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Lesson Title: Pythagoras Theorem
Lesson #:
Date: October 26, 2017
Subject: Mathematics
Grades: 8

Rationale:

In any shape with a 90 degree angle, the distance across the shape can be calculated using the Pythagoras theorem, A2 + B2 = C2. This lesson teaches Pythagoras theorem, which fundamental for calculating the distance between two given points, and can be considered part of a larger unit on measurements, shapes, mapping, or distance.

Curriculum Connections

Curriculum Competency:

Use logic and patterns to solve puzzles and play games.
Use tools or technology to explore and create patterns and relationships, and text conjectures.
Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving.
Visualize to explore mathematical concepts.
Represent mathematical ideas in concrete, pictorial, and symbolic forms.

Content:

Calculating Pythagoras theorem (the shortest distance between two points on a 90 degree angle).

Learning Intentions	Activity	Assessment
I can calculate the hypotenuse of a triangle using Pythagorean theorem.	Can I Do It activity, scavenger hunt.	Check Can I Do It answers while circulating. Students will hand in scavenger hunt.
I can use a calculator to find exponents and square roots in a meaningful way.	Can I Do It activity, scavenger hunt.	Check Can I Do It answers while circulating. Students will hand in scavenger hunt.
I can visually explore mathematical concepts, and share how these concepts can be used outside of the classroom.	Scavenger hunt, post-hunt discussion about uses for Pythagorean theorem in our world.	Students will hand in scavenger hunt. Class discussion about uses for Pythagorean theorem.

I can apply my knowledge of Pythagorean theorem to our larger unit of direction and First People's constellations.	Scavenger hunt, Can I Do It activity.	Teacher will circulate throughout CIDI and class activities, ensuring all learners have the basic skills necessary for success with the unit.

Prerequisite Concepts and Skill:

Measuring using tape measures (cm)
To be able to visually detect and understand a 90 degree angle.
A basic understanding of exponents and square roots.
Calculate exponents and square roots using technology (calculators)

Materials and Resources with References/Sources:

For Teacher	For Students
Sample rectangle / triangle and measuring tape	Scavenger hunt worksheet
Copy of scavenger hunt	Calculators
Measuring tape	A variety of different rectangles / triangles
Prizes / lightly competitive music	Tape measures (one between two)

Differentiated Instruction (DI) (Accommodations):

Have students who have difficulties work alongside students who do not have difficulty with the activities.

Students with extra difficulties may wish to practice calculating the hypotenuse with various objects, and shy away from the competitive, gamified environment, simply focusing on what they are comfortable with.

Have students who need a challenge practice finding the hypotenuse of triangles where the "c" side is not immediately evident (such as a diamond shape).

Organizational / Management Strategies:

Groups of two – random selection using popsicle sticks. Students with significant difficulties may "randomly" find themselves with a stronger student, or placed in a group of three.

Have extra calculators, scavenger hunt sheets, and measuring tapes ready for use. Be prepared to explain how to find exponents and square roots on the specific calculators.

Have a prize available for the winning team, but let students know there are small prizes for all participants (no anxiety, panic, or manic drive to win that results in sloppy work).

Table on board for winning team to share results from hunt, and potential for answers to be countered by opposing teams.

Possible Aboriginal Connections/First Peoples Principles of Learning: This lesson can become part of a larger Aboriginal unit for constructing canoe paths and landings given the current on a river. It can also be used as a means of calculating, identifying, and exploring First Peoples constellations.

Lesson Activities:

Teacher Activities	Student Activities	Pacing
Introduction (hook/ motivate/lesson overview) Have Teacher A come through the door. Teacher B is standing in the opposite corner with a delicious, hot coffee, calling over Teacher A. Ask students what is the fastest way for Teacher A to access their hot coffee. Is it by walking along the walls to the opposite corner, or by walking across the room?	Students are sitting and reading to begin class. Students observe the "hook" Have students work in pairs to discuss what is the fastest way for Teacher A to walk across the room. Have students ready to explain how they arrived at their answer.	
Body (Lesson flow, Management) Explain about Pythagorean Theorem, how it originated, and how it works. BRAIN BREAK Hand out instruction sheet. Explain to students how to calculate Pythagorean	Invite students to participate in this discussion, adding in their pre-existing understandings of measurement and triangles, or to make a hypothesis. BRAIN BREAK	

theorem, as well as how to use class calculators to calculate exponents and square roots. The teacher gives another example. Group students randomly into pairs. Explain the process of the scavenger hunt, and that there is more than one prize (do not stop working if another group finishes first). Hand out scavenger hunt. Play music quietly. Instruct students to come up for a tape measure and calculator. Circulate and offer assistance, without giving answers away, as students work on Pythagorean theorem scavenger hunt. Call class to attention. Ask students what they have discovered about calculating the hypotenuse, based upon their observations in the classroom.	The students observe the teacher's example, measurement, and use of exponents and square roots. Students try a Can I Do It question. Give feedback. Students try another example from the instruction sheet. Students assemble in their pairs, or in groups of 3. One person from each pair comes up to get a measuring tape and calculator. Students work their way through the entirety of the scavenger hunt in pairs. As each pair completes the hunt, they are awarded a small prize. Students sit down and claim prizes. Students recognize that the object's size does not matter; the theorem remains the same. Students recognize that triangles and rectangles can both be calculated. Students recognize practical applications for the theorem (construction, navigation, etc…). Students will break into pairs to discuss practical applications, followed by brief class discussion.	

Have students choose a number of examples from the scavenger hunt (actually moving toward the physical object in the room) to ensure all teams have arrived at the correct answer.	Have students actively participate in ensuring answers are correct. Students may take turns measuring the samples and creating the calculations.	
Closure (connections within lesson or between lessons, sharing successes, summaries) Next class, we will be applying Pythagorean theorem to our study of First People's constellations.	Ticket out the door: How can we calculate the hypotenuse of a 90 degree angle triangle?	