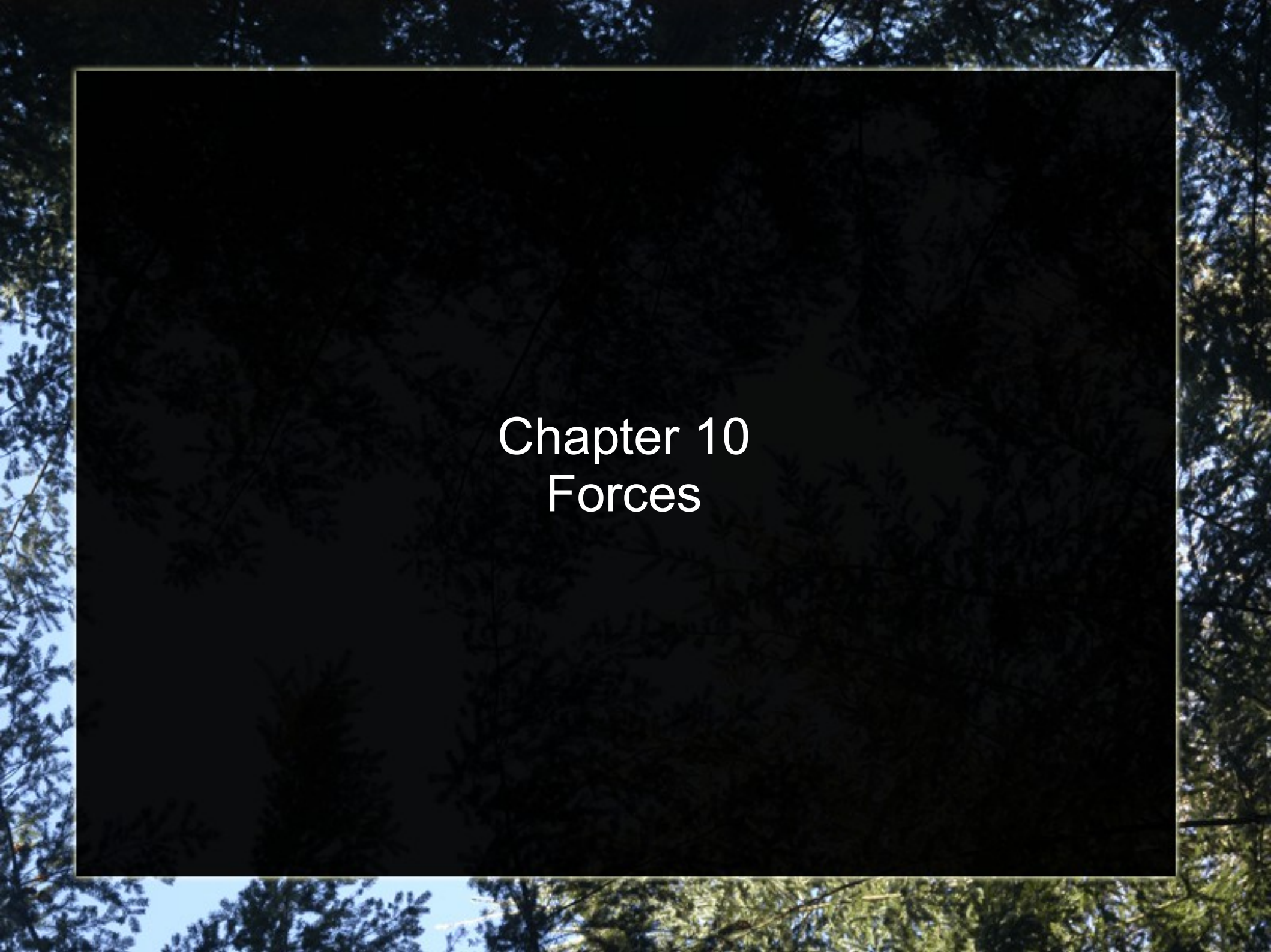

Chapter 10
Forces

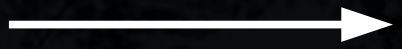
What is a force?

- A force is any outside influence that causes an object to undergo a change in its movement or direction.
  - Forces are described by the strength and direction in which they act.
    - The strength of a force is measured in a unit called a newton (N).
    - A push and a pull act in opposite directions.

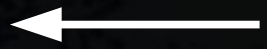
Notating Forces

- Forces are often represented visually by an arrow. The longer the arrow is, the stronger the force is.

5 N push



2 N pull



1 N pull

Combining Forces

- Multiple forces are often acting on an object at the same time. The combination of all simultaneous forces is called the net force.
  - When forces are acting in the same direction, net force is found by adding the strength of the individual forces.

When forces are acting in the opposite direction, they combine by subtraction, and the net force acts in the direction of the greater individual force.

If two equal, opposing forces combine, there is zero net force.

Calculation practice

- Eddie and Caroline are both pushing on a filing cabinet. Eddie is pushing with 10 N of force to the right, while Caroline is pushing with 8 N of force to the left. What is the net force?

10 N → & 8 N ← = 2 N →

Caroline and Natalie both push in opposite directions with the 8 N of force.

8 N → & 8 N ← = 0 N

Independent Practice

- 12 N → & 7 N → = 19 N →
- 9 N ← & 6 N ← = 15 N ←
- 12 N → & 8 N ← = 4 N →
- 7 N → & 7 N ← = 0 N

Are there different types of forces?

- Gravity – the force of attraction between two objects.
- Friction – the force that resists the movement of an object.
- Elastic - an object that has the ability to stretch and return to its original shape creates kinetic energy when it returns.
- Inertia – an object in motion tends to remain in motion and an object at rest tends to remain at rest.
- Magnetism – the attraction and repulsion of objects because of charged electrons
- Centripetal – the force that makes an object follow a curved path.