artsNOW
Integrated learning solutions

ART BOTS
Grade Band: 4-5
Content Focus: STEAM



LEARNING DESCRIPTION

In this hands-on STEAM lesson, students will explore the relationship between electricity, motion, and unbalanced forces by designing and building their own wobbling art bots. Using hobby motors, battery packs, pool noodles, and markers, students will follow the engineering design process (Ask, Imagine, Plan, Create, Improve) to construct a bot that moves and draws in unpredictable patterns.
Through experimentation, students will discover how unbalanced forces affect motion, how simple circuits power their bots, and how small design changes can alter movement. They will analyze their bots' performance, make modifications, and reflect on their design choices. By combining science, engineering, and art, this lesson fosters creativity, problem-solving, and critical thinking while reinforcing foundational physical science concepts.

LEARNING TARGETS

Essential Questions	"I Can" Statements
How do unbalanced forces affect motion? How does a motor and battery work together to power movement? How can I use the engineering design process to improve my art bot?	I can build a simple circuit to power a motor. I can explain how unbalanced forces affect motion. I can use the engineering design process to create and improve my art bot.

What design choices influence how my bot moves and draws?	I can analyze how design choices impact the movement and artwork created by my bot.

GEORGIA STANDARDS

Curriculum Standards	Arts Standards
Grade 4: S4P3: Obtain, evaluate, and communicate information about the relationship between balanced and unbalanced forces and the motion of an object. **Grade 5:** S5P3: Obtain, evaluate, and communicate information about magnetism and electric circuits.	VA.CR.1 Engage in the creative process to generate and visualize ideas by using subject matter and symbols to communicate meaning. VA.CR.4 Understand and apply media, techniques, and processes of three-dimensional art.

SOUTH CAROLINA STANDARDS

Curriculum Standards	Arts Standards
Grade 4: 4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. 4-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.	**Anchor Standard 1:** I can use the elements and principles of art to create artwork. **Anchor Standard 2:** I can use different materials, techniques, and processes to make art. **Anchor Standard 7:** I can relate visual arts ideas to other arts disciplines, content areas, and careers.

KEY VOCABULARY

Content Vocabulary	Arts Vocabulary
• Circuit – A complete path through which electricity flows • Motor – A device that converts electrical energy into movement • Unbalanced force – A force that causes an object to start moving, stop moving, or change direction • Vibration – A rapid back-and-forth motion that can create movement	• Line – A continuous mark made on some surface by a moving point. It may be two dimensional, like a pencil mark on a paper or it may be three dimensional (wire) or implied (the edge of a shape or form) often it is an outline, contour or silhouette. • Shape – A flat, enclosed line that is always two-dimensional and can be either geometric or organic • Pattern – Repetition of specific visual elements such as a unit of shape or form

	• Texture (visual) – The surface quality, or "feel" of an object, such as roughness, smoothness, or softness. Actual texture can be felt while simulated textures are implied by the way the artist renders areas of the picture. • Composition – How an artist arranges the Elements of Art (line, shape, form, value, color, space, texture) to create an artwork • Collaboration – Working together to create something new • Abstract art – Art that does not try to represent real life realistically; often made with shapes, colors, and lines

MATERIALS

- Hobby motors
- Battery packs (with AA batteries)
- Pool noodles (cut into smaller sections)
- Thin markers
- Tape (masking or electrical)
- Small weights (paperclips, washers, etc.)
- Scissors
- Googly eyes
- Pipe cleaners
- Foam shapes
- Image of the Engineering Design Process

INSTRUCTIONAL DESIGN

Opening/Activating Strategy

- **Engage:**
  - Hook: Show a short video of a scribble bot or demonstrate a pre-made art bot.
  - Discussion–Ask students:
    - What do you notice about how it moves?
    - What might be making it move this way?
    - How could we create something similar?

Work Session

- Introduce the Engineering Design Process and explain that students will follow these steps to create their own art bots.
- Optional: Have students choose or assign a partner to create their bots and artwork.

Explore – Building the Art Bots

- **Ask**: What materials and design choices will help us create a wobbling art bot?
- **Imagine:** Have students brainstorm ideas for how to make an art bot using the provided materials.
- **Plan**: Students sketch their design and label the parts and materials they will use.

- **Create:** Show students how to create their bots.
    - Attach a motor to a small battery pack.
    - Insert the motor into the center of a pool noodle piece.
    - Tape thin markers as "legs" to hold the bot upright.
    - Add weights to one side of the motor shaft to create an unbalanced motion.
- Have students place their bot on plain white paper. Turn on the motor and test the movement.

Explain – Connecting to Science Concepts

- Discuss how the unbalanced forces created by the off-center motor make the bot wobble.
- Relate the motion to concepts like vibration, force, and circuits.
- Ask students to describe what happened when they turned their bot on.

Improving the Design

- **Improve:** Students analyze their bot's movement and adjust its design to change the motion or artwork produced.
- Encourage experimentation:
    - Change marker placement for different drawing effects.
    - Add or remove weights to alter movement.
    - Adjust motor positioning to control wobbling direction.
- Ask your students to think of their art bot as an artistic partner! Ask students what they could add to this artwork to bring it to life. Could they turn the bot's movements into something meaningful or funny or beautiful?
    - Students will add their own hand-drawn designs, shapes, and/or details to enhance the bot's scribbles.
    - Students will use crayons, colored pencils, or markers to transform the bot's random motion drawings into imaginative creations (e.g., turning loops into flowers, zig-zags into roller coasters, spirals into galaxies).
- Ask students to name their collaborative artwork.

Closing/Reflection

- Turn your classroom into a gallery!
    - Lay artworks on desks or hang them around the room.
    - Have students walk through the gallery, viewing each other's bot collaborations.

- Facilitate a discussion around the following reflection questions:
    - What made your art bot move in a fun or interesting way?
    - What was one thing you changed or improved?
    - What did your art bot draw that surprised you?

- Have students complete a written or oral reflection of how they followed the engineering design process and what they would do differently next time.

ASSESSMENTS

Formative

- Teachers will assess student learning through:
    - Observation of student engagement and participation.
    - Questioning during discussions to check understanding.
    - Peer discussions about design choices.

Summative

- Art bot demonstration: Each student will showcase their bot and explain how design choices impacted movement answering the following questions.
    - How did unbalanced forces affect your bot's motion?
    - What design change improved your bot the most?
- **Reflection:** Students' will complete a written or oral discussion of how they followed the engineering design process and what they would do differently next time.

DIFFERENTIATION

Accelerated:

- Ask students to modify their bot to create a specific pattern or shape.
- Introduce Scratch: Students can create digital "bot" animations or stories reflecting the movement of their physical bots.

Remedial:

- Provide pre-wired circuits to simplify the process.
- Provide extended time for building and reflecting.
- Offer verbal instructions paired with written guides.
- Allow for alternative methods of documentation (photos, audio).

ADDITIONAL RESOURCES

This integrated lesson provides differentiated ideas and activities for educators that are aligned to a sampling of standards. Standards referenced at the time of publishing may differ based on each state's adoption of new standards.

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