artsNOW
Integrated learning solutions

# TRIGONOMETRY ON STAGE
## Grade Band: 9-12
## Content Focus: Theatre & Geometry/Algebra



## LEARNING DESCRIPTION

In this lesson, students deepen their understanding of trigonometric vocabulary and problem-solving by personifying key terms as characters and creating a scene that demonstrates their relationships in a right triangle.

## LEARNING TARGETS

| Essential Questions | "I Can" Statements |
|---|---|
| How can understanding trigonometric terms as characters help us solve real-world problems involving right triangles? | I can explain the meanings of sine, cosine, tangent, opposite, adjacent, and hypotenuse.<br><br>I can use trigonometric ratios and the Pythagorean Theorem to solve problems with right triangles.<br><br>I can work with my group to create a scene where the vocabulary terms solve a problem together.<br><br>I can use my voice and body to create and embody characters out of trigonometric terms. |

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| | I can reflect on how this creative process helped me understand and demonstrate understanding of trigonometry. |

## GEORGIA STANDARDS

| Curriculum Standards | Arts Standards |
|---|---|
| **Geometry:**<br>G.GSR.6.3 Use trigonometric ratios and the Pythagorean Theorem to solve for sides and angles of right triangles in applied problems. | TAHSFT.PR.1<br>Act by communicating and sustaining roles in formal and informal environments.<br>TAHSFT.PR.1.a<br>Observe and demonstrate aspects of verbal and non-verbal techniques in common human activity for performance (e.g. voice, breathing, posture, facial expression, physical movement).<br><br>TAHSFT.CN.1<br>Explore how theatre connects to life experiences, careers, and other content. |

## SOUTH CAROLINA STANDARDS

| Curriculum Standards | Arts Standards |
|---|---|
| **Algebra 2 with Probability:**<br>A2P.MGSR.1. Explore and analyze sine and cosine functions using the unit circle, right triangle definitions, and models of periodic phenomena.<br><br>**Geometry with Statistics:**<br>GS.MGSR.6. Discover and apply relationships in similar right triangles. | **Anchor Standard 1:** I can create scenes and write scripts using story elements and structure.<br><br>**Anchor Standard 3:** I can act in improvised scenes and written scripts.<br><br>**Anchor Standard 8:** I can relate theatre to other content areas, arts disciplines, and careers. |

## KEY VOCABULARY

| Content Vocabulary | Arts Vocabulary |
|---|---|
| • Sine — Ratio of the length of the opposite side to the hypotenuse in a right triangle<br><br>• Cosine — Ratio of the length of the adjacent side to the hypotenuse in a right triangle<br><br>• Tangent — Ratio of the length of the opposite side to the adjacent side in a right triangle | • Actor/Actress — A person who portrays a character in a theatrical performance<br><br>• Improvisation — A moment in a play that is not rehearsed or “scripted”, or acting without a script. For example: if an actor forgets a line, he/ she may improvise the line in the scene. Improvisation is also a style of theatre that lends itself to comedy that is created “in the moment”.<br><br>• Embodiment — The representation or expression of something in a tangible |

| | |
|---|---|
| • Opposite — The side opposite the given angle in a right triangle<br><br>• Adjacent — The side next to (adjacent to) the given angle in a right triangle<br><br>• Hypotenuse — The longest side of a right triangle, opposite the right angle | form while bridging the gap between the character's thoughts and your physical self<br><br>• Voice - Actors use their voice to be heard by the audience clearly. Actors must also apply vocal choices such as pitch, tempo, and volume to the character they are dramatizing.<br><br>• Gesture - An expressive movement of the body or limbs<br><br>• Body - Actors use their body to become a character through body posture and movement. What your mind thinks, what your emotions feel, all of this is supposed to show up in your body. |

## MATERIALS

- Whiteboard/projector for mini-lesson and instructions
- Pre-written vocabulary definitions for reference (or handout)
- Teacher generated right triangle problem sets appropriate for level of class
- Paper and pencils for planning and writing scenes
- Space for groups to perform
- Character and scene worksheet
- Rubric
- Optional: simple props or signs with the vocabulary terms
- Optional: "Embodying the Role" video

## INSTRUCTIONAL DESIGN DAY 1

**Opening/Activating Strategy**

**Day One**

- Introduce the essential question and objectives.
- Mini-lesson: Review right triangle vocabulary (sine, cosine, tangent, opposite, adjacent, hypotenuse) with definitions and examples.
- Do a quick guided practice identifying sides and calculating basic ratios.

**Work Session**

- Assign students to small groups (3–6 students).
- Assign each group one or more of the vocabulary words to personify.
- Explain to the students that they will be acting as their characters to solve a right-triangle problem and create a scene showing the solution.
- Optional: Show the "Embodying the Role" video to help students understand how to get into character.
- Groups will decide:
    - What personality traits fit their word?
    - What does their word "do" in a right triangle?

    - How can their word interact with the others?
- Groups will create short descriptions of each character and practice acting out their word (voice, gesture, movement).
- Teacher will assign a right-triangle problem to each group.
- Groups will work together to solve the problem mathematically.
- Once solved, groups write a short scene where their vocabulary characters interact to explain and solve the problem together. Students can use the Trigonometry Character Scene Worksheet to help plan their scene.
- Groups will rehearse their scene and practice staying in character.
- Teacher will circulate and offer prompts to help students as needed such as:
    - What would Sine say to Opposite and Hypotenuse?
    - How does Tangent feel about Adjacent?
    - Who works together to find the missing angle?
    - What happens when the triangle comes to life?

**Closing/Reflection**

- Each group will introduce their character(s) to the class (name, personality, and what role they play in a triangle).
- Each group will then perform their scene for the class.
- After all performances, discuss the following:
    - How did acting out the words help you understand them?
    - Which terms do you feel most confident about now?

## ASSESSMENTS

**Formative**

- Observations during group work and mini-lesson questioning.
- Completion of character profiles and problem-solution.

**Summative**

- Group scene performance (see rubric)

## DIFFERENTIATION

**Acceleration:** Add more challenging problems or ask students to incorporate additional terms (like angle of elevation/depression).

**Remediation:** Provide sentence starters or sample lines for scenes and support with additional examples of right triangles.

## 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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