

# Draft Dodgers

Primary Curriculum	Kindergarten
Supplemental Curriculum	Grades K–2
Notes	Standard unit/refill kit comes with enough materials for 30 students.

## Description

**Why is it harder to walk on a windy day?**

Fast cars, demolition derbies, and the power of the wind are the tools used to introduce your classroom of budding innovators to force, motion, and aerodynamics. Join Daniele as he talks about how his love for fast cars brought him to the United States from Torino, Italy, to study aerodynamics and rocket ships.

Using the overarching question of why it can be hard to walk on a windy day, students explore force, motion, and engineering as they ask themselves: *“How does the air and wind affect the way we move?”*

## Main Investigations

### Knock It Down! & Demolition Derby – Exploring Forces



### Windy Walk in the Park



## Number of Lessons\*      Best Suited For

**Full unit** – 17–20 lessons  
**Supplemental program** – minimum 8–10 lessons

*\*Lesson = 30–40 min. block, 50% of full unit lessons can be delivered in non-science classes*

- Classroom science instruction (Kindergarten)
- Summer camps (1 week) (Grades K–2)
- Afterschool programs (Grades K–2)

## Overarching Enduring Understanding

**What causes things to move and how can that movement help explain things that we cannot see?**

**How can understanding the power of the air help us to improve our lives?**

### Number of Lessons\*

Full unit – 17-20 lessons

Supplemental program – minimum 8-10 lessons

\*Lesson = 30 – 40 min block, 50% of full unit lessons can be delivered in non-science classes

### FLOW OF INSTRUCTION

#### **Investigation: What Moves You? Knock It Down! (hands-on activity, occurs during week 1)**

Students plan and conduct an investigation as they try to figure out how to knock down a tower of cups under the constraint of not using their hands. They will compare and discuss the effectiveness of different strategies. Some examples of strategies (or constraints) include (a) use a part of your body that isn't your hands to push over the tower, (b) use an object to help you push down the tower, (c) use an object to help you pull down the tower, (d) try to knock down the tower without touching it (e.g., they can use a fan, or loud stomps, etc.). *Note: It is likely that they won't have any ideas for criteria (d) during this initial investigation. However, when they come back to the activity for Knock It Down! The Remix they should have some ideas for this part.*

#### **Investigation: Wind in My Sail (hands-on activity, occurs during week 2)**

In this investigation students visualize the force of the air/wind by analyzing and discussing what happens when a piece of cloth is held in front of a fan. Students investigate what happens when they change the shape and the orientation of the cloth.

#### **Investigation: Knock It Down! The Remix (hands-on activity, occurs during week 3 or 4)**

In this activity students revisit their initial challenge and apply what they have learned over the past few weeks to think of other ways to knock down the tower.

Students plan and conduct an investigation as they try to figure out how to knock down a tower of cups under different constraints. They will compare and discuss the effectiveness of different strategies. Some examples of constraints include (a) use a part of your body that isn't your hands to push over the tower, (b) use an object to help you push down the tower, (c) use an object to help you pull down the tower, (d) try to knock down the tower without touching it (e.g., they can use a fan, loud stomps, etc.).

#### **Investigation: Demolition Derby (hands-on activity, occurs during weeks 3, 4, and 5)**

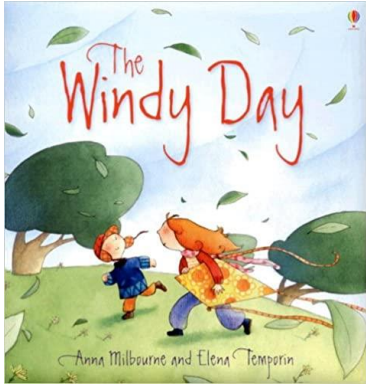
In this investigation students will design cars to go down a ramp and either (a) knock down a block tower or (b) not knock down a block tower. Each week they will test out different variations on their designs and analyze the outcomes to determine if their design produced the intended change, the strengths of the design, and the weaknesses of the design.

For each investigation they will share (e.g., draw, write, dictate, etc.), with support from teachers and/or technology, the different conditions they are testing/tested and their observations of the outcomes of test.

#### **Investigation: A Windy Walk in the Park (summative challenge, occurs during week 5)**

Students must draw a picture, make up a song, or tell a story about a windy day in the park. In it they must include examples of pushes, pulls, and evidence that the wind has strength. *Note: Picture supports are included in the Appendix for students who may struggle with this.*

## Parts Lists

Full Unit	
<p><b>Printed Materials</b></p> <ul style="list-style-type: none"> <li>• Educator Guide</li> <li>• Individual <i>My STEM Stories™</i> notebooks</li> <li>• Individual <i>My STEM Explorer Notes™</i> mini notebooks</li> <li>• Timeline sheets</li> <li>• Introductory investigation sheets</li> </ul>	<p><b>Trade Books</b></p>
<p><b>Provided Equipment &amp; Materials</b></p> <ul style="list-style-type: none"> <li>• Pieces of light cloth (10)</li> <li>• Pinwheel</li> <li>• Sailboat</li> <li>• Plastic cups (50)</li> <li>• Hand fan</li> <li>• Car frames (base, wheels, axles, tubing)</li> <li>• Car modifiers (dowels, paper, cloth)</li> <li>• Air tools (hand fan, straws, squeeze bottles)</li> </ul>	 <p><i>The Windy Day</i> by Anna Milbourne</p>
<p><b>Common Equipment &amp; Materials Needed but NOT Provided</b></p> <ul style="list-style-type: none"> <li>• Box or table fan</li> <li>• Chart paper</li> <li>• Ramp (could be a simple piece of board)</li> <li>• Wagon/cart</li> <li>• String</li> <li>• Scissors and tape</li> </ul>	<p><b>Digital Resources</b></p> <ul style="list-style-type: none"> <li>• Electronic copies of printed materials<sup>1</sup></li> <li>• How-To videos for investigations<sup>1</sup></li> <li>• Easy-to-use links to publicly available videos and other information.</li> </ul>

## Supplemental Unit

### Printed Materials

- Educator Guide
- Individual *My STEM Stories™* notebooks
- Individual *My STEM Explorer Notes™* mini notebooks
- Timeline sheets
- Introductory investigation sheets

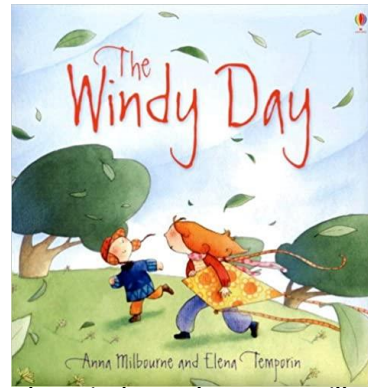
### Provided Equipment & Materials

- Pieces of light cloth (10)
- Pinwheel
- Sailboat
- Plastic cups (50)
- Hand fan
- Car frames (base, wheels, axles, tubing)
- Car modifiers (dowels, paper, cloth)
- Air tools (hand fan, straws, squeeze bottles)

### Common Equipment & Materials Needed but NOT Provided

- Box or table fan
- Chart paper
- Ramp (could be a simple piece of board)
- Wagon/cart
- String
- Scissors and tape

### Trade Books



*The Windy Day* by Anna Milbourne

### Digital Resources

- Electronic copies of printed materials<sup>1</sup>
- How-To videos for investigations<sup>1</sup>
- Easy-to-use links to publicly available videos and other information.

## Refill Kit

### Printed Materials

- Educator Guide
- Individual *My STEM Stories™* notebooks
- Individual *My STEM Explorer Notes™* mini notebooks
- Timeline sheets
- Introductory investigation sheets

### Provided Equipment & Materials

- Car frames (base, wheels, axles, tubing)
- Car modifiers (dowels, paper, cloth)

### Digital Resources

- Electronic copies of printed materials<sup>1</sup>
- How-To videos for investigations<sup>1</sup>
- Easy-to-use links to publicly available videos and other information.

**Overarching Enduring Understanding**

**What causes things to move and how can that movement help explain things that we cannot see?  
How can understanding the power of the air help us to improve our lives?**

**Number of Lessons\***

Full unit – 17-20 lessons

Supplemental program – minimum 8-10 lessons

\*Lesson = 30 – 40 min block, 50% of full unit lessons can be delivered in non-science classes

**FLOW OF INSTRUCTION**

<p><b><u>K-PS2-1</u></b></p> <p>Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.</p>	<p><b><u>K-PS2-2</u></b></p> <p>Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.</p> <p><b><u>K-2-ETS1-1</u></b></p> <p>Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.</p> <p><b><u>K-2-ETS1-2</u></b></p> <p>Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.</p> <p><b><u>K-2-ETS1-3</u></b></p> <p>Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.</p>
<p><b>Investigation: What Moves You? Knock It Down! (hands-on activity, occurs during week 1)</b></p> <p>Students <b>plan and conduct an investigation</b> as they try to figure out how to knock down a tower of cups under the constraint of not using their hands. They will <b>compare and discuss the effectiveness of different strategies</b>. Some examples of strategies (or constraints) include (a) use a part of your body that isn't your hands to <b>push</b> over the tower, (b) use an object to help you <b>push</b> down the tower, (c) use an object to help you <b>pull</b> down the tower, (d) try to knock down the tower without touching it (e.g., they can use a fan, or loud stomps, etc.). <i>Note: It is likely that they won't have any ideas for criteria (d) during this initial investigation. However, when they come back to the activity for Knock It Down! The Remix they should have some ideas for this part.</i></p> <p><b>Investigation: Wind in My Sail (hands-on activity, occurs during week 2)</b></p> <p>In this investigation students visualize the force of the air/wind by analyzing and discussing what happens when a piece of cloth is held in front of a fan. Students investigate what happens when they change the shape and the orientation of the cloth.</p> <p><b>Investigation: Knock It Down! The Remix (hands-on activity, occurs during week 3 or 4)</b></p> <p>In this activity students revisit their initial challenge and apply what they have learned over the past few weeks to think of other ways to knock down the tower.</p> <p>Students <b>plan and conduct an investigation</b> as they try to figure out how to knock down a tower of cups under different constraints. They will <b>compare and discuss the effectiveness of different strategies</b>. Some examples of constraints include (a) use a part of your body that isn't your hands to <b>push</b> over the tower, (b) use an object to help you <b>push</b> down the tower, (c) use an object to help you <b>pull</b> down the tower, (d) try to knock down the tower without touching it (e.g., they can use a fan, loud stomps, etc.).</p>	<p><b>Investigation: Demolition Derby (hands-on activity, occurs during weeks 3, 4, and 5)</b></p> <p>In this investigation students will design cars to go down a ramp and either (a) knock down a block tower or (b) not knock down a block tower. Each week they <b>will test out different variations</b> on their designs and analyze the outcomes to determine if their design produced the <b>intended change</b>, the <b>strengths of the design</b>, and the <b>weaknesses of the design</b>.</p> <p>For each investigation they will <b>share</b> (e.g., <b>draw, write, dictate, etc.</b>), with support from teachers and/or technology, the different conditions they are testing/tested and their observations of the outcomes of test.</p> <p><b>Investigation: A Windy Walk in the Park (summative challenge, occurs during week 5)</b></p> <p>Students must draw a picture, make up a song, or tell a story about a windy day in the park. In it they must include examples of pushes, pulls, and evidence that the wind has strength. <i>Note: Picture supports are included in the Appendix for students who may struggle with this.</i></p>