Pythagorean Theorem

Grade Levels: 6-8 Grades

Subject: Geometry & Measurement (GM)

Oklahoma Academic Standards | Mathematics

PA.GM.1.1 Informally justify the Pythagorean Theorem using measurements, diagrams, or dynamic software and use the Pythagorean Theorem to solve problems in two and three dimensions involving right triangles

Lesson Summary

Students will justify or demonstrate their understanding of the Pythagorean Theorem by developing a "real world" situation problem involving right triangles and an unknown leg or hypotenuse. Students will also solve the problem by explaining the process they used when solving.

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Oklahoma Academic Standards | English Language Arts
  2.2.R.2, 3.2.R.2, 4.2.R.2, 5.2.R.2 Students will begin to compare and contrast details *(e.g., plots or events, settings, and characters)* to discriminate genres.

ENGAGEMENT/HOOK	
ENGAGEMENT/HOOK • *Describe how the teacher will capture students' interest.* • *What kind of questions should the student ask themselves after the engagement?*	Present ball sticks and ball (from the trunk) and inquire about their knowledge of what the ball sticks are used for and what are their experiences, if any, with them. Use the game to discuss how the Pythagorean Theorem can be seen in reference to the height of the pole, distance the player is from the base of the pole and the top of the pole. **Video:** Stickball at the College of Muscogee Creek Nation and/or Cherokee Nation Stickball
EXPLANATION (Teacher models) • *Student explanations should precede the introduction of terms or explanations by the teacher. What questions or techniques will the teacher use to help students connect their exploration to the concept under examination?* • *List higher order thinking questions which teachers will use to solicit student explanations and help them to justify their explanations.*	Use slide show presentation to propose the "hook" question along with links to YouTube videos demonstrating stickball games and explanation of how the Pythagorean Theorem was derived and how it is used to find distances in right triangles and to "test" triangles to see if they are right triangles. Using the Pythagorean Theorem would it be possible to calculate the distance between the "player" and the height of the pole if the height of the pole and distance from the base is known.
ELABORATION • *Describe how students will develop a more sophisticated understanding of the concept.* • *What vocabulary will be introduced and how will it connect to students' observations?* • *How is this knowledge applied in our daily lives?*	**Vocabulary:** Stickball Pythagorean Theorem **Application:** Homebuilding, woodworking, construction (making sure angles are "square")

EXPLORATION **(Guided/Independent Practice)** • *Describe what hands-on/minds-on activities students will be doing.* • *List "big idea" conceptual questions the teacher will use to encourage and/or focus students' exploration.*	Students will complete the Pythagorean Theorem handout from Kuta Software. Students will justify/demonstrate their understanding of the Pythagorean Theorem by developing their own "real world" situation problem involving right triangles and an unknown leg or hypotenuse. They will also solve the problem by explaining the process they used when solving.

CLOSURE/EVALUATION **(Pre/Post-Formal/Informal Assessments)** • *How will students demonstrate that they have achieved the lesson objective? How will you know they met the objective/learned the lesson?* • *This should be embedded throughout the lesson as well as at the end of the lesson.*	Students will complete an exit ticket with questions requiring them to solve for missing sides of right triangles using the Pythagorean Theorem.

Materials Needed:
Pencil/paper

Slideshow Presentation:
https://docs.google.com/presentation/d/1mrBzIeabqISOgAvpH3NXd0IHLkw6MslHysKwtEk8tgk/edit?usp=sharing

YouTube Video(s):
https://www.youtube.com/watch?v=a_jciUjfsuU (Stickball at the College of the Muscogee Creek Nation)
https://www.youtube.com/watch?v=j5XXOEPCro0&t=40s (Cherokee Nation Stickball)
https://www.youtube.com/watch?v=WqhlG3Vakw8 (Math Antics - The Pythagorean Theorem)

MCN Education Trunk:
Ball Sticks and Ball

Handout:
https://cdn.kutasoftware.com/Worksheets/PreAlg/Pythagorean%20Theorem.pdf