ESTABLISHING PURPOSE

1

What are the key content standards I will focus on in this lesson?

Content Standards:

TEKS Geometry Standards

(9) Similarity, proof, and trigonometry. The student uses the process skills to understand and apply relationships in right triangles. The student is expected to:

(A) determine the lengths of sides and measures of angles in a right triangle by applying the trigonometric ratios sine, cosine, and tangent to solve problems; and

(B) apply the relationships in special right triangles 30°-60°-90° and 45°-45°-90° and the Pythagorean theorem, including Pythagorean triples, to solve problems.

TEKS Mathematical Process Standards:

- Create and use representations to organize, record, and communicate mathematical ideas.
- Analyze mathematical relationships to connect and communicate mathematical ideas.
- Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written and oral communication.

2

What are the learning intentions (the goal and *why* of learning, stated in student-friendly language) I will focus on in this lesson?

Content: To understand the relationship between trigonometric functions (sine, cosine, and tangent) and their inverses.

Language: To precisely state each inverse trigonometric function as it is being used (i.e., the inverse sine of ___ is ___).

Social: To hold one another accountable to the language learning intention. #grammarpolice

SUCCESS CRITERIA

3

When will I introduce and reinforce the learning intention(s) so that students understand it, see the relevance, connect it to previous learning, and can clearly communicate it themselves?

After finishing the PAR trade at the beginning of class, the learning intentions will be introduced along with the success criteria. Though today we will be developing a surface-level procedural understanding of inverse trig functions, this is the missing piece for deep learning to occur on the overarching topic of trig functions and their connection to right triangles. I'll know deep learning is occurring when I hear students' audible "Aha!" moments.

4   **What evidence shows that students have mastered the learning intention(s)? What criteria will I use?**

I can statements:

- I can use inverse trigonometric functions to find unknown angles in right triangles.
- I can solve right triangles, given any two of their sides, and explain my thinking.

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5   **How will I check students' understanding (assess learning) during instruction and make accommodations?**

I will assess prior knowledge by listening in on PAR conversations. I will look for areas of common struggle and seek out competent peers for reciprocal teaching.

I will also scan and conduct student interviews during collaborative practice in addition to "numbered heads together" for sharing out.

INSTRUCTION

6   **What activities and tasks will move students forward in their learning?**

Peer-Assisted Reflection (PAR) Trade

Class will begin with students trading their PARs with a partner, providing written feedback, and then discussing the feedback. This will activate the prior knowledge we need to access for today.

Direct/Deliberate Instruction

I'll present a problem that cannot be solved using our current skillset to build the need for new learning. This will generate our discussion of trigonometric functions and their inverses. I'll use a combination of guided questioning and direct teaching to flesh out the concepts. I will model the procedure of using inverse trig functions with a few worked examples.

Collaborative Practice

Students will solve right triangles in collaborative groups using inverse trig functions and other previously learned strategies. I will scan during this time and organize a structured share-out in an intentional order.

Share-Out

In this phase, students from each group will explain how they approached a given problem. The goal is for students to make connections between strategies and start to develop preferences based on efficiency.

Peer-Assisted Reflection (PAR) Homework

Students will receive a new PAR aligned to today's success criteria for independent practice. Their homework tonight is to complete a draft solution.

7 **What resources (materials and sentence frames) are needed?**

1. Table-sized whiteboards and markers for collaborative practice
2. Printed copies of PAR 4.4

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8 **How will I organize and facilitate the learning? What questions will I ask? How will I initiate closure?**

The day will be organized in a linear fashion through the phases listed in Section 7:

1. PAR Trade
   a. Why did you choose to solve this triangle this way?
   b. Are there other routes you could have chosen?
   c. Are any routes more efficient or less efficient than others?

2. Direct/Deliberate Instruction
   a. Can our trigonometry help us find unknown angles?
   b. Sine of what equals 1? $\frac{1}{\sqrt{2}}$? $\frac{\sqrt{3}}{2}$?
   c. How do inverse functions work, and how might they apply to this?

3. Collaborative Practice
   a. What information do we have?
   b. What information do we need?
   c. What mathematical tools can we use to get us the information we need?

4. Share-Out
   a. How many different routes did we see to solve the problem today?
   b. Which one was "the best"?
   c. Do we see any other routes that weren't used?
   d. How might you decide which route to use, based on the problem itself?