



Balanced and Unbalanced Forces

Force

- A push or pull on an object
- Able to change the motion of an object
- Gravity, friction, and air resistance are three common forces on Earth

Gravity



Friction

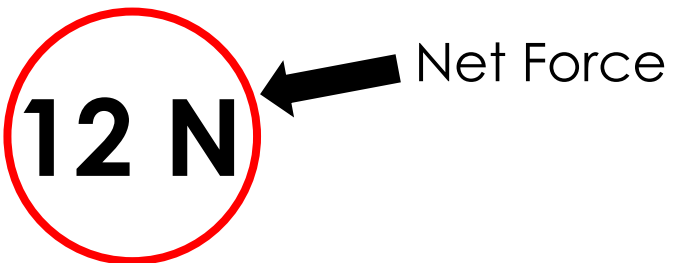


Air Resistance



Net Force

- The overall force exerted on an object; measured in Newtons (N)
- If the net force is 0, then a change in motion will not occur
- If the net force is greater than 0, then a change in motion will occur

$$5\text{ N} + 7\text{ N} = 12\text{ N}$$


Net Force

Net Force

How to calculate net force from a picture or diagram

- Subtract the forces if the arrows are pointed toward each other or pointed away from each other



- Add the forces together if the arrows are all pointed the same direction



Balanced Forces

- Equal forces that do not cause a change in an object's motion (Net Force = 0 Newtons)
- The net force on an object must be calculated in order to determine if it is balanced or unbalanced



BALANCED



$$50 \text{ N} - 50 \text{ N} = 0 \text{ N}$$

Balanced Forces Examples

Forces are **balanced** when the **net force** = 0 Newtons

- A cell phone resting on the counter
- Tying an arm wrestling match
- A picture hanging on the wall
- Any object with no motion
- Any object moving at a constant speed

Unbalanced Forces

- Unequal forces that cause a change in an object's motion
- Cause a change in speed and/or direction of an object – moves the direction of the greater force



UNBALANCED



$$100 \text{ N} - 50 \text{ N} = 50 \text{ N}$$

Unbalanced Forces Examples

Forces are **unbalanced** when the **net force** does not equal 0 Newtons

- A football player tackling a quarterback
- Pushing a lawnmower across the yard
- A skydiver falling toward the ground
- Any object that is speeding up, slowing down, or changing direction (accelerating)

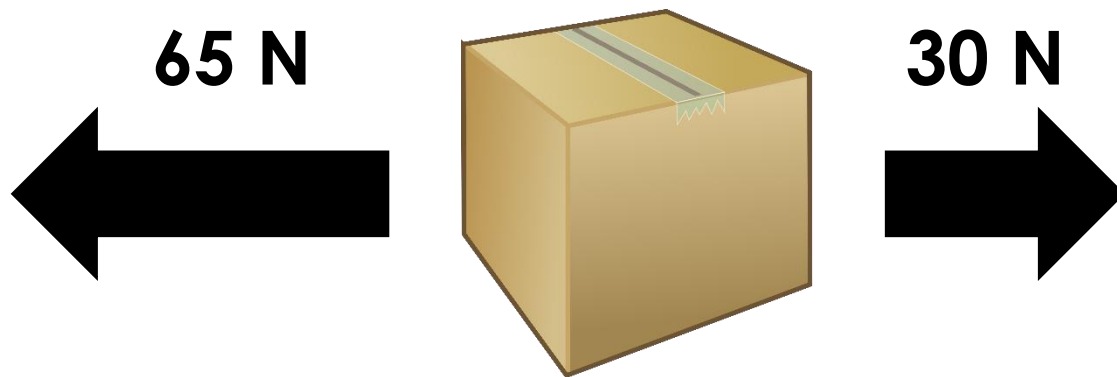
Checkpoint

- **5 checkpoint questions**
- **Discuss each question with a partner**
- **Write a complete answer to each question on your notes page**



Question 1

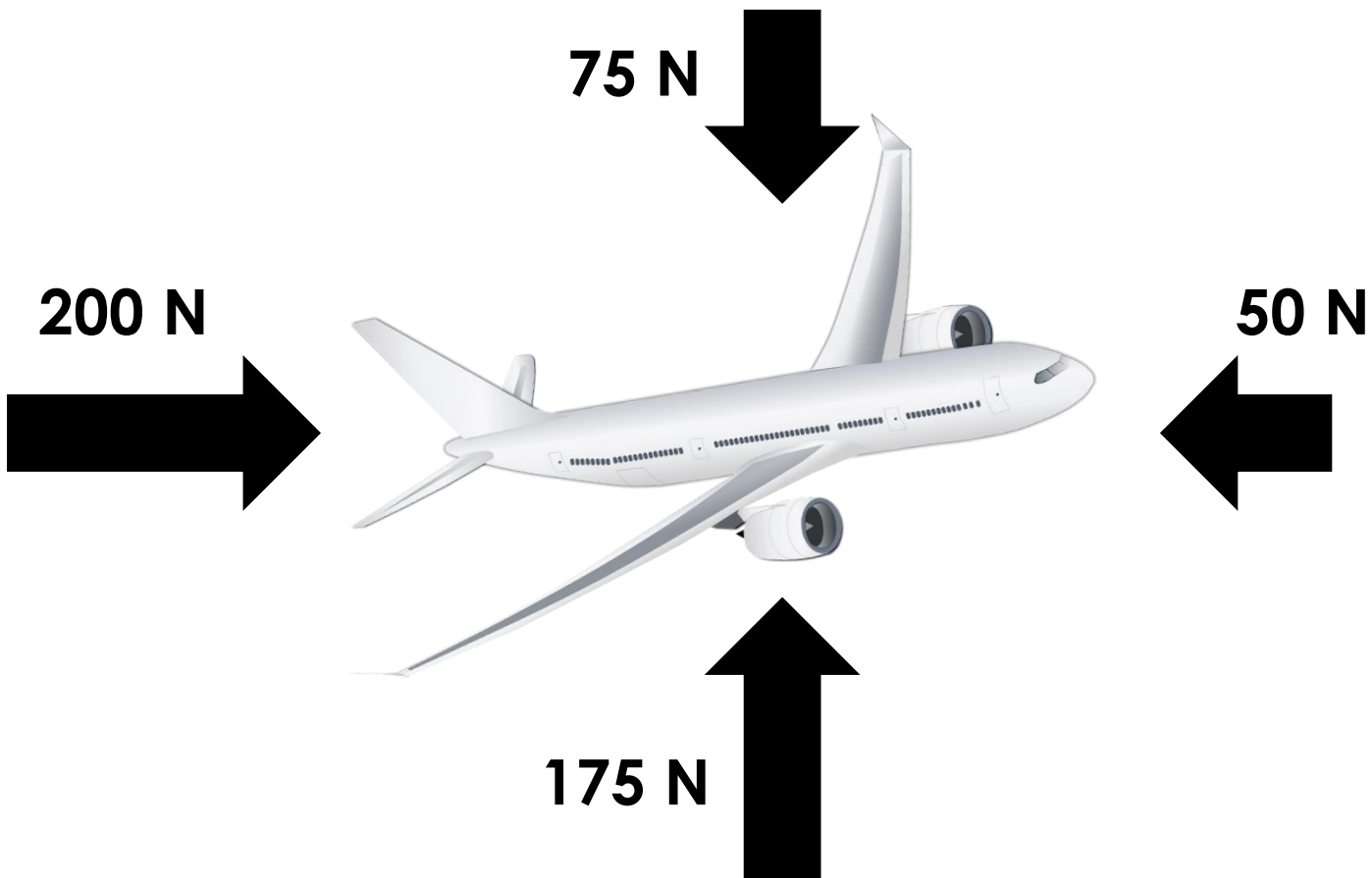
Calculate the net force exerted on the box.



Which direction will the box move?

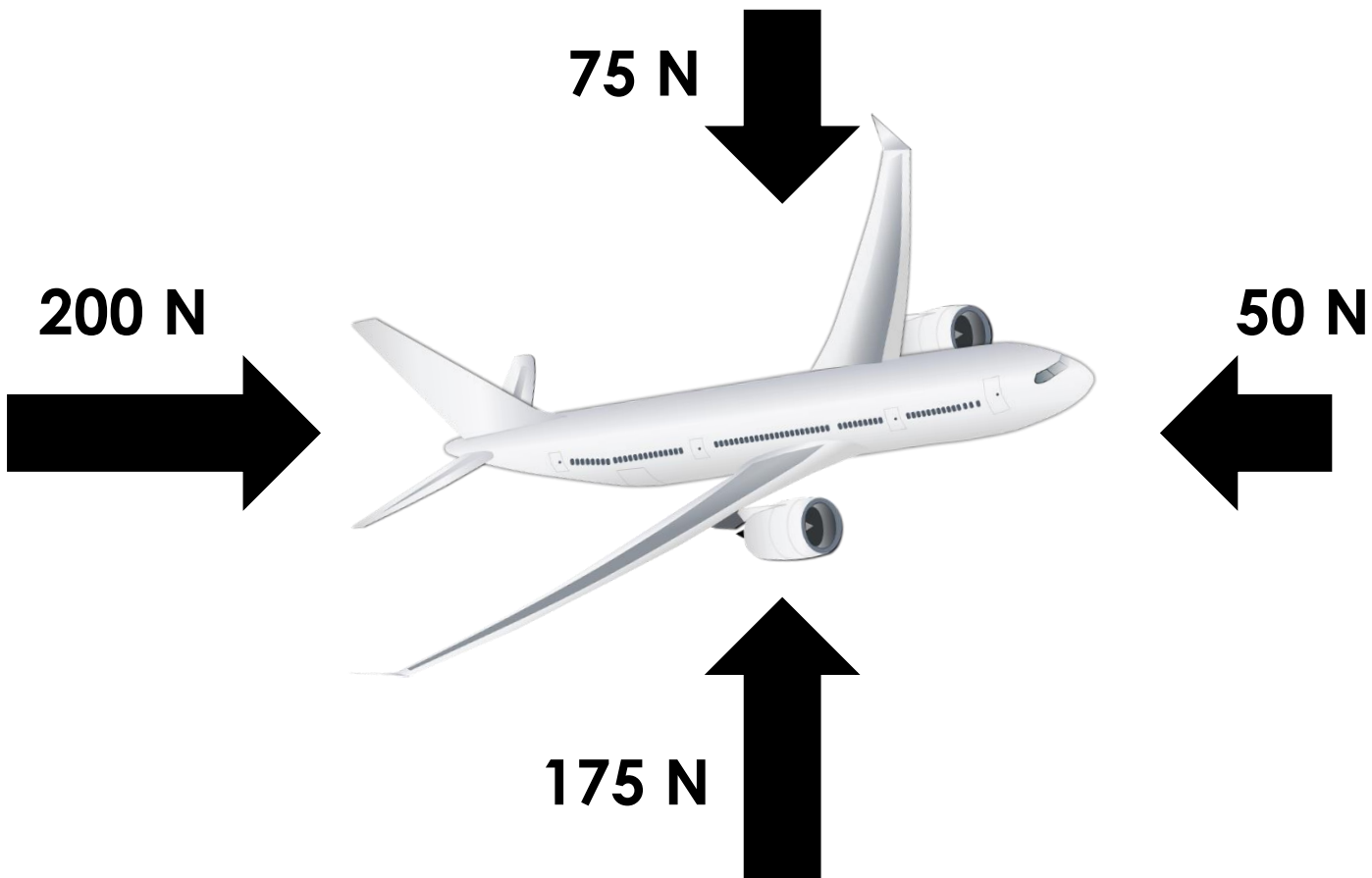
Question 2

Balanced or Unbalanced Forces?



Question 3

Which direction will the airplane move?



Question 4

Why would an object moving at a constant speed experience balanced forces?

Question 5

Identify one example of balanced and unbalanced forces in the room.