

# Forces



# Warm Up: What is Wind?

9/27/17

1. Explain how does a difference in temperature cause convection currents in gases.
2. Using what you know about convection currents, explain why large amounts of air move to become wind.

# Windmills Spinning

<https://www.youtube.com/watch?v=Gu3EyzOYpGY>

## Ziggy

- <https://www.youtube.com/watch?v=Yydv7unoTtk>

## Pool Tricks

- <https://www.youtube.com/watch?v=pvVGRfN7DxQ>

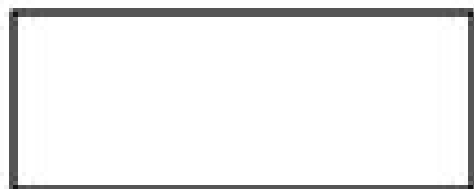
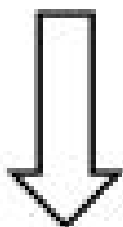
## Sledding

- <https://www.ngssphenomena.com/#/sleddinginertia/>

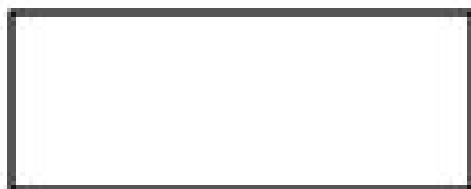
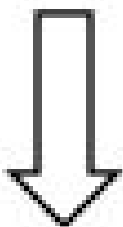
# **What should we figure out**

How does wind turn the blades of a windmill?

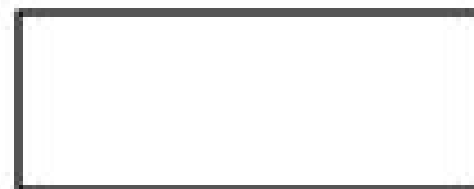
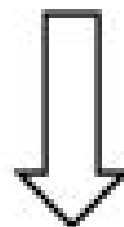
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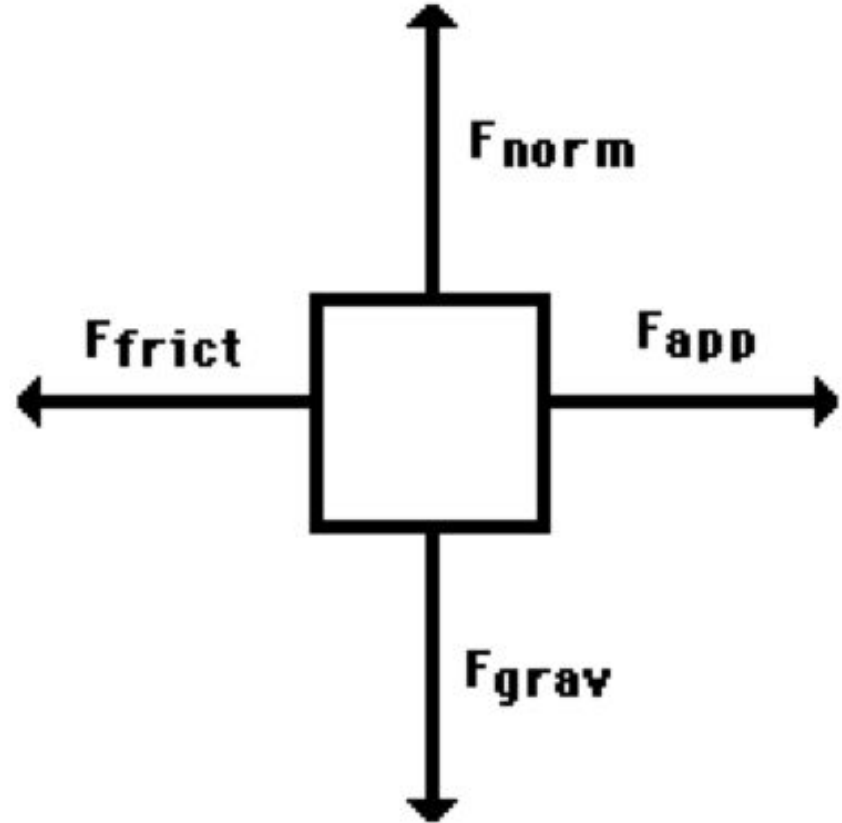
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In your own words, explain to your partner what you think a force is

# Notes: Free-body Diagrams 9/27/17

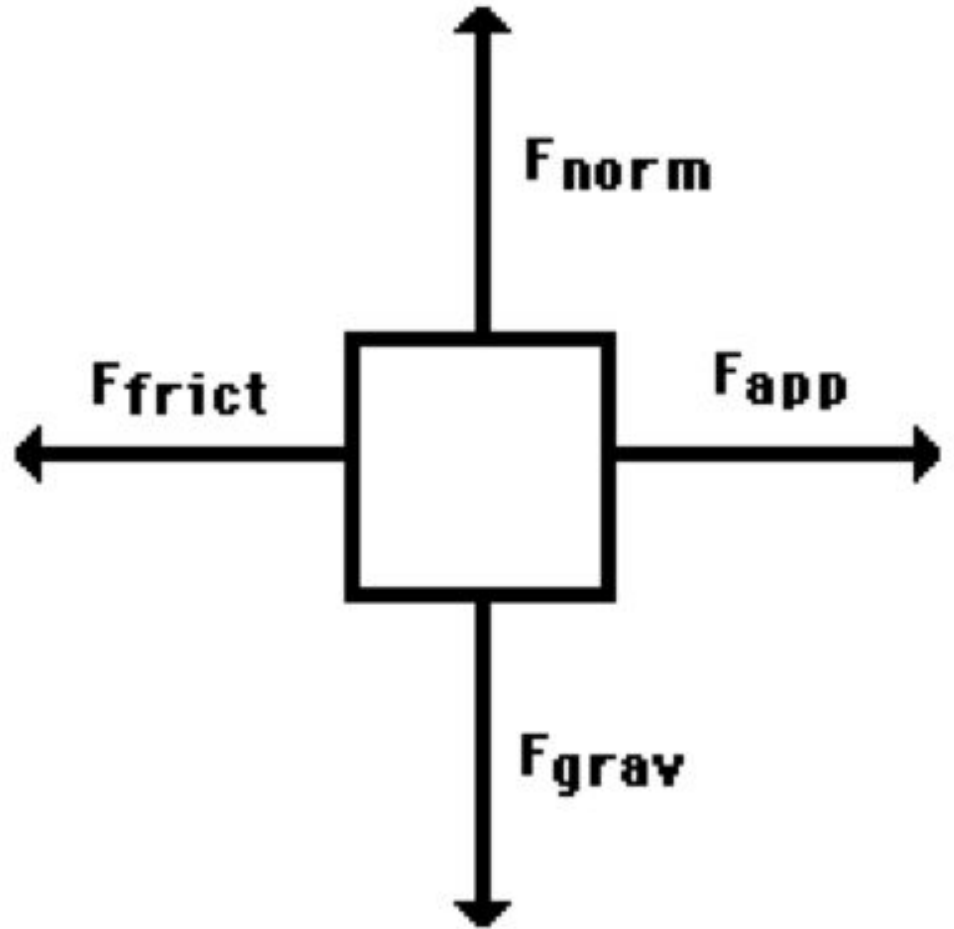
Free-body diagrams are pictures that show the **size** and **direction** of each force that acts on an object.

The square represents the object.





This diagram shows four forces acting on an object. There aren't always four forces like the picture. There might be one, two, or three forces.



# Common Forces

The ***force of gravity*** is shown by  $F_G$  and it usually pulls *down*.

The ***normal force***,  $F_N$ , pushes against objects. For example, the normal force for a book lying on a table would point straight up.

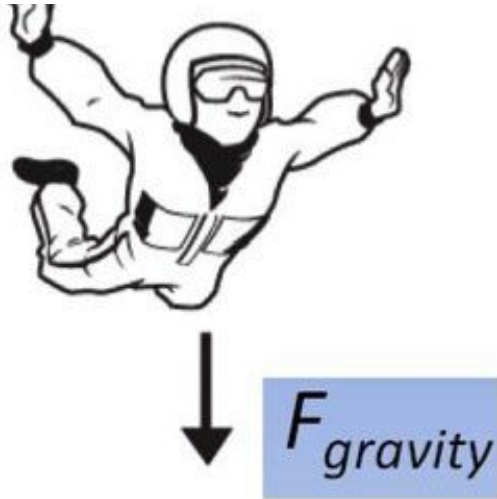
The ***force of air resistance***,  $F_{\text{air}}$ , pushes against gravity for falling objects. The direction of this force is usually opposite of gravity.

The ***applied force***,  $F_{\text{app}}$ , is the force of pushing an object.

The ***force of friction***,  $F_{\text{frict}}$ , pushes against the direction of movement.

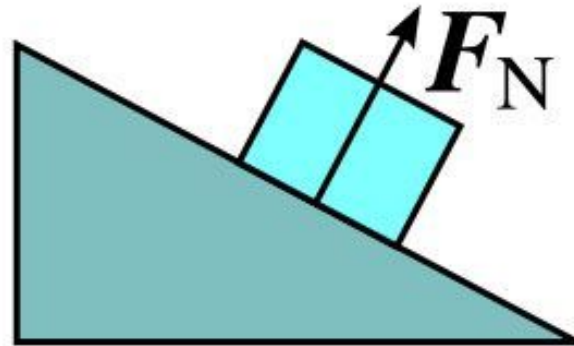
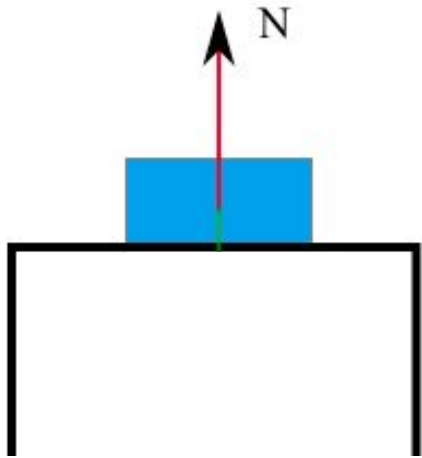
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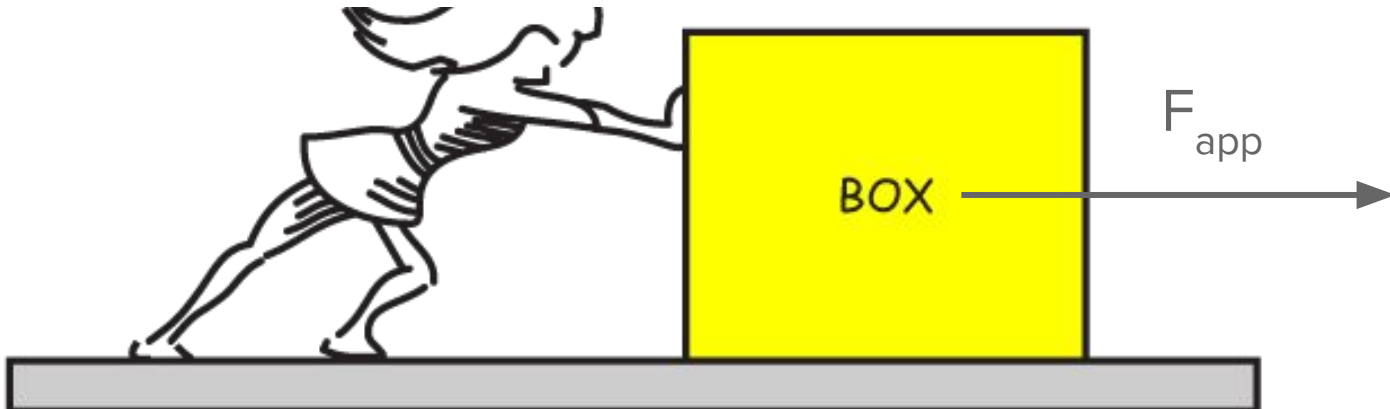
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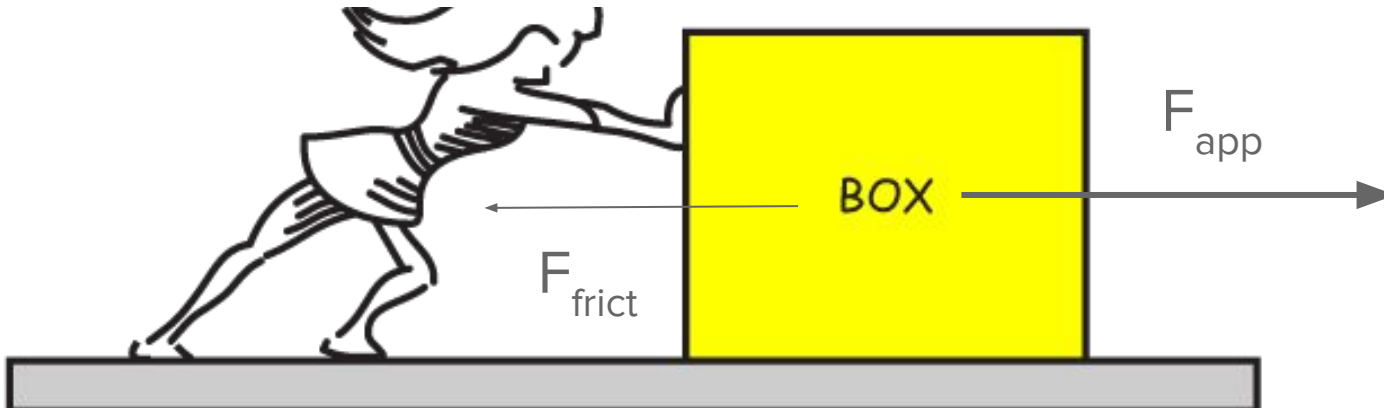
# Common Forces

The *applied force*,  $F_{\text{app}}$ , is the force of pushing an object.



# Common Forces

The **force of friction**,  $F_{\text{frict}}$ , pushes against the direction of movement.



## Steps to Diagram Forces:

1. Draw a box to represent the object.
2. Identify all forces acting on the object.
3. Draw arrows to represent those forces.



## Example 1

A book is at rest on a table.

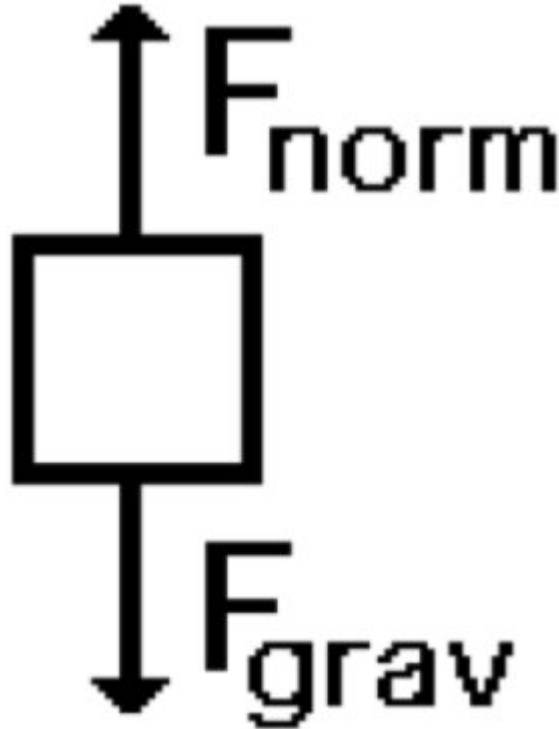
Diagram the forces acting on the book.

- Force of gravity
- Normal force

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Diagram the forces acting on the book.

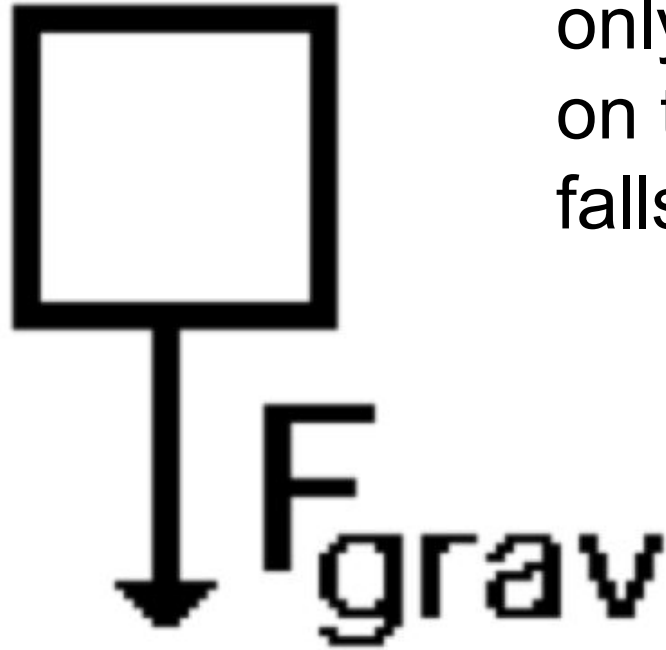


In this diagram:

- The force of gravity is pulling the object down
- The normal force is pushing against gravity.

## Example 2

An egg is falling from a nest in a tree. Ignore air resistance.



Gravity is the only force acting on the egg as it falls.