Balance and Motion
Unit Design

Content Area	**Science**
Standard	**5.2 Physical Science:** All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.
Strand	**E. Forces and Motion:** It takes energy to change the motion of objects. The energy change is understood in terms of forces.

By the end of grade	Content Statement	CPI#	Cumulative Progress Indicator (CPI)
P	Observations and investigations form a basis for young learners' understanding of motion.	5.2.P.E.1	Investigate how and why things move (e.g., slide blocks, balance structures, push structures over, use ramps to explore how far and how fast different objects move or roll).
2	Objects can move in many different ways (fast and slow, in a straight line, in a circular path, zigzag, and back and forth).	5.2.2.E.1	Investigate and model the various ways that inanimate objects can move.
2	A force is a push or a pull. Pushing or pulling can move an object. The speed an object moves is related to how strongly it is pushed or pulled. When an object does not move in response to a push or a pull, it is because another push or pull (friction) is being applied by the environment.	5.2.2.E.2	Predict an object's relative speed, path, or how far it will travel using various forces and surfaces.
2	Some forces act by touching, while other forces can act without touching.	5.2.2.E.3	Distinguish a force that acts by direct contact with an object (e.g., by pushing or pulling) from a force that can act without direct contact (e.g., the attraction between a magnet and a steel paper clip).

Words in **bold** are important for science vocabulary development, and should be used for word walls.

	Investigation	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
1.1	Trick Crayfish	• How many ways can a shape balance?	Objects can be **balanced** in many ways **Counterweights** can help balance an object The way an object can be **balanced** can be changed by counterweighting
1.2	Triangle and Arch	• How can counterweights help us balance other shapes?	A **stable** position is one that is steady; the object is not falling over The place on which an object balances is called the **balance point** **Counterweights** should be placed low or below an object in relation to the **balance point**
1.3	The Pencil Trick	• How can a pencil be balanced on its point?	**Counterweights** should be placed low or below an object in relation to the **balance point** The position of an object can be described by relating its location to another object
1.4	Mobiles	• How do the parts of a mobile stay in stable positions?	A mobile is a system of balanced beams and objects
2.1	Tops	• How can spinning tops be changed?	Objects and systems that turn on a central axis exhibit **rotational motion** You need a **force** to start a top spinning The amount and position of **mass** affect how the object **rotates**
2.2	Zoomers	• How can a spinning object be kept in motion?	There are different ways to initiate **rotational motion** The **motion** of an object can be changed by **pushing** or **pulling** Tops and zoomers both spin, but in different ways
2.3	Twirlers	• How did the different shapes make the twirler move?	Variations in design can influence the **rotational motion** of spinning objects **Air resistance** can act as the force that initiates **rotational motion**
3.1	Rolling Wheels	• How can a wheel and axle system be changed?	**Wheels** roll down a slope A slope is a surface that is higher on one end than another **Axles** support **wheels** **Wheel-and-axle systems** with **wheels** of different sizes roll toward the smaller **wheel**
3.2	Rolling Cups	• Can we predict the behavior of the rolling cup? • What happens if weight is added to a rolling cup system?	Cups roll in the direction of the smaller end To roll straight, two cups can be taped together so the ends are the same size The amount and location of an added weight can change the way a system rolls
3.3	Rolling Spheres	• How can we make a runway that will keep a marble rolling?	Spheres are round in all directions and roll in all directions A runway must be high at the start and low at the finish for a sphere to roll the complete length of the runway. Spheres roll down a slope