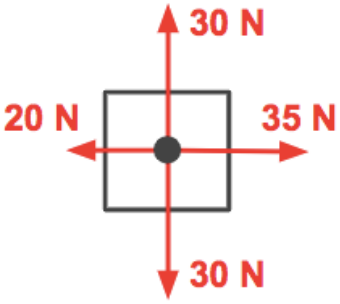
Newton's Second Law
Lesson Notes

Newton's Second Law:
The acceleration of an object is ...
- **Directly proportional** to the **net force** that acts upon it, and
- **Inversely proportional** to the **mass** of the object, and
- In the **same direction as** the **net force**.

What is Net Force?
The **net force** is sometimes referred to as *the vector sum of all the forces*.



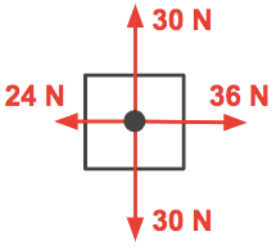
F_{net} = 15 N, Right

Acceleration and Net Force
Double F_{net} ⇒ Double a
Triple F_{net} ⇒ Triple a
Halve F_{net} ⇒ Halve a
By whatever *factor* $\mathbf{F_{net}}$ is changed, **a** is changed by the same factor.

Acceleration and Mass
Double m ⇒ Halve a
Triple m ⇒ One-third a
Halve m ⇒ Double a
By whatever *factor* **m** is changed, **a** is changed by the reciprocal factor.

Newton's Second Law Equation: $a = F_{net} / m$

Determine the F_{net} and the **a** of the 3-kg object whose force diagram is shown.



F_{net} = 12 N, right

a = 4 m/s², right

Direction of Acceleration
The acceleration caused by the net force has a direction that is the same as the net force direction.

Direction of Net Force, Acceleration, and Motion of Object

The direction an object moves is not determined by the forces.