

### Primary Unit Objective:

Introduce students to one of the primary tasks of engineering: making things move.

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### Recommended Grade Level:

PreK - 1st

### Mobile STEM Lab Required:

ROK Blocks (1 per group of 4 students)

### # of Lessons Included:

4

### Developing STEM Identity:

In this unit, students explore the physics of movement. They learn about force, gravity, pushes, and pulls. Students learn that when they make things move, they are acting as engineers.

### Alignment to STEM Standards:

Unit 4 focuses on a specific engineering problem - making things move - and explores different ways to create movement in a design. The unit also expands student's skills using ROK Blocks by introducing the use of additional engineering materials. The table below outlines the Student Learning Objectives (SLO) for Unit 4 and their alignment to the Next Generation Science Standards (NGSS) and the Common Core State Standards in Math.

Unit Learning Objectives	NGSS DCI	NGSS SEP	NGSS CCC	CCSS-MA
SLO 1: Manipulate ROK Blocks to build objects that move.	Developing possible solutions	Developing & using models	Structure & function	Combine different shapes to make an object or design
SLO 2: Explore a specific problem engineers often face (making things move).	Defining/engineering problems	Asking questions & defining problems	Structure & function	
SLO 3: Understand that pushes/pulls on objects can have different strengths and that bigger pushes/pulls can cause bigger changes in the object.	Pushes/pulls on objects have different strengths	Designing solutions	- Scale, proportion, & functionality - Cause & effect	
SLO 4: Match 3-dimensional objects to 2-dimensional pictures.				Recognize 3D objects in 2D pictures
SLO 5: Compare and contrast vehicle types and how different vehicles do work by moving.		Planning & carrying out investigations	Scale, proportion, & quantity	

## Unit 4 Lesson Overview:

### Lesson 1: Pushes & Pulls (30 - 40 min.)

In this lesson, students will build a tractor and explore how different forces, like pushes and pulls, can be used to move objects.

### Lesson 2: Exploring Gravity (30 min.)

In this lesson, students will build a helicopter and explore the concept of gravity.

### Lesson 3: Make Your Castle Strong (30 - 40 min.)

In this lesson, students will build a castle wall that includes a door. Students will explore how to use different engineering materials to make the castle door open and close.

### Lesson 4: Free Build (30 - 40 min.)

In this lesson, students are free to create something of their own design. Students can use the skills they have learned throughout previous lessons to build and improve a custom design.

## Classroom Organizational Tips

All the lessons in Unit 4 can be taught to the whole class (with or without older student facilitators) or in teacher-facilitated small groups. The lessons are designed to be implemented with small groups of students seated around a shared table. At times it is helpful to have students work in pairs, sharing their observations with their partner. When students use a ROK Blocks Lab, there should be no more than 4 students using each lab.

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## Target Vocabulary

Curve	Transport
Direction	Vehicle
Drag	Wheel
Estimate	Work
Force	
Gravity	
Helicopter	
Movement	
Pivot	
Push	
Pull	
Rotate	

## Recommended Children's Literature

"Motion: Push and Pull, Fast and Slow" by Darlene Stille and Sheree Boyd

"Pushes and Pulls" by Helen Gregory

"Push and Pull" by Charlotte Guillain



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