EDR 321 Lesson Plan (Fall 2014)

EDR 321 Student Name: Samantha Parks and Paul Garrett  
Grade Level/Content Area: 8th grade/ Mathematics  
Placement School: Grandville Middle School 
Collaborating Teacher: Jamie Stuart

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<th>Content Area (Class)/Grade</th>
<th>Date of Lesson</th>
<th>November 10, 2014</th>
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<tr>
<td>8th grade Algebra</td>
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<table>
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<tr>
<th>Lesson Title</th>
<th>Date (circle/highlight one)</th>
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<td>What’s Your Angle, Pythagoras?</td>
<td>Independent</td>
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<th>Standards (CCSS and/or Content Standards)</th>
<th>Texts/Visuals/Resources/Supplementary Materials</th>
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<tr>
<td>CCSS.MATH.CONTENT.8.G.B.6</td>
<td>• “What’s Your Angle, Pythagoras?” Introduction Worksheet</td>
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| Explain a proof of the Pythagorean Theorem and its converse. | • “What’s Your Angle Pythagoras?” by Julie Ellis  
|                                           | • Guided Reading Worksheet                    |

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<th>Key Vocabulary</th>
<th>Texts/Visuals/Resources/Supplementary Materials</th>
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<td>From Introductory Worksheet: Area, Dimensions, Side Length</td>
<td>• “What’s Your Angle, Pythagoras?” Introduction Worksheet</td>
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| From Pythagoras Book: Right Angle, Right Triangle, Squared, Pythagoras | • “What’s Your Angle Pythagoras?” by Julie Ellis  
| Vocab word of the day: Perfect Square | • Guided Reading Worksheet |

More than half of our unit is devoted to teaching the Pythagorean Theorem, so this lesson is aimed to be a creative approach at introducing this topic. We have decided to begin the lesson with an exploratory activity where students are experimenting with the Pythagorean Theorem without it being formally identified. We want students to come to a realization of what the Pythagorean Theorem is on their own, rather than simply being told what it is. After the student’s introduction worksheet, we will read the book “What’s your angle Pythagoras?” which is aimed at illustrating how the theorem was created, but it is in the format of a children’s story so it is easily accessible and entertaining to students. Leading up to this lesson, we have taught the students basic concepts of irrational numbers so that they have the tools needed to thoroughly understand the theorem and all of its parts.
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<th>Objectives</th>
<th>Meaningful Instructional Activities</th>
<th>Assessment</th>
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<td>(What will students know, be able to do? For each objective, provide an example of evidence of success: If students met the learning target, what would they say/do? Is the purpose of this lesson to teach something new, to review, or to formatively assess (what knowledge/skills are students bringing and do not need to be taught or what should be taught at the point of need)? NOTE: Objectives should build on earlier learning and prepare for future learning)</td>
<td>(What will teacher and students be doing? Lesson should be based on a model of gradually releasing responsibility to and include focus lesson, guided instruction, productive group work, and independent learning, though not necessarily in lock-step order. Note that a focus lesson is not simply teacher modeling of what student should do in the end, though certainly there is value in modeling. Rather, it is teacher explicit instruction in the form of clear explanation of tasks and demonstration using comprehensible input that scaffold to ensure understanding of concepts. [I do. You watch and respond.] Guided instruction should use instructional strategies/approaches that facilitate students’ use of learning strategies. Teacher moves should be supported by theoretical and empirical (based on research) work. [We do together. I help and respond.] Productive group work should provide opportunities for practice in applying content and language knowledge developed in guided instruction and further build knowledge and hone skills in interaction with peers. [You do together. I watch and respond.] Independent learning [You do independently. I watch and respond.]</td>
<td>(For each content or language objective, what evidence of student learning will you collect? These may be spot-checks, teacher observations, and questioning, but it is not enough to simply say ‘observation’ or ‘anecdotal notes.’ Describe succinctly, attach or append to plan tool/criteria to be used. Include prompts to elicit deep thinking. Be clear if these assessments are formative or summative.)</td>
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### Content Objective(s)

The Student Will Be Able To:
- Verify the validity of the Pythagorean Theorem.
- Construct a basic proof of the Pythagorean Theorem.
- Review a piece of literature to identify the key points.
- Identify relationships between mathematical concepts.

### Language Objective(s) (including Launch)

**Launch**
- We will begin by going over our vocabulary word of the day, which will be “Perfect Square.” This will be a review of a concept covered the previous day, and is something that the students need to remember when learning about the Pythagorean Theorem.
- After vocabulary, we will present a mathematical problem to students that they will be unable to solve. This problem is attached at the end of the lesson. This will illustrate the need for the Pythagorean Theorem in everyday life, future math classes, and will hopefully get students excited about learning something new.

**Lesson Sequence**
(Steps that provide instruction and practice and application of key concepts, language and vocabulary via speaking, listening, reading, writing, viewing and representing visually; based on Gradual Release of Responsibility.)

### Assessment of Student Learning

**Launch**
- During the in-class activity the teacher will be able to assess the students progress and understanding by reviewing the work each student has done, interpret the questions asked, and assessing body language of their students.

**Lesson Sequence**
- During this portion of the lesson, students will be given a worksheet that acts as a tool to help them pick out the main, and most important, ideas within the book. This worksheet is provided at the end of this
The Student Will Be Able To:

- Understand the key vocabulary and use it in context.
- Interprett written mathematical concepts and wri the them as algebraic statements.

After our launch activities, we will give students the worksheet titled, “What’s Your Angle, Pythagoras? Intro Worksheet”. This worksheet is an introduction to the book that we will read to the students because it involves constructing the same figures that Pythagoras constructs in the book, which help him discover the Pythagorean Theorem. Our goal is that students will see this relationship on their own, before it is laid out for them in the book. Overall, this is a guided discovery type of document.

This worksheet should take students about 10-15 minutes to complete. While students work, the teacher will be walking around the room making sure students are staying on task and have a clear idea of what the directions are asking them to do. No explicit answers should be given to the students during this time, students are supposed to struggle with these ideas on their own.

Once students have completed the worksheet, we will put it aside and immediately go into the reading of the book “What’s Your Angle, Pythagoras?”. We do not want to go over the worksheet as a class because the purpose of the activity is simply to get students thinking about the Pythagorean Theorem and the idea behind why it works.

The teacher will read the entire Pythagorean Theorem book to the students, without stopping to clarify or talk about certain content. Students will be analyzing the text on their own after the book is completed in order to pick out the important information, so the teacher should not give students the answers during the reading.

The teacher will make the book reading a fun activity for the students by allowing them to sit however they feel most comfortable in the room as a break from the norm.

Afterwards, the teacher will ask the students to grab white boards that each group has at their disposal. Working in groups, the students will participate in an activity that allows them to think about the topic and apply their prior knowledge and understanding to the Pythagorean Theorem while also having a chance to write down things that may confuse them. Individually students should write on their groups whiteboard what they think they know about the topic and something they document. Students will have the remainder of class to complete the worksheet. If it is not completed in class, a scanned copy of the book will be uploaded onto an accessible school website that every student has full access to (all students in these particular classrooms have access to the internet at home). This worksheet will help students solidify what the Pythagorean Theorem is, an idea (yet fantastical) of how it was derived, and gives them a few examples of how it can be used in a real life context.

Wrap-Up

- The next day in class the worksheet will be covered as a whole class. Many of the questions were designed to keep the students attention and to help them follow the story so the teacher should emphasize the questions that contain the most content and are the most important. No formal grade will be assigned to the worksheet, the teacher will simply assess the students understanding as a whole group as the next few lessons will be aimed at helping them further explore this idea in a more formalized manner.
**Content Objective(s)**

The Student Will Be Able To:

- Verify the validity of the Pythagorean Theorem.
- Construct a basic proof of the Pythagorean Theorem.
- Review a piece of literature to identify the key points.
- Identify relationships between mathematical concepts.
- Understand the key vocabulary and use it in context.
- Interpret written mathematical concepts and write them as algebraic statements.

**Launch**

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**Launch**

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** IMPORTANT TO NOTE:** Please supply any/all materials that will help instructor and peers understand this lesson, for example, a text to be used, links to websites, photographs of items not known or readily visualize-able (e.g., posters, charts), and if there is something that you plan to copy and distribute to students, it should be attached or included at the conclusion of this lesson plan document.
<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
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<tr>
<td><strong>1. So...how do you feel the lesson went and why?</strong></td>
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<tr>
<td><strong>2. Provide evidence of the full range of student learning</strong></td>
<td>(i.e., students who: 1.) can do, 2.) can almost do, 3.) can do with support) in the form of data, quotes, annotated student work (scanned, attached), your own reflections, etc.</td>
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<tr>
<td><strong>3. After identifying the full of range of student learning (see question #2 above) and the factors that may have influenced learning, what are your (and your CT’s) next steps and why?</strong></td>
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<tr>
<td><strong>4. What additional ways can (and will) you support students’ content-area literacy development (e.g., the ability to read, write, and communicate for various purposes in your content area)?</strong></td>
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Launch Problem

Mrs. Stuart, Mr. Garrett, and Ms. Parks are decorating for Thanksgiving and are looking to hang a colorful paper chain diagonally across the room. If they know that the room is 40 feet wide and 50 feet long, how can they use this information to find out how long their paper chain needs to be in order to hang from one corner of the room to the corner diagonal from it.
What's Your Angle, Pythagoras?
* Intro Worksheet *

*Image will be put in by hand*

Shown above is a triangle with side lengths 3, 4, and 5.

1. Using the three side lengths of the triangle, construct three different squares (using the graph paper provided) each having dimensions corresponding to the three side lengths of the triangle (Hint: One of these squares will be a 4x4). Glue these squares in their corresponding locations along the sides of the triangle.

2. Find the area of each square and record it below:

3. What do you notice about the relationship between the area of the smaller squares and the larger square?
What’s Your Angle Pythagoras?

1. What was wrong with the ladder that Pepros and Saltros built?

2. What was wrong with the columns that Pepros and Saltros built?

3. Why didn’t Pythagoras’ father sail directly from his home to Crete?

4. When Pythagoras sailed to Alexandria with his father and met Nef, what tool did Nef show Pythagoras and what did he use this tool for?

5. While Pythagoras explored with the rope, he made a triangle with what three lengths?

6. What did Pythagoras do with his father’s red and blue tiles after he found the triangular concrete base?

7. What did Pythagoras discover about his constructions with the red and blue tiles?

8. When sailing home with his father, what did Pythagoras discover about how to find the total number of tiles in a square?

9. What does he call multiplying a number by itself?

10. After Pythagoras drew a new picture, what equation did he come up with to represent the relationship between the three squares?

11. How did Pythagoras use his new ideas about right triangles to solve Pepros and Saltos’ ladder problem?

12. What does Pythagoras tell Pepros and Saltos they can do to make their columns stand straight?

13. What is Pythagoras’ right triangle pattern?
14. How does he use this pattern to find the distance from Crete to Samos?