

MATHEMATICS

LESSON TITLE: The Pythagorean Theorem

Curriculum Area: Pre-Algebra

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Grade Level: 8 Time Required: 90 minutes

Instructional Grouping: Heterogeneous

http://daretodifferentiate.wikispaces.com/file/view/nagc_choice_menus.pdf

1. Overview of Lesson:

Today students will contract with the teacher for independent practice and extension through their choices on a Think Tac Toe board. Students will select their activities today and begin their work. The contracts will be continued at home and completed during the first part of the next class period.

2. Materials:

Think Tac Toe sheets for every student.

3. As a result of this lesson students should:

(a) know...

The Pythagorean Theorem states that in a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs ($c^2 = a^2 + b^2$).

In a right triangle, the hypotenuse is the leg opposite the right angle.

The hypotenuse is the longest side of the right triangle.

(b) understand...

The Pythagorean theorem was developed in ancient times and is still an integral tool today.

The relationship between the three sides of a right triangle.

The Pythagorean Theorem works only for right triangles.

(c) be able to do...

Use measurements to test the Pythagorean Theorem.

Apply the theorem to solve practice problems.

Recognize when to use the Pythagorean Theorem.

4. Pre-assessment:

5. Steps in Lesson:

1) The teacher will pass out Think Tac Toe sheets to every student.

2) The teacher will explain the activity choice in each square.

3) Just as in the "real" Tic Tac Toe game, students will select a line of three activities (3) to complete by the middle of the next class period.

4) Teacher will guide students as needed for the remainder of the period.

6. What is differentiated and how?

• The content is differentiated by increased complexity in the right-hand column.

• The process is differentiated by student interest (choice) and learning style.

7. Practical Hints for Implementation:

• Students will need clear directions and ready access to materials for all nine squares.

• You may want to steer your more advanced students toward the far right column.

*Attachments:

• Think Tac Toe master

• Directions for each square

Think Tac Toe
The Pythagorean Theorem

Directions: Complete the activities described in either one vertical or one diagonal row.

<p>Draw a right triangle and label the right angle, legs, and hypotenuse. State the relationship of the sides of a triangle.</p>	<p>Name a career in which one would have to use the Pythagorean Theorem. Give an example of when, where and how it would be used.</p>	<p>Design a teaching tool with a diagram of a proof of the Pythagorean Theorem. Label it for all to understand.</p>
<p>Complete all of the EVEN Practice Problems on p. 266 of your Prentice Hall text.</p>	<p>Complete the Practice Problems found at this site: http://regentsprep/Regents/math/fpyth/PracPyth.htm</p>	<p>Create four (4) real world problems that would need the use of the Pythagorean Theorem. Show the solutions.</p>
<p>Determine a set of 8 Pythagorean "TRIPLES." Prove them with equations.</p>	<p>Write a descriptive essay about Pythagoras: his life, accomplishments, and failures.</p>	<p>Find another mathematical theorem. State it, diagram its proof, and write a paragraph about why, how and where it works.</p>

Name: _____

Due Date: _____

Teacher: _____

Period: _____

The purpose of this project is to further your knowledge of right triangles, Pythagorean Theorem, and Trigonometric Ratios. You will need to turn in three separate items for your project. You will use the Tic-Tac-Toe Menu below to choose which three items you want to complete and turn in. The three items you choose must be either in the same row, same column, or on a diagonal.

TIC - TAC- TOE MENU

PICK 3 ITEMS IN THE SAME COLUMN, ROW, OR ON A DIAGONAL

<p>Write a "breaking news" report about the trigonometric ratios.</p>	<p>Write a 1 page paper about the history and origin of the Pythagorean Theorem.</p>	<p>Write a song or poem about the concepts of this unit (Pythagorean Theorem, Special Right Triangles, and Trigonometric Ratios)</p>
<p>Find 10 examples of right triangles in the real world and briefly discuss their characteristics.</p>	<p>Make a poster on one of the following topics:</p> <ul style="list-style-type: none">• Pythagorean Theorem• Special Right Triangles• Trigonometric Ratios	<p>Write a children's story that contains two of three following concepts of this unit. (Pythagorean Theorem, Special Right Triangles, or Trigonometric Ratios)</p>
<p>Make a drawing using at least 6 special right triangles.</p>	<p>Make up a game that utilizes the concepts of this unit (Pythagorean Theorem, Special Right Triangles, and Trigonometric Ratios)</p>	<p>Solve and present the solutions to 3 problems provided by the teacher.</p>

Grading:

Each item will be scored between 1 and 4 based on the rubric below. For turning in your project on or before the due date, you will receive 25 points. For each day (this is actual day and not class period) that the project is late it is 5 points off. Each point that you receive on your project is worth 7 points.

Example: Project was turned in on the due date and received a score of 9. This student would earn an 88 as their grade (25 (turning the project in on due date) + 63 (9 times 7))

Rubric for this Assignment:

Choice	1 Low level of Achievement	2 Moderate Level of Achievement	3 High Level of Achievement	4 Exemplary Achievement
"Breaking News"	News report does not demonstrate knowledge of trigonometric ratios.	News report demonstrates knowledge of trigonometric ratios.	News report demonstrates a solid knowledge of trigonometric ratios.	News report demonstrates a deep knowledge of trigonometric ratios. Readers come away with a deep understanding of the concept.
1 Page Paper	Paper presents little or no evidence of research and knowledge of the history and origin of the Pythagorean Theorem.	Paper presents some evidence of research and knowledge of the history and origin of the Pythagorean Theorem.	Paper presents evidence of research and a thorough knowledge of the history and origin of the Pythagorean Theorem.	Paper presents convincing evidence of extensive research and a thorough knowledge of the history and origin of the Pythagorean Theorem. Readers gain a deeper understanding of the concept.
Drawing	Drawing demonstrates little or no understanding of special right triangles.	Drawing effectively demonstrates a basic understanding of special right triangles.	Drawing effectively demonstrates a solid understanding of special right triangles.	Drawing effectively demonstrates a complete understanding of special right triangles. Viewers also gain a deeper understanding of the topic.
Examples	The examples selected demonstrate little or no understanding of right triangles and how they occur in the real world.	The examples selected demonstrate a basic understanding of right triangles and how they occur in the real world.	The examples selected create a complete picture of right triangles and how they occur in the real world.	The examples selected create a perfect picture of right triangles and how they occur in the real world. Viewers of the examples come away with a better understanding of right triangles.
Poster	The poster demonstrates little or no understanding of the topic selected.	The poster demonstrates a basic understanding of the topic selected.	The poster effectively demonstrates a solid understanding of the topic selected.	The poster effectively demonstrates a solid understanding of the topic selected. Viewers come away with a deeper understanding of the selected topic.
Children's Story	The Children's Story contains none or one of the three concepts, and does little to explain it in an understandable way.	The Children's Story contains two of the three concepts, but does little to explain them in an understandable way.	The Children's Story contains two of the three concepts, and explains them in an understandable way.	The Children's Story contains two of the three concepts, and explains them in such a way as to become an example for later classes.
Game	The Game does not effectively utilize the concepts of this unit.	The Game effectively utilizes the concepts of this unit.	The Game effectively utilizes the concepts of this unit, and it is easy and fun to play.	The Game effectively utilizes the concepts of this unit, it is easy and fun to play, and it can be used to teach the unit in the future.
Song or Poem	The Song or Poem shows little or no understanding of the concepts in this unit.	The Song or Poem shows some understanding of the concepts in this unit.	The Song or Poem shows a solid understanding of the concepts in this unit. It is well-written.	The Song or Poem shows a complete understanding of the concepts in this unit, it is well-written, and it is polished and ready to be performed in public.
Solve and Present	The solution and presentation of the 3 problems demonstrate little or no understanding of the concepts presented in this unit.	The solution and presentation of the 3 problems demonstrate a basic understanding of the concepts presented in this unit.	The solution and presentation of the 3 problems demonstrate a solid understanding of the concepts presented in this unit.	The solution and presentation of the 3 problems demonstrate a complete understanding of the concepts presented in this unit, and could be used as examples in class.

EXAMPLE 1 OF DIFFERENTIATED INSTRUCTION

Interest & Learning Style & Readiness

RAFT

Format based on work of Doug Buehl cited in *Teaching Reading in the Content Areas: If Not Me, Then Who?* Billmeyer and Martin, 1998

A Raft...

Is a creative, fun strategy that encourages students to

-assume a role

-consider their audience, while

-working in a particular format

-to examine a topic from their chosen perspective and is motivating because it gives students choice, appeals to their interests and learning profiles and can be adapted for student readiness

Know: Names of functions, end behavior, degree, intercepts, sketch

Understand: Understand that a function has certain properties

Do: Explain and illustrate how a certain function looks and the important parts that it entails

Role Good spot for interest differentiation	Audience Good spot for interest and/or readiness differentiation	Format Good spot for learning profile differentiation	Topic Good spot for interest and/or readiness differentiation	Optional Column Hints, Required Points, Etc.
Comedian	Math Symposium (Comedy Act)	Comedy Skit Notes	Favorite Function	Properties of function Sketch End Behavior Degree Intercepts
Student	Parent	Wallet Card	You will enjoy these features	
Function	Another Function	Facebook Page	We are alike and unique in different ways	
Graphing Calculator	Calculator Company	Letter	My screen broke! How can a student know the pertinent information?	

EXAMPLE 2 OF DIFFERENTIATED INSTRUCTION

Interest & Learning Style & Readiness

Know: Different types of conic sections and properties

Understand: Understand that conic sections are prevalent in the world and have a variety of uses/applications

Do: Identify the different parts of conic sections, explain how they are relevant

Analytical Prompt	Practical Prompt	Creative Prompt
Identify the key properties of each conic section and organize your information in a chart. Give a concrete example of each conic in the world and explain why it is relevant to society.	Create a graphic organizer that would help a struggling student with the conic properties and give a concrete example of each conic in the world and explain why it is relevant to society.	Create a cartoon that identifies the key properties of each conic. Give a concrete example of each conic in the world and explain why it is relevant to society.