Hypnotizers

A wind-up machine that draws hypnotic spirals.

GRADES K THROUGH 5 | AGES 5 TO 10 | ABOUT 30 MIN

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

Next Generation Science Standards (NGSS)

CODE	WHAT IT COVERS
K-PS2-1	Motion and Stability: Forces and Interactions
WHERE YOU'LL SEE IT (GRADES K-2): Learners **feel how pushing and turning the wind-up knob stores energy** and then observe how releasing the platform changes the motion of the sticky note - experiencing firsthand that pushes and pulls can start, stop, or change the motion of an object, and that the strength of the push (how many winds) changes the motion they produce.	
K-2-ETS1-3	Analyze data from tests of two objects to compare strengths and weaknesses
WHERE YOU'LL SEE IT (GRADES K-2): Learners **test a fully wound Hypnotizer against a half-wound one - two designs solving the same challenge of drawing a spiral** - and compare how each performs: the full wind draws a longer, tighter spiral that can spin off the small sticky note's edge, while the half wind draws a shorter, looser spiral that stays contained but covers less of the page, weighing what each version does well and poorly rather than picking a favorite.	
4-PS3-1	Use evidence to construct an explanation relating the speed of an object to its energy
WHERE YOU'LL SEE IT (GRADES 3-5): Learners **compare a fully wound Hypnotizer to a half-wound one** and use the spirals as evidence: more winds store more energy, the platform spins faster and for longer, and the marker traces a wider, tighter spiral. The drawing itself is the record that a faster-moving platform carried more energy.	
3-5-ETS1-3	Plan and carry out fair tests to identify failure points
WHERE YOU'LL SEE IT (GRADES 3-5): Learners **systematically test why a Hypnotizer stops working** by checking one variable at a time: is the wind-up mechanism centered in the handle? Is the platform fully seated on the connector? Is the sticky note pressed down firmly? Is the marker pressing too hard? They isolate the failure point and re-test, practicing structured troubleshooting.	
MS-ETS1-4	Develop a model to generate data for iterative testing and modification
WHERE YOU'LL SEE IT (GRADES 6-8): Learners **use their gallery of test spirals as iteration data** - varying one thing at a time (sticky-note position, number of winds, marker pressure), recording what each change does to the spiral's size and tightness, and using that record to decide what to change on the next attempt. The stack of sticky notes becomes a cheap physical dataset for refining the design.	
MS-PS3-5	Construct an argument about kinetic energy and energy transfer
WHERE YOU'LL SEE IT (GRADES 6-8): Learners **argue from their Hypnotizer data that every visible spiral is evidence of energy transferred from the spring to the platform**. Before release, the spring is loaded with elastic potential energy and the platform's kinetic energy is zero. After release, the platform has rotational kinetic energy and the spring is relaxed. The change in kinetic energy is exactly the energy transferred out of the spring - and the spiral on the paper is the visual trace of that transfer happening in real time.	

Common Core State Standards (Math and ELA)

CODE	WHAT IT COVERS
RI.K-2.7	Use illustrations and words in a text to describe key ideas
WHERE YOU'LL SEE IT (GRADES K-2): Learners **use the Hypnotizer instruction sheet and slide deck illustrations** to figure out where the wind-up mechanism goes into the foam handle and where the platform connects on top, combining pictures and short captions to understand a two-part assembly.	
SL.K-2.1	Participate in collaborative conversations
WHERE YOU'LL SEE IT (GRADES K-2): Learners **describe to a partner what happens when the platform is released** - naming the wind-up, platform, and sticky note, and explaining in their own words what makes the spiral appear on the paper during the first drawing attempt.	
RI.3-5.7	Use information from illustrations and words to demonstrate understanding
WHERE YOU'LL SEE IT (GRADES 3-5): Learners **use the slide deck's storing and releasing diagram** to explain how winding the mechanism stores potential energy and how releasing it produces the spinning motion that draws the spiral - connecting a visual diagram to the physical experience of their own Hypnotizer.	
SL.3-5.1	Engage effectively in collaborative discussions
WHERE YOU'LL SEE IT (GRADES 3-5): Learners **discuss how different sticky-note positions and wind amounts change the spirals** in a small-group conversation after building their first gallery, building on each other's observations to predict what a new position or wind strength will produce.	

CODE	WHAT IT COVERS
RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments

WHERE YOU'LL SEE IT (GRADES 6-8): Learners **follow the Hypnotizers build sequence precisely** - inserting the mechanism before attaching the platform, winding with one finger holding the platform still, releasing before touching marker to paper - and understand that skipping or reordering steps means the machine won't spin or the spiral won't form.

SL.6-8.1	Engage in a range of collaborative discussions with diverse partners

WHERE YOU'LL SEE IT (GRADES 6-8): Learners **debate whether a fully wound Hypnotizer or a half-wound one produces a better spiral**, each defending a position with evidence from their own gallery of test spirals - connecting observation, prediction, and the physics of stored spring energy.

K.G.A.2	Correctly name shapes regardless of orientations or overall size

WHERE YOU'LL SEE IT (GRADES K-2): Learners **identify the circles that form when a still marker touches the spinning sticky note** - noticing that no matter where they put the marker, the resulting shape is always a circle, because the paper is moving in a rotation under a stationary point.

1.G.A.2	Compose two-dimensional shapes to create a composite shape

WHERE YOU'LL SEE IT (GRADES K-2): Learners **compose multiple spirals and circles into a layered composite shape** on a single sticky note by drawing a second spiral on top of the first in a different color, observing how two simple shapes combine into a more complex pattern.

3.G.A.2	Partition shapes into parts with equal areas

WHERE YOU'LL SEE IT (GRADES 3-5): Learners **partition a circular spiral into equal angular wedges** by drawing multiple radial lines outward from the center after the spiral forms, then describing each wedge as a fraction (¼, ⅙, 1/8) of the full circle traced by the marker.

4.G.A.3	Recognize a line of symmetry for a two-dimensional figure

WHERE YOU'LL SEE IT (GRADES 3-5): Learners **fold their sticky note in half to test for lines of symmetry**, discovering that the circle traced while the marker holds still folds flat onto itself from any angle - infinitely many lines of symmetry - while the spiral traced as the platform slows down has none, since it winds continuously in one direction and can never be folded to match itself.

6.RP.A.1	Understand ratio concepts and use ratio reasoning

WHERE YOU'LL SEE IT (GRADES 6-8): Learners **measure the number of winds versus the spin time of their Hypnotizer**, expressing the relationship as a ratio (e.g., "six winds produces twelve seconds of spinning") and comparing ratios across different wind strengths to describe how stored energy scales with winding.

7.G.B.4	Know the formulas for the area and circumference of a circle

WHERE YOU'LL SEE IT (GRADES 6-8): Learners **measure the radius of their spiral with a ruler, then use πr^2 to estimate the area the marker covered** and $2\pi r$ to estimate the path length of the outermost ring. Comparing two spirals - one small, one large - gives them a quantitative read on how much further the marker traveled in the larger one, connecting the machine's output to the real circle geometry they just traced.

LEARNERS EXPLORE

elastic potential and kinetic energy; spin art / generative drawing; circular geometry; Moiré patterns; cause and effect in mechanical energy release