidly!

Explanation of the toy:

When the child blows into the straw, the air moves to both the ends on the other straw. Since we cut both the ends of the straw in opposite directions, the blown air provides force to the straw and makes it rotate. This process shows how one type of energy can be converted into another (wind to kinetic energy).

FLYING FISH

The flying fish is a mind-blowing toy that can be used to help children learn how wind energy can be used to move objects. This toy can be made out of trash and requires very little material. To make this toy, you must have the following materials:

- 1 plastic straw
- 2 paper rectangle cut outs of dimensions 9cm by 5cm
- Glue
- Balloon
- Plastic rubber band

Procedure to make and use the toy:

1. Cut the shape of a fish out of the paper cut outs and colour them so that they look fun and vibrant.
2. Place the straw in between the cut outs and stick the cut outs together as shown below



3. Blow into the balloon and use a rubber band to tie the balloon around one end of the straw. While you are doing this, make sure that you cover the other end of the straw with your finger
4. Remove your finger and let go of the toy. When the child does this, the toy will fly around rapidly!

Explanation of the toy:

When the finger is removed, the air from the balloon rushes out of the straw. This creates an upward force on the toy and makes it fly upwards. This toy can be used to show the working of a rocket to children.

DANCING DOLL

The dancing doll is an interesting toy that can be used to help children learn how to make a simple motor. This toy can be made out of trash and requires very little material. To make this toy, you must have the following materials:

- 1 small empty water bottle
- 2 bicycle spokes
- Cardboard pieces
- scissors

Procedure to make and use the toy:

1. Pierce one bicycle spoke in one end of the bottle till it comes out the other.
2. Then bend the spoke so that it looks like as shown below
3. Take the other spoke, pierce it into the back of the bottle, and bend it around the first spoke
4. Cut out cardboard pieces so that they look like a doll and stick them to the part of the spoke that is outside the bottle
5. When the child will rotate the first spoke the doll will magically start moving up and down!



Explanation of the toy:

This toy can be used to show children how rotational energy can be converted into up and down movement. Moreover, it can be used to show how a simple motor can be made.

FLAPPING BUTTERFLY

The flapping butterfly is an amazing toy that can be used to help children learn the butterfly effect. This toy can be made out of trash and requires very little material. To make this toy, you must have the following materials:

- 1 small wooden stick
- 1 bendable wire
- Cardboard pieces in the shape of butterflies

Procedure to make and use the toy:

1. Stick the butterfly shaped cardboard pieces to the wooden stick
2. Attach the two ends of the wire to the centre of both the wings of the butterfly
3. When the child pulls the wire up and down, the wings will move in the same way, imitating a butterfly!



Explanation of the toy:

The butterfly effect states that a motion as small as the flapping of butterfly wings, can cause a tornado in another location after a significant period of time. This principle can be taught to a child in a fun way by using this toy

DASHING CAR

The dashing car is a fun toy that can be used to help children learn how a large surface area increases air resistance. This toy can be made out of trash and requires very little material. To make this toy, you must have the following materials:

- 1 small empty water bottle
- 1 large cardboard circle of radius 6cm
- 1 small fan
- 1 piece of thread
- 4 buttons
- Cardboard pieces in the shape of a car

Procedure to make and use the toy:

1. Stick the car shaped cardboard pieces onto the bottle
2. Cut the cardboard circle into half, and paste this circle at the back of the bottle
3. Attach the 4 buttons at the bottom of the bottle so that they look like wheels
4. Tie the thread onto any part of the toy
5. When the fan is turned on a faced toward the car, you will see that the car will move forward quickly! You can use the thread to pull the car back



Explanation of the toy:

When the fan is turned on, the large semi-circle is pushed on by the force of the air. This causes the car to move forward. This toy can be used to show students that because of the large surface area of the circle, more air resistance acts on the car, making it move fast.

WATER SPRINKLER

The water sprinkler is an amazing toy that can be used to help children learn how windmills work. This toy can be made out of trash and requires very little material. To make this toy, you must have the following materials:

- 1 Bicycle spoke
- 1 straw
- 1 empty plastic bottle
- tape

Procedure to make and use the toy:

1. Cut the top of the bottle and make repeated minor cuts in it so that it looks like the cut out shown below



2. Slightly twist all the loose ends to face one side
3. Pierce the bicycle spoke into the cap of the bottle cut out
4. Fold the straw and tape it to the spoke as shown below



5. The toy is ready, and the child can place the toy under a fan and in a bucket of water. The child will be shocked to see how wind energy can be used to sprinkle the water everywhere!



Explanation of the toy:

The windmill uses wind energy to create electricity. This energy conversion is extremely important for humans because of their high dependence on electricity. This toy will show how energy conversion takes place to children in a fun way.