Crankie Contraptions

A hand-cranked scrolling story, like a tiny theater.

GRADES 1 THROUGH 8 | AGES 6 TO 14 | ABOUT 60 MIN

These are the standards listed in the Crankie Contraptions educator guide. Under each one is where you will see it in the activity.

Next Generation Science Standards (NGSS)

CODE	WHAT IT COVERS
K-2-ETS1-2	Engineering Design: 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
WHERE YOU'LL SEE IT (GRADES K-2): Learners **sketch their story plan on the Story Sketch Handout before folding the frame**, then use their sketch to guide how many scenes will fit across the crankie's viewing window - iterating on their drawing when a panel is too wide or too tall to display cleanly inside the frame.	
K-PS2-1	Motion and Stability: Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls
WHERE YOU'LL SEE IT (GRADES K-2): Learners **investigate what happens when they turn the straws in different directions** - rolling toward the center scrolls the story forward, turning away unwinds the paper or pulls the scroll off the straw. They compare the two directions and describe the rule: always turn toward the center.	
3-5-ETS1-2	Engineering Design: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem
WHERE YOU'LL SEE IT (GRADES 3-5): Learners **compare a horizontal crankie build to a vertical build** for a story about a plant growing or a rocket launching, evaluating which orientation better matches the story's direction of motion and which is easier to hand-crank smoothly during a performance.	
3-5-ETS1-3	Engineering Design: Plan and carry out fair tests to identify aspects of a model or prototype that can be improved
WHERE YOU'LL SEE IT (GRADES 3-5): Learners **test their crankie before adding final illustrations**, rolling through the full scroll to identify failure points: a loose sticker attachment, a torn corner, a scroll that binds inside the frame, or a scene that sits too high to be visible. They fix each issue and re-test - the engineering design cycle in miniature.	
MS-ETS1-2	Engineering Design: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem
WHERE YOU'LL SEE IT (GRADES 6-8): Learners **evaluate competing scroll designs** - a standard single-length scroll, a printable extended scroll glued into multiple sections, or a vertical crankie - scoring each against criteria like story length, ease of turning, and audience visibility during a performance. They justify the choice with evidence from their test runs.	
MS-ETS1-4	Engineering Design: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process
WHERE YOU'LL SEE IT (GRADES 6-8): Learners **use their finished crankie as a model to generate iteration data**: timing how long each scene stays on screen, counting scroll wraps per turn, and noting which panels confuse the audience - then redesigning the scene spacing, sticker placement, or scroll length for a second iteration that tells the story more clearly.	

Common Core State Standards (Math and ELA)

CODE	WHAT IT COVERS
RL.K-2.2	Retell stories, including key details, and demonstrate understanding of their central message
WHERE YOU'LL SEE IT (GRADES K-2): Learners **retell the story they illustrated on their crankie scroll** by turning the straws and narrating aloud what happens in the beginning, middle, and end - pointing to each scene they drew and naming the main character and what changes by the resolution.	
W.K-2.3	Write narratives in which they recount a well-elaborated event or short sequence of events
WHERE YOU'LL SEE IT (GRADES K-2): Learners **plan a short narrative or sequence on the Story Sketch Handout** - naming who the main character is, where the story takes place, and what happens first, next, and last - then transfer that planned sequence onto their crankie scroll with pencil before coloring.	
RL.3-5.5	Explain how chapters, scenes, or stanzas provide the overall structure of a story
WHERE YOU'LL SEE IT (GRADES 3-5): Learners **explain how each panel on their crankie scroll contributes to the structure of the story** - identifying which sections are the setup, which show the conflict or change, and which deliver the ending or unexpected twist that resolves the plot.	

CODE	WHAT IT COVERS
SL.3-5.5	Include visual displays in presentations to emphasize main ideas

WHERE YOU'LL SEE IT (GRADES 3-5): Learners **perform their crankie for a peer or small group**, using the hand-cranked illustrated scroll as a visual display while they narrate the story aloud - pacing the scroll so each scene stays on screen long enough for the audience to see the character, the setting, and the key action.

RL.6-8.5	Analyze how a particular sentence, chapter, scene, or stanza fits into the overall structure of a text and contributes to the development of theme

WHERE YOU'LL SEE IT (GRADES 6-8): Learners **analyze how the ordering of scenes on the crankie scroll builds meaning** - arguing why they placed the conflict in the middle panels and why the final scene delivers the intended theme or unexpected twist, connecting the visual structure of the scroll to narrative craft.

W.6-8.3	Write narratives to develop real or imagined experiences using effective technique, relevant descriptive details, and well-structured event sequences

WHERE YOU'LL SEE IT (GRADES 6-8): Learners **develop a multi-panel illustrated narrative for their crankie scroll** with a clear character, setting, rising action, and resolution - revising their Story Sketch plan based on peer feedback so each panel contributes a well-chosen detail to the overall sequence.

K.MD.A.1	Describe measurable attributes of objects, such as length or weight

WHERE YOU'LL SEE IT (GRADES K-2): Learners **compare the length of the unrolled paper scroll to the width of the cardboard frame** and describe how many scenes they can fit across the 'screen' at one time - using positional language like longer, shorter, and between as they plan where each panel of their story will land.

1.OA.A.1	Use addition and subtraction to solve one- and two-step word problems

WHERE YOU'LL SEE IT (GRADES K-2): Learners **count the number of scenes in their story plan and the number of spaces on the scroll**, using addition and subtraction to figure out how many more panels they can fit or how many they need to remove so the story fits the length of the paper.

3.MD.B.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch

WHERE YOU'LL SEE IT (GRADES 3-5): Learners **measure the width of the frame's viewing window and the length of their scroll paper**, then divide the scroll into equal sections for each panel of their story - generating a measurement plan that ensures every scene is the same size as it scrolls across the screen.

4.OA.C.5	Generate and analyze patterns

WHERE YOU'LL SEE IT (GRADES 3-5): Learners **observe the inverse pattern of the two straws as they test their crankie** - when the receiving straw gains paper, the feeding straw loses the same amount. They describe this as a consistent one-to-one inverse relationship and predict where on the scroll the story will be after a given number of turns.

6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship

WHERE YOU'LL SEE IT (GRADES 6-8): Learners **describe the ratio of scenes to scroll length** in their crankie - if the scroll holds six scenes across its full length, what ratio describes 'three scenes per half of the scroll'? They use this ratio to plan scene spacing before drawing.

7.G.A.1	Solve problems involving scale drawings of geometric figures

WHERE YOU'LL SEE IT (GRADES 6-8): Learners **treat the Story Sketch Handout as a scale drawing of the final scroll** - measuring how each planned panel on the handout will translate to full size on the paper scroll, so characters and settings fit properly inside the frame's viewing window when the finished story plays back.

LEARNERS EXPLORE

visual storytelling structure (beginning, middle, end); mechanical winding and scroll mechanisms; engineering-meets-narrative design; measurement and scene planning; iterative testing of a physical mechanism