# \*Investigating gravity’s effect on a moving marble.

You will release a marble from different starting points (75cm, 60cm, 45cm, 30cm and 15cm), to determine the effect of gravity on a moving object.

# TASK

1.) Chairs are 60cm inches apart and the pipe insulator is between the two chairs, forming a “U” and extending 90 off the floor at both ends. Tape the pipe onto the chairs. You will be releasing a marble from various starting points and recording your observation

2.) Place the marble on the pipe insulator 75cm from the floor and release it. Observe and measure how far up the other side the marble traveled. Write your observations below.

3.) Repeat step 2 from a height of 60cm, 45cm, 30cm and 15cm. Observe and analyze the results.

# Observations

|  |  |
| --- | --- |
| **Starting Height (cm)** | **How far up did the marble travel?** |
| 75 |  |
| 60 |  |
| 45 |  |
| 30 |  |
| 15 |  |

**Analyzing**

What force(s) are being observed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What object received the force(s)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What was the effect of the force on the object? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# \*Investigating the effects some materials have on an object.

This station has four boards are made of different materials: sandpaper, wax paper, bubble wrap and carpet. Here you are observing how a matchbox car moves along each of these surfaces to investigate the effects of friction.

# TASK

1.) Place each board on three stacked books

2.) Roll the matchbox car down each ramp, one at a time.

3.) Time how long the car takes to get down the ramp, and measure how far the car continues on once down the ramp. Write your observations below.

# Observations

|  |  |  |
| --- | --- | --- |
| **Ramp** | **How long did it take the car to travel down the ramp?** | **How far did the car travel beyond the ramp?** |
| sandpaper |  |  |
| wax paper |  |  |
| bubble wrap |  |  |
| carpet |  |  |

**Analyzing**

What force(s) are being observed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What object received the force(s)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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What was the effect of the force on the object? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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# \*Investigating the effects of gravity and air resistance on an object in flight.

There are two pre-made paper helicopter at this station, one with short and wide blades, the other with long and narrow blades. You are releasing each helicopter (one at a time) from an elevated area. You are observing the effects that air resistance and gravity has on the helicopter by using a stop watch to record how long it takes for it to fall to the ground.

# TASK

1.) Release each helicopter, one at a time, from the stairwell

2.) Time how long the helicopter takes to get to the ground. Write the time below.

3.) Observe how each one moves to the ground. Describe its motion in the box below.

|  |  |  |
| --- | --- | --- |
| **Model** | **How long did it take for the helicopter to reach the bottom?** | **Describe its motion** |
| **1**  short and wide blades |  |  |
| **2**  long and narrow blades |  |  |

# Analyzing

What force(s) are being observed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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What object received the force(s)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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What was the effect of the force on the object? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**STATION 4: Clingy Clips**

# \*Investigating the effects of magnetism on certain materials.

Here, you are observing the effects of magnetism by trying to lift paperclips through three different types of plastic cups.

# TASK

1.) Place paperclips under inverted plastic cup #1 (thin plastic cup)

2.) Bring the magnet close to the cup and try to lift the paperclips. How strong is the magnetic force? Add more paperclips to find out

3.) Repeat this process using cup #2 (solo plastic cup) and cup #3 (thick, heavy duty plastic cup) 4.) Record each observation below.

|  |  |  |
| --- | --- | --- |
| **Plastic Cup** | **How many paper clips were held?** | **Observations (What did you notice?)** |
| **Plastic Cup 1**  (thin plastic) |  |  |
| **Plastic Cup 2**  (thicker plastic) |  |  |
| **Plastic Cup 3**  (very thick, heavy duty plastic) |  |  |

# Analyzing

What force(s) are being observed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What object received the force(s)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What was the effect of the force on the object? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**STATION 5: A Balancing Act**

# \*Investigating the effects of balanced and unbalanced forces.

Since it is difficult to see forces in action on large items like a building or standing wall, this station will help you visualize how these forces are working.

# TASK

1.) Place a chair in the middle of the floor. You should notice that it is not moving because gravity is pulling down, but the floor is pushing it back up. It doesn’t move because of the balanced forces.

2.) Gently push the chair a short distance across the floor. What forces acted on it? Record your observations in the table below?

3.) Now repeat #2. But this time have a second student push on the chair in the opposite direction. What happens? (Record your observations in the table below)

|  |  |
| --- | --- |
| **Chair**  **Movement** | **Describe its motion** |
| **1**  person |  |
| **2**  people |  |

# Analyzing

What force(s) are being observed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What object received the force(s)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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What was the effect of the force on the object? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**STATION 6: Applied Force**

# \*Investigating the effects of applying different amounts of force on an object.

During this station, you are using a pre-made mini-air cannon to launch a pom-pom through the air. They take turns applying different amounts of forces as the pull and release the balloon.

**TASK**- **(**For each time your launch, place one pom-pom inside the air cannon.)

1.) Launch 1-Pull the balloon back a little bit and release. What did you notice? How far did it go? Measure the distance between you and where the pom-pom landed. Record all of your answers and observation in the table below

2.) Launch 2-This time you will apply more pull. Pull the balloon back a more than you did in part 1, but not all the way, and release. What did you notice? How far did it go? Measure the distance between you and where the pom-pom landed. Is there a difference from the last launch? Record all of your answers to these questions in the table below.

3.) Launch 3-This time you will apply the most pull. Pull the balloon back as far as it will go (without breaking it, and release. What did you notice? How far did it go? Measure the distance between you and where the pom-pom landed. Is there a difference from the last two launch?

Record all of your answers to these questions in the table below

|  |  |  |
| --- | --- | --- |
| **Launch** | **Describe your observation of each launch.** | **How far did pom-pom travel?** |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |

# Analyzing

What force(s) are being observed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What object received the force(s)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What was the effect of the force on the object? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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