Why do we teach about forces?

Forces tell the physics story
Forces make things happen
Forces are our friends
Types of Forces

Contact forces

• Grip (friction – not moving)
• Slip (friction – moving)
• Drag
• Buoyancy/Upthrust
• Support/Compression (squash)/Normal Contact
• Tension (stretch)

Non-contact forces

• Gravitational
• Magnetic
• Electric
Washing Up Bowl Challenge

- strawberry laces
- fridge magnets
- empty can
- flip flop
- cupcake cases
- rubber duck
- balloon
- sponge
- bouncy ball
- bottle top
- straws
Washing Up Bowl Challenge

THE FORCES...
• Grip (friction – not moving)
• Slip (friction – moving)
• Drag
• Buoyancy/Upthrust
• Support/Compression/Normal Contact
• Tension (stretch)
• Gravitational
• Magnetic
• Electric
Types of Force – Contact Forces - FRICTION

Contact forces

• Grip (friction – not moving)
• Slip (friction – moving)
• Drag (friction in fluids)
  • Buoyancy/Upthrust
  • Support/Compression (squash)/Normal Contact
  • Tension (stretch)

Non-contact forces

• Gravitational
• Magnetic
• Electric
Friction Forces - GRIP and SLIP
Friction Forces - DRAG
Types of Force – Contact Forces - SUPPORT

Contact forces

• Grip (friction – not moving)
• Slip (friction – moving)
• Drag (friction in fluids)

• Buoyancy/Upthrust
• Support/Compression (squash)/Normal Contact
• Tension (stretch)

Non-contact forces

• Gravitational
• Magnetic
• Electric
Support Force - BUOYANCY
Support Force - COMPRESSION or NORMAL CONTACT
Support Force - COMPRESSION or NORMAL CONTACT

The effect of compression forces

This apparatus was used to measure the force required to compress a piece of cushion foam. Force readings were taken from the top pan scale. A ruler was used to measure the thickness of the foam.

Here are the results:

<table>
<thead>
<tr>
<th>Weight added / N</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foam thickness / mm</td>
<td>120</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
</tbody>
</table>

Create a suitable graph and display these results on the graph:

1. Use your graph to find out: i. the thickness of the foam when the weight was 50 N. ii. the thickness of the foam for a weight of 85 N

2. When the foam was 80 mm thick: i. how much force was acting down on the foam? ii. how much force was the foam exerting on the weights? iii. were the scales and the table itself exerting any forces? If so, how much?
Support Force - TENSION
## Types of Force – Non-contact Forces

### Contact forces
- Grip (friction – not moving)
- Slip (friction – moving)
- Drag (friction in fluids)
- Buoyancy/Upthrust
- Support/Compression (squash)/Normal Contact
- Tension (stretch)

### Non-contact forces
- Gravitational
- Magnetic
- Electric
Non-contact forces - GRAVITATIONAL
Non-contact Forces - MAGNETIC
Non-contact Forces - MAGNETIC

**DO TRY THIS AT HOME**

**Evan and Milo**

That's a great question, Evan! Can I have a try?

Put one magnet on top of the other so that the two magnetic poles are touching. Try to slide them apart along the longest side. How easily do they slide?

Fridge magnets are made from thin strips of magnets with alternating north and south poles. If you try to slide the magnets away from each other, the thin strips are being attracted and then repelled, making the magnets judder.

Download more Marvin and Milo activities at iop.org/marvinandmilo

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Non-contact Forces – ELECTRIC/ELECTROSTATIC
Non-contact Forces – ELECTRIC/ELECTROSTATIC

[Comic illustration of a experiment using a balloon and a can. The text is not legible in the image.]

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Non-contact Forces – ELECTRIC/ELECTROSTATIC

DO THIS AT HOME

What you need:

- A plastic bottle cap
- A rubber band
- A pen

Instructions:

1. Place the plastic bottle cap on a table. Rub the straw with a rubber band several times in the same direction.
2. Hold the plastic bottle cap on a table. Rub the straw with a rubber band several times in the same direction.
3. The straw will start to repel the cap. Bring one hand close to the straw, but don’t touch it.
4. Touch the straw with your hand to get the best response. Does one end of the straw stand up better than the other? Does using two hands, rather than one, make a difference?

Acknowledgment:

Adding the straw makes it negatively charged and this induces a positive charge in your hand. The attraction between the straw and your hand makes the straw follow your hand as you move it.

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Washing Up Bowl Challenge

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