

Invent a Windmill



1ST GRADE

TEACHER LESSON PLAN

Overview

In this lesson, students will enhance their literacy and STEM skills as they participate in a read-aloud of *The Boy Who Harnessed the Wind* by William Kamkwamba and Bryan Mealer, learn how wind creates movement and energy, and apply their knowledge to design their own windmill using the Kid Spark Early Inventors STEM Lab.

Learning Objectives

- I can build a model of a windmill.
- I can tell about my windmill and its parts.

Curriculum Connections

- Literacy:** Students explore the /kw/ sound made by qu, identify the letter Qq, and build early reading skills through vocabulary and story-based activities.
- Language Development:** Students learn and use new words, describe ideas, and participate in conversations related to wind, invention, and curiosity.
- Engineering:** Students plan and build a windmill using the Kid Spark Early Inventors STEM Lab, applying problem-solving and creativity.
- Collaboration:** Students work together, share ideas, and reflect on their building experience through guided discussion.

Next Generation Science Standards (NGSS)

K-2-ETS1-2: 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.

International Society for Technology in Education (ISTE) Standards

1.4 Innovative Designer

Common Core State Standards (CCSS)

RF.1.2: Demonstrate understanding of spoken words, syllables, and sounds (phonemes).

L.1.4: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 1 reading and content.

SL.1.1: Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.

Activity Details

- Activity Time:** 35 - 40 Minutes
- Target Grade Level:** 1st Grade
- Grouping and Setup:** The read-aloud and discussion can be done as a whole group. Students can build independently or with a partner, based on your class structure.

Materials

- Kid Spark Early Inventors STEM Lab
- The Boy Who Harnessed the Wind* by William Kamkwamba and Bryan Mealer
- "Invent a Windmill" Activity Guide  Print one per student or pair, or display it
- "Invent a Windmill" Slide Companion (optional)



Invent a Windmill

Lesson Vocabulary

The following key terms will be used throughout this lesson.

Question: A question is when you ask something to learn more.

Windmill: A windmill is a machine that uses wind to spin its blade and do work.

Rotor: The rotor on a windmill is the middle part that connects the blades and helps them spin.

Blades: The blades on a windmill are the big arms that catch the wind and spin around.

Tower: The tower of a windmill is the tall poles that hold up the windmill so it can reach the wind.

Base: The base of the windmill is the bottom part that keeps the windmill strong and steady.

Generator: The generator on a windmill is the machine inside that turns spinning power into electricity.

Pre-Lesson Preparation

- Review the “Invent a Windmill” Teacher Lesson Plan to become familiar with the lesson flow and key prompts.
- Prepare the windmill design from Step 03 of the activity guide to use as a model.
- Consider laminating the activity guides for durability and repeated use in future lessons.



Plan for All Learners: Every student deserves access to STEM learning. Before teaching, consider how you might adapt this lesson to meet the needs of students using assistive technology, accessible materials, or other support services. Collaborate with special education staff as needed to align with IEPs or 504 Plans.

Anticipatory Set (5 MINUTES)

- Engage students:** “Let’s play a quick game called What If! I’ll ask some questions, and you can imagine what might happen:

- What if your shoes kept coming untied—how could you fix it?
- What if you had to cross a puddle but didn’t want to get your shoes wet?
- What if a dog needed a way to stay dry in the rain during a walk?”

Allow students to share their ideas freely. Encourage imaginative or funny answers first, then guide the conversation: “When we wonder about things like that, it means we’re being curious. Curious means you really want to learn more or figure something out. Asking questions helps us learn new things and think of solutions—just like scientists and inventors do!”

Say: “The story we’ll read today is about a boy named William who asked questions about how things work. His curiosity helped him find a way to help his whole village!”

- Introduce the essential question:** “What are the parts of a windmill, and how can I build a model of my own?”
- State the learning objectives:** “Today, we’re going to read *The Boy Who Harnessed the Wind*. Then, we’ll learn about the parts of a windmill and invent our own! By the end of our lesson, you will be able to say:
 - ‘I can build a model of a windmill.’
 - ‘I can tell about my windmill and its parts.’”

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Instruction (25-30 MINUTES)

Step 01: Read

- Using the “Invent a Windmill” Activity Guide, introduce the letter **Qq**. Explain that machine begins with the letter **Qq**. Invite students to trace the capital and lowercase **Qq** with their fingers on the guide—or try fun options like:
 - Tracing **Qq** in the air
 - Drawing **Qq** on a partner’s back
 - “Writing” **Qq** with their nose
- Introduce the word **question** using simple language: “A question is when you ask something to learn more. Questions help us find out new things!”
- Emphasize the **/kw/** sound at the beginning of question.

Say: “The word question begins with the blend qu, which makes the **/kw/** sound.”

Show *coin*, *quiz*, and *cup* from the activity guide. Say each word aloud and have students repeat after you.

Ask: “Which of these words begin with the **/kw/** sound made by the letters qu?”

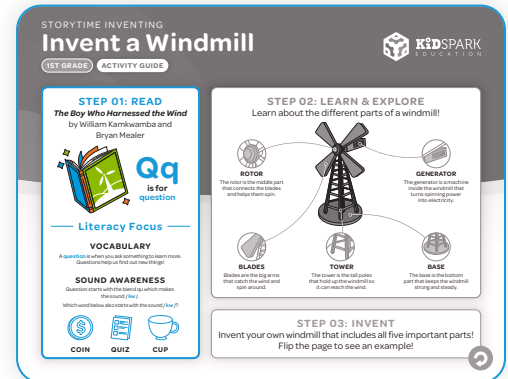
- Show the cover of ***The Boy Who Harnessed the Wind***. Ask:

- “What do you see on the cover?”
- “What do you think this story will be about?”

Teacher Tip: Consider introducing storytime by prompting students to prepare for active listening. Review expectations such as:

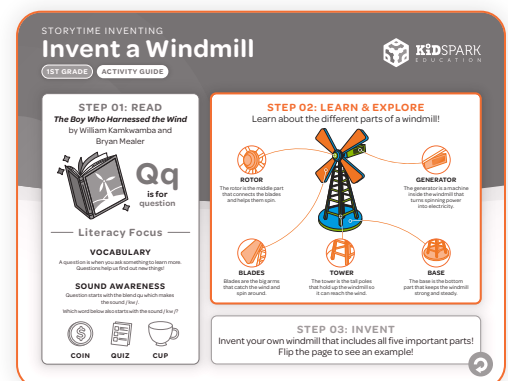
- Eyes watching
- Voices off
- Body still
- Minds focused on the story

- Read ***The Boy Who Harnessed the Wind*** aloud. Before you begin, provide a listening focus: “As we read, listen for the questions William asks. What is he trying to learn? What does he build, and how does it help his family?”



Step 02: Learn & Explore

- Using the “Invent a Windmill” Activity Guide, explore the five main parts of a windmill: Rotor, blades, tower, base, and generator.
- Say: “William wanted to help his village, so he built a windmill to solve a problem. Today, we’re going to build our own windmills and learn about the important parts that help them work.”
- Ask guiding questions to spark conversation:
 - “Why does a windmill need to be tall?”
 - “Why is it important for the windmill to be sturdy?”
 - “What can windmills help people do?”
 - “Where have you seen something spin like this before?”



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Step 03: Invent

- Students will build a windmill using the Kid Spark Early Inventors STEM Lab. This can be done individually or with a partner, based on teacher discretion or class setup. If students need help getting started, display the **Example Windmill** build plans from the Slide Companion or have them check the example in the activity guide.

Say: "Now it's your turn to invent a windmill! Try to include all the important parts—like the rotor, blades, tower, base, and generator!"

Teacher Tip: Awareness of self and others is an important part of working with a partner. If students choose to work in pairs, consider introducing simple community agreements before building, such as:

- Inventors share.
- Inventors listen.
- Inventors build together.

You can also support conversations with sentence stems like:

- Sharing an Idea: "I have an idea."
- Asking a Partner: "What do you think?"
- Taking Turns: "Your turn, then my turn."
- If You Don't Agree: "Let's try something else!"

- Before building, ask students questions to help them plan. Partners can talk together; ask individual students directly.

- "What parts will you build first?"
- "Which block could be the rotor?"
- "How can you make the blades spin?"
- "How can you build a strong base so your windmill stands up?"

Let students know: "After we build, we'll share our windmills with the group—so be ready to tell us about your design!"

- Whether students are working with a partner or on their own, support their thinking by encouraging conversation, observation, and expression.

Provide flexible ways for students to express their thinking:

- Talk with their partner or teacher about what they are building
- Point to or describe materials
- Use hand motions or build something to show their idea

- Support students based on what you observe:

If a student builds something that doesn't look like a windmill: "That's a cool idea! What could you add to make it more like a windmill?"

Prompt: "What will you do next when I walk away?"

If a student is copying the example exactly: "That's a great start! What could you add or change to make it your own?"

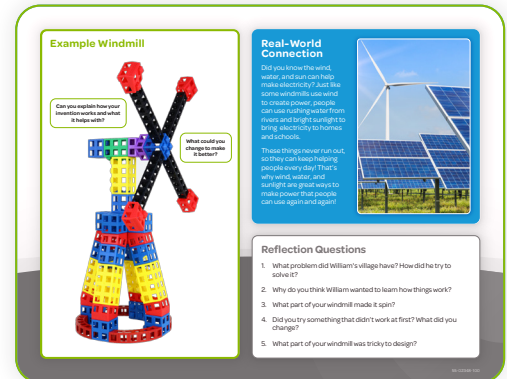
Prompt: "How can you make this windmill even better?"

If a student doesn't know how to start: Pick up a few blocks and begin building something simple.

Say: "Watch what I make—you can try it too, then add something to it."

Prompt: "What will you add next?"

- While students are building, read the **Read-World Connection** aloud on the activity guide.



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Closure & Reflection Questions (5 MINUTES)

1. Let students know they will share their windmills and talk about what they learned. Say: "Now we're going to share what we built and what we learned today!"
2. Have students talk about their design before sharing with the whole class. If they worked with a partner, they can discuss their build together. If they worked alone, ask them to explain their design to you. Use the prompts below to guide the conversation.

Prompts to support sharing:

- "What did you make first?"
 - "What blocks did you use to build your windmill?"
 - "What was your idea, and how did you make it happen?"
3. Invite students to share their windmills with the whole class. Consider using a simple show-and-tell format, in which students hold up their windmills and describe them, or point to parts while you help narrate their ideas.

If a student is quiet or unsure, help them share by describing their windmill based on what you've seen or talked about together.
 4. Use the following discussion questions, grouped by focus, to guide the whole-group reflection. Choose 2–3 based on your time and students' engagement.

Reading Comprehension

- "What problem did William's village have? How did he try to solve it?"
- "Why do you think William wanted to learn how things work?"

Design Experience

- "What part of your windmill made it spin?"
- "Did you try something that didn't work at first? What did you change?"
- "What part of your windmill was tricky to design?"

