Eyelusions

A motorized optical illusion learners draw and build.

GRADES 2 THROUGH 8 | AGES 7 TO 14 | ABOUT 45 MIN

These are the standards listed in the Eyelusions 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	Plan and conduct an investigation to compare forces
WHERE YOU'LL SEE IT (GRADES K-2): Learners **compare a gentle push against a firm push when seating the paper tube onto the motor's connector cap**, discovering that a gentle push leaves the tube loose and wobbling off-center while a firm push seats it straight - directly investigating how a stronger push changes whether the tube spins smoothly or wobbles.	
K-2-ETS1-2	Develop a simple sketch or model to illustrate a solution
WHERE YOU'LL SEE IT (GRADES K-2): Learners **use the practice sheet to sketch and refine image pair designs** before committing to stickers, treating the planning sheet as an iterative model where mistakes are welcome and multiple approaches (mild, medium, spiciest) can be tested before selecting a final design to transfer.	
3-PS2-1	Investigate the effects of balanced and unbalanced forces on motion
WHERE YOU'LL SEE IT (GRADES 3-5): Learners **observe how the centered versus off-center placement of the paper tube on the motor connector affects rotational motion**, discovering that a misaligned tube causes the entire base to vibrate and wobble across the table, directly demonstrating how unbalanced forces disrupt steady rotation.	
3-5-ETS1-3	Plan and carry out fair tests to identify failure points
WHERE YOU'LL SEE IT (GRADES 3-5): Learners **iterate through multiple sticker design attempts** using the three spice-scale splitting techniques, testing each design by spinning and observing whether the illusion blends correctly, identifying which approach worked and why - and using sticky notes or cut practice sheet drawings when stickers run out to extend their testing.	
MS-LS1-8	Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain
WHERE YOU'LL SEE IT (GRADES 6-8): Learners **investigate how the visual system's sensory receptors transmit signals to the brain faster than the brain can resolve two distinct images** when the thaumatrope spins, modeling the phi phenomenon as the brain's integration of rapidly alternating visual stimuli into a single perceived image - directly connecting the retina's response to spinning stimuli to the neural processing that produces the optical illusion.	
MS-ETS1-2	Evaluate competing design solutions using criteria and constraints
WHERE YOU'LL SEE IT (GRADES 6-8): Learners **compare the three sticker splitting strategies on the spice scale**, evaluating each against the criteria of image clarity and the constraint of the circular sticker boundary, using evidence from spinning results to determine which technique (top/bottom, left/right, or opposite corners) best meets the goal of producing a convincing blended illusion.	

Common Core State Standards (Math and ELA)

CODE	WHAT IT COVERS
RI.K-2.7	Use illustrations and details to describe key ideas
WHERE YOU'LL SEE IT (GRADES K-2): Learners **use the practice sheet and spice scale illustrations** to plan their image pairs, connecting visual diagrams of the three splitting strategies (top/bottom, left/right, opposite corners) to the concept of how two halves combine into a single blended picture.	
SL.K-2.1	Participate in collaborative conversations
WHERE YOU'LL SEE IT (GRADES K-2): Learners **discuss their sticker design choices with peers** during the planning and iteration stages, sharing which spice-scale technique they chose and why, and asking for help from classmates who have a working illusion when their own design doesn't blend correctly.	
RI.3-5.3	Explain relationships between events or concepts
WHERE YOU'LL SEE IT (GRADES 3-5): Learners **explain the cause-and-effect relationship between spinning speed and image blending**, articulating how the motor's rotational rate determines whether the brain perceives two separate sticker drawings or one fused optical illusion.	
W.3-5.2	Write informative/explanatory texts to examine a topic and convey ideas clearly
WHERE YOU'LL SEE IT (GRADES 3-5): Learners **explain how the thaumatrope connects to modern animation and film**, writing a short explanatory piece that traces the idea from early optical toys through cartoons to movies, using the "wonder turner" etymology and their own spinning results to explain how persistence of vision made moving pictures possible.	

CODE	WHAT IT COVERS
RST.6-8.3	Follow precisely a multistep procedure
WHERE YOU'LL SEE IT (GRADES 6-8): Learners **execute the nine-step build sequence** - from stacking and slotting foam bases through motor installation, wire testing, sticker alignment, and tube attachment - applying precise procedural reading to ensure the connector sits straight and sticker orientation is maintained on both sides of the tube.	
SL.6-8.1	Engage in collaborative discussion
WHERE YOU'LL SEE IT (GRADES 6-8): Learners **evaluate competing design technique choices** with peers, discussing the tradeoffs between mild (top/bottom), medium (left/right), and spiciest (opposite corners) splitting strategies, and citing evidence from their own spinning results to support which approach produced the clearest illusion.	
K.G.A.1	Describe positions and shapes in the environment
WHERE YOU'LL SEE IT (GRADES K-2): Learners **identify and describe the circular sticker shape and the relative positions of image halves** - above/below the horizontal guideline, left/right of the vertical guideline, or in opposite corners - as they plan their designs on the practice sheet using spatial vocabulary.	
K.MD.A.1	Describe measurable attributes of objects
WHERE YOU'LL SEE IT (GRADES K-2): Learners **describe measurable attributes of their paper tube and foam base** - length and weight - comparing whose tube feels longer or heavier before mounting it on the motor, and predicting whether a heavier tube will spin as easily as a lighter one.	
3.G.A.1	Understand that shapes in different categories may share attributes
WHERE YOU'LL SEE IT (GRADES 3-5): Learners **analyze the circular sticker as a geometric shape divided by horizontal, vertical, and diagonal guidelines** - partitioning the circle into two equal regions and comparing how each splitting strategy (top/bottom, left/right, opposite corners) creates symmetrical halves that serve as mirror-image designs when the thaumatrope spins.	
4.G.A.3	Recognize a line of symmetry for a two-dimensional figure
WHERE YOU'LL SEE IT (GRADES 3-5): Learners **identify the line of symmetry each splitting strategy draws across the circular sticker** - a horizontal fold line for top/bottom, a vertical fold line for left/right, a diagonal fold line for opposite corners - checking that folding the sticker along their chosen guideline lines up the two halves before they commit to drawing.	
7.G.A.1	Solve problems involving scale drawings of geometric figures
WHERE YOU'LL SEE IT (GRADES 6-8): Learners **reproduce their sticker design at a different scale** in the Sticky Note Supersized extension, transferring the same image pair from the small circular sticker onto a larger sticky note while keeping the proportions of their drawing the same, then troubleshooting the new alignment challenges a bigger scale creates.	
7.G.B.4	Know the formulas for the area and circumference of a circle and use them to solve problems
WHERE YOU'LL SEE IT (GRADES 6-8): Learners **measure the radius of the circular sticker and use πr^2 to find its area**, then work out how much area each half-image occupies under the three splitting strategies - halves for the top/bottom and left/right splits, diagonal quadrant pairs for the spiciest technique - and use $2\pi r$ to compare how far a point on the rim travels in a single rotation.	

LEARNERS EXPLORE

persistence of vision; optical illusion design; closing a simple battery circuit; image splitting and spatial reasoning; iterative troubleshooting