



artsNOW

Integrated learning solutions

ART BOTS

Grade Band: 6-8

Content Focus: STEAM & ELA



LEARNING DESCRIPTION

Students take on the role of designer-engineers and artists by constructing “drawing robots” that demonstrate how energy transforms into motion. Using motors, batteries, and weighted components to intentionally create imbalance, students will explore concepts like kinetic energy, unbalanced forces, and vibration.

After testing and refining their bots, students will respond to the prompt: “Write an explanation of how your Art Bot transforms electrical energy into motion and artwork. Reflect on your design process and explain how art and engineering work together”.

This writing task reinforces content vocabulary and scientific reasoning while inviting students to make connections between disciplines. The lesson culminates with students presenting their bot’s visual output and reading their explanatory writing aloud in a collaborative critique session.

LEARNING TARGETS

Essential Questions	“I Can” Statements
How do unbalanced forces affect the motion of an object?	I can build and test a simple circuit to power a motor.
How does a motor convert electrical energy into motion?	I can explain how unbalanced forces influence motion.

What design choices impact the movement and artistic output of an Art Bot?	I can describe how energy is transformed in my Art Bot.
How can the engineering design process help improve a design?	I can use the engineering design process to test and improve my design.

GEORGIA STANDARDS

Curriculum Standards	Arts Standards
<p>SCIENCE</p> <p>Grade 6: S6P2: Obtain, evaluate, and communicate information about the relationship between force, mass, and the motion of objects.</p> <p>S6P3: Construct an explanation of the relationships among electric force, magnetic force, and motion.</p> <p>Grade 7: S7P2: Obtain, evaluate, and communicate information to explain the effects of forces on the motion of an object.</p> <p>Grade 8: S8P2: Develop models to illustrate the relationship between potential and kinetic energy.</p> <p>ELA</p> <p>Grade 6: 6.T.T.1.e Apply narrative techniques to enhance writing, engage audiences, and achieve specific purposes.</p> <p>Grade 7: 7.T.T.1.e Apply narrative techniques to enhance writing, engage audiences, and achieve specific purposes.</p> <p>Grade 8: 8.T.T.1.e Apply narrative techniques to enhance writing, engage audiences, and achieve specific purposes.</p>	<p>VA.CR.1 Visualize and generate ideas for creating works of art.</p> <p>VA.CR.2 Choose from a range of materials and/or methods of traditional and contemporary artistic practices to plan and create works of art. VA.CR.2.b Produce three-dimensional artworks using a variety of media/materials (e.g. clay, papier-mâché, cardboard, paper, plaster, wood, wire, found objects, fiber).</p> <p>VA.CR.3 Engage in an array of processes, media, techniques, and/or technology through experimentation, practice, and persistence.</p>

SOUTH CAROLINA STANDARDS

Curriculum Standards	Arts Standards
<p>SCIENCE</p> <p>Grade 6:</p>	<p>Anchor Standard 1: I can use the elements and principles of art to create artwork.</p>

6-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

Grade 7:

7-PS3-2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

7-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

Grade 8:

8-PS2-3. Analyze and interpret data to determine the factors that affect the strength of electric and magnetic forces.

8-PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

ELA

Grade 6:

ELA.6.C.2.1 Write informative texts to examine a topic and analyze information from one or more sources. When writing:

a. introduce a topic clearly and organize information logically; b. develop the topic with relevant facts, definitions, details, quotes, or other information and examples; c. use appropriate transitions to clarify the relationships among ideas and concepts; d. use precise language and vocabulary to inform or to explain the topic; and e. provide a concluding statement or section.

Grade 7:

ELA.7.C.2.1 Write informative texts to examine a topic and analyze information from one or more sources. When writing:

a. introduce a topic and organize ideas, concepts, and information using structures such as definition, compare and contrast, and/or cause and effect; b. develop the topic with relevant facts, definitions, details, and/or

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.

quotes; c. use appropriate transitions to clarify the relationships between ideas and concepts; d. use precise language and thoughtful elaboration to inform or to explain the topic; e. establish a tone appropriate to the task and audience; and f. provide a concluding statement or section that supports the information presented.

Grade 8:

ELA.8.C.2.1 Write informative texts to examine a topic and analyze information from multiple sources. When writing:

a. introduce a topic clearly and organize ideas, concepts, and information, using a structure such as definition, compare and contrast, and/or cause and effect; b. develop the topic with relevant facts, definitions, details, and/or quotes; c. use varied transitions to clarify the relationships between ideas and concepts; d. use precise language and thoughtful elaboration to inform or to explain the topic; e. establish a tone appropriate to the task and audience; and f. provide a concluding statement or section that supports the information presented.

KEY VOCABULARY

Content Vocabulary	Arts Vocabulary
<ul style="list-style-type: none"> ● <u>Unbalanced force</u> – A force that changes the motion of an object ● <u>Friction</u> – A force that opposes motion ● <u>Circuit</u> – A closed path through which electricity flows ● <u>Kinetic energy</u> – Energy of motion ● <u>Potential energy</u> – Stored energy that can be converted into motion ● <u>Energy transformation</u> – The process of changing one form of energy into another 	<ul style="list-style-type: none"> ● <u>Movement</u> – This principle of design is associated with rhythm and refers to the arrangement of parts in an artwork that creates a sense of motion to the viewer's eye through the work. ● <u>Balance</u> – This is a sense of stability in the body of work. Balance can be created by repeating the same shapes and by creating a feeling of equal visual weight. ● <u>Form</u> – An object that is three-dimensional and encloses volume (cubes, spheres, and cylinders are examples of various forms) ● <u>Kinetic art</u> – Art that incorporates real motion ● <u>Contrast</u> – The arrangement of opposite elements in a composition (light vs. dark,

	<p>rough vs. smooth, etc.) Similar to variety, which refers to the differences in a work, achieved by using different shapes, textures, colors and values.</p> <ul style="list-style-type: none"> ● <u>Mark-making</u> – The lines, textures, and marks made by tools or gestures ● <u>Negative space</u> – The space around and between subjects in an artwork ● <u>Engineering Design Process</u> – A problem-solving approach that involves identifying a need, researching, brainstorming possible solutions, developing and testing prototypes, and improving the design until the optimal solution is achieved; the steps are Ask, Imagine, Plan, Create, Improve
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MATERIALS

- Hobby motors
- Battery packs (with AA batteries)
- Pool noodles (cut into sections)
- Thin markers
- Electrical tape or masking tape
- Small weights (washers, paperclips, clay, etc.)
- Switches (optional for advanced circuits)
- Scissors
- 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 forces might be acting on it?
 - How does the energy from the battery turn into movement?

Work Session

- Introduce the [Engineering Design Process](#) and explain that students will follow these steps to create their own Art Bots.
- Explore – Building the Art Bots**
- **Ask:**
 - How can we design an Art Bot that moves unpredictably?
 - How do we make sure our bot stays powered and balanced?
 - **Imagine:**
 - Students will brainstorm ideas and sketch potential designs for their bots.

- **Plan:**
 - Show students a list of materials that they have available to them to build their bots.
 - Students will create a sketch of their bot with materials labeled before beginning to build their bots.
- **Create:**
 - Show students how to create their bots.
 - Connect the battery pack to the motor, ensuring a working circuit.
 - Insert the motor into the pool noodle.
 - Attach markers as "legs" using tape.
 - Add weights off-center on the motor shaft to create an unbalanced force.
- Have students place the bot on plain white paper and turn it on to observe its movement.
- **Improve:** Elaborate – Improving the Design
 - Students will analyze their bot's movement and adjust:
 - Marker placement for different drawing effects.
 - Weight distribution to change speed and wobbling direction.
 - Motor positioning to alter how much it vibrates.
- Students will compare designs and discuss how small modifications affect motion.
- Students will respond to the following writing prompt: Write an explanation of how your Art Bot transforms electrical energy into motion and artwork. Reflect on your design process and explain how art and engineering work together. Use specific vocabulary and examples from your experience.
 - Writing Criteria:
 - **Introduce the topic clearly:** "My Art Bot transforms energy into motion through a simple electric circuit".
 - **Use content-specific vocabulary**, such as: *circuit, energy transformation, kinetic energy, friction, unbalanced force, vibration*.
 - **Describe the sequence of events** in the engineering design process: Ask → plan → create → test → improve.
 - **Explain connections between scientific concepts and artistic outcomes.**
 - **Use transitions**, such as first, next, as a result, finally, to clarify progression.
 - **Conclude with insights** about what was learned or how the design evolved.

Closing/Reflection

- Explain: Facilitate a discussion on the science behind the bots.
 - Discuss how unbalanced forces create movement.
 - Explain energy transformations (chemical → electrical → kinetic).
 - Relate movement patterns to force, friction, and weight distribution.
 - Students should reflect on what worked well and what they would improve.
- Gallery walk: Display the collaborative works and ask students to share their reflections.

ASSESSMENTS

Formative

- Observations of student engagement and problem-solving
- Questioning during discussions
- Peer feedback on bot performance

Summative

- Students' written responses to the writing prompt.

DIFFERENTIATION

Accelerated:

- Introduce data collection by having students measure and compare drawing patterns.
- Additional writing prompts:
 - Compare how the energy transformation in your Art Bot is like what happens in a real machine or natural system.
 - How would you redesign your Art Bot to make it draw letters or words? Justify your choices using science vocabulary.
- Use Micro:bit or Arduino to program bots to change motion patterns.

Remedial:

- Provide pre-made circuits.
- Provide extended time for building and reflecting.
- Offer verbal instructions paired with written guides.
- Allow for alternative methods of documentation (photos, audio).
- Additional writing prompts:
 - Draw and label how your Art Bot moves.
 - Write three to five sentences explaining how the battery made your Art Bot move.
 - List three problems you solved while building your bot.

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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