Newton’s Second and Third Laws of Motion

When a boat is on the water, two Laws of Physics affect its motion. They were discovered by a 17th century physicist, Sir Isaac Newton.

**Newton’s Second Law of Motion**
Newton’s Second Law of Motion explains one set of factors that affect how fast your boat will move through the water.

Newton’s Second Law Formula states that Force = Mass x Acceleration

We want to know what our acceleration (speed) will be, so we solve for acceleration

Formula: Force/Mass = Acceleration
Your Boat: Force (paddler’s strength)/Mass (weight of boat) = Acceleration (speed)

The lighter your boat and the stronger your paddler, the faster your boat will go.

**Newton’s Third Law of Motion**
Newton’s Third Law of Motion explains that for every action, there is an equal and opposite reaction.

In your boat, your paddler will push his/her paddle into the water. The water pushes back against the blade and propels the boat forward. The force – the speed of your boat – depends on how hard your paddler is pushing against the water!