



Unit 3: Forces and Interactions

Subject Area: Science	Course: 8th Grade Science		
Unit Title: Forces and Interactions	Grade(s): 8th	Start: April 1st	End: June 15th
Unit Summary: In this unit...			

Stage 1: Desired Results

- **8.MS-PS2-1. Develop a model that demonstrates Newton's third law involving the motion of two colliding objects. State Assessment Boundary. State assessment will be limited to vertical or horizontal interactions in one dimension.**
- **8.MS-PS2-2. Provide evidence that the change in an object's speed depends on the sum of the forces on the object (the net force) and the mass of the object.**

Transfer (Authentic, relevant application of learning to new situations)

Students will be able to independently use their learning to...

Identifying force pairs in various situations, such as pushing against a wall or walking.

In vehicle design, understanding collision forces helps in developing safety features (like airbags and crumple zones) that mitigate the effects of crashes.



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: Engineers must consider action-reaction pairs when designing buildings and bridges to ensure they can withstand external forces, such as wind and earthquakes.

Rockets operate on this principle. As fuel is expelled downward (action), the rocket is propelled upward (reaction). This is fundamental to space exploration and satellite deployment.

In sports, athletes apply force to the ground (action), resulting in an equal and opposite force that propels them upward or forward (reaction). Techniques in sports can be optimized by understanding these forces.

Meaning

Enduring Understandings

Students will understand that...

We can use models to predict and show the outcome of collisions

There is a relationship between Force, Mass and Acceleration

Mass and weight are fundamentally different measurements that affect motion.

Gravity is a force acting on all matter therefore affects all motion.

Essential Questions

Students will consider...

- Explain the Law of Conservation of Momentum
- How do balanced and unbalanced forces affect motion?
- Explain how a Free Body Diagram (or Force Diagram) shows the forces acting on an object.(draw it).
- How does friction affect motion?
- Explain gravity and the factors that affect it.
- Explain the difference between mass and weight.



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Acquisition	
Knowledge	Skills
Students will know... The difference between mass and weight How to differentiate between different forces How various forces combine to affect motion Gravity's and friction's role in motion How to draw, interpret, and evaluate Free Body Diagrams	Students will be skilled at... Creating Models that demonstrate Newton's Laws Use online simulations that allow manipulation of mass and force (like PhET simulations). Students can observe how changes in force and mass affect an object's acceleration and speed. Recording and analyzing data to illustrate how different net forces produce varying accelerations.