Geometry is fun, let's make it done

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Rationale

As a high school student, I was usually one of those that asked teachers "Why do we need this?", "When will I use this? ", or "How can this help me in life?". I didn't know at that time that Math is everywhere around us and that we use math everyday. I couldn't see the beauty behind "cold" formulas, I didn't get why sine, cosine and tangent has to exist. I wasn't very fond of trigonometry and found it very challenging. I was frustrated to learn all the formulas and the rules that we needed to know and apply, without understanding the magic that stands behind it. Now, as a teacher, I can see that, if you do not have a dedicated educator who can open your mind to see all such aspects, you will never be able to learn and apply trigonometry. That's why I want to approach this unit from a different and fun perspective that can enhance students' achievements and understanding.

Objectives

The new Common Core State Standards expect that high school students who are enrolled in Geometry class will be able to argue and justify the Pythagorean Theorem using right triangle similarity, as well as identify, use, and apply trigonometric functions as they relate to right triangles. They are expected to be able to apply the properties of special right triangles to find side lengths. Students will be able to set up trigonometric ratios in right triangles and use these ratios to solve problems (find side lengths and angle measures). Last, they will be able to use the Pythagorean Theorem and trigonometric ratios to solve right triangles in applied math problems and word problems.

Most of my students are enrolled in the MYP International Baccalaureate program, and, according to International Baccalaureate Organization[1] , "IB learners strive to be inquirers, knowledgeable, thinkers, communicators, principled, open-minded, caring, risk-takers, balanced, reflective and the aim of all IB programme is to develop internationally minded people who, recognizing their common humanity and shared guardianship of the planet, help to create a better and more peaceful world." Having that in mind, I will try with this unit to start the base of their international awareness, to present the content in different and more entertaining way, so they will be able to develop their natural curiosity, to acquire the skills necessary to conduct inquiry and research and show independence in learning and they actively enjoy learning, therefore this love of learning will be sustained throughout their lives.

In this unit, I will expose my students to the concepts related to the right triangle, having in mind that they should have a solid foundation of Pythagorean Theorem from 8^{th} grade. After mastering the Theorem and solving problems using it, I will present special right triangle (30- 60 – 90 and 45- 45- 90) that will lead us to the basic trigonometric ratios: sine, cosine, tangent. The last part of the unit will be dedicated to angles of elevation and depression.

I will start the unit with a part of the history of ancient mathematics, more specific the history of the Pythagorean Theorem. Searching online resources about this topic, I discover this great site[2] where I was able to find this interesting remark related to the Pythagorean Theorem:

Remark

The statement of the Theorem was discovered on a Babylonian tablet circa 1900-1600 B.C. Whether Pythagoras (c.560-c.480 B.C.) or someone else from his School was the first to discover its proof can't be claimed with any degree of credibility. Euclid's (c 300 B.C.) *Elements* furnish the first and, later, the standard reference in Geometry. In fact Euclid supplied two very different proofs: the Proposition I.47 (First Book, Proposition 47) and VI.31. The Theorem is *reversible* which means that its *converse* is also true. The converse states that a triangle whose sides satisfy $a^2 + b^2 = c^2$ is necessarily right angled. Euclid was the first (I.48) to mention and prove this fact.

W. Dunham [*Mathematical Universe*] cites a book *The Pythagorean Proposition* by an early 20th century professor Elisha Scott Loomis. The book is a collection of 367 proofs of the Pythagorean Theorem and has been republished by NCTM in 1968. In the Foreword, the author rightly asserts that the number of algebraic proofs is limitless as is also the number of geometric proofs, but that the proposition admits no trigonometric proof. Curiously, nowhere in the book does Loomis mention Euclid's VI.31 even when offering it and the variants as algebraic proofs 1 and 93 or as geometric proof 230.

In all likelihood, Loomis drew inspiration from a series of short articles in *The American Mathematical Monthly* published by B. F. Yanney and J. A. Calderhead in 1896-1899. Counting possible variations in calculations derived from the same geometric configurations, the potential number of proofs there grew into thousands.

In trigonometric terms, the Pythagorean theorem asserts that in a triangle ABC, the equality $\sin^2A + \sin^2B = 1$ is equivalent to the angle at C being right. A more symmetric assertion is that ΔABC is right if $\sin^2A + \sin^2B + \sin^2C = 2$. By the sine law, the latter is equivalent to $a^2 + b^2 + c^2 = 2d^2$, where d is the diameter of the circumcircle. Another form of the same property is $\cos^2A + \cos^2B + \cos^2C = 1$ which I like even more.

Pythagorean Theorem generalizes two spaces of higher dimensions. Some of the generalizations are far from obvious. Pythagorean theorem serves as the basis of the Euclidean distance formula.

Larry Hoehn came up with a plane generalization which is related to the law of cosines but is shorter and looks nicer.

The Theorem whose formulation leads to the notion of Euclidean distance and Euclidean and Hilbert spaces, plays an important role in Mathematics as a whole. There is a small collection of rather elementary facts whose proof may be based on the Pythagorean Theorem.

Wherever all three sides of a right triangle are integers, their lengths form a *Pythagorean triple* (or *Pythagorean numbers*). There is a general formula for obtaining all such numbers.

Several false proofs of the theorem have also been published. It is better to learn from mistakes of others than to commit one's own.

It is known that the Pythagorean Theorem is Equivalent to Parallel Postulate.

The Pythagorean configuration is known under many names, the Bride's Chair being probably the most popular. Besides the statement of the Pythagorean theorem, Bride's chair has many interesting properties, many quite elementary.

The most famous of right-angled triangles, the one with dimensions 3:4:5, has been sighted in Gothic Art and can be obtained by paper folding. Rather inadvertently, it pops up in several Sangaku problems.

Perhaps not surprisingly, the Pythagorean theorem is a consequence of various physical laws and is encountered in several mechanical phenomena.

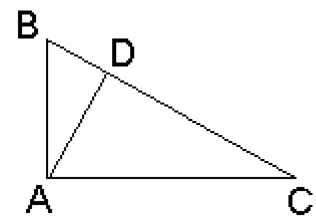
Teaching strategies

I will provide each student with a booklet with this remark and also incorporate some of the proofs for Pythagorean Theorem. I will divide my students in learning teams and I will assign them a project based on the proofs of the Pythagorean Theorem. I will refer them to the link above and also provide them 20-30 of the 98 proofs and each group will need to choose one of the proofs. After they picked one, they will have to create a presentation of the proof, according to their learning style. One group will need to make a presentation on a tri-fold board and will need to come with good argumentation why they have chosen that specific proof. Two groups that have different proofs will have to create an advertisement to sell their “product”- the proof. A different group will need to create a children’s book that tells story of the proof. Other group will create a play and one student will embody Pythagora, who is presenting to his students the proof of his own theorem.

These are some of the proofs that my students can choose from:

Proof #1

We start with the original right triangle, now denoted ABC, and need only one additional construct - the altitude AD. The triangles ABC, DBA, and DAC are similar which leads to two ratios:



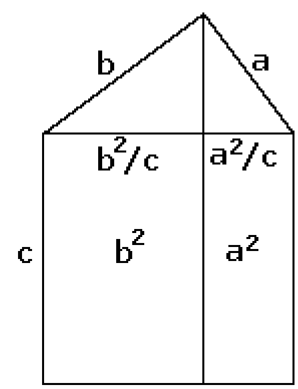
$$AB/BC = BD/AB \text{ and } AC/BC = DC/AC.$$

Written another way these become

$$AB \cdot AB = BD \cdot BC \text{ and } AC \cdot AC = DC \cdot BC$$

Summing up we get $AB \cdot AB + AC \cdot AC = BD \cdot BC + DC \cdot BC = (BD+DC) \cdot BC = BC \cdot BC$

In a little different form, this proof appeared in the *Mathematics Magazine*, 33 (March, 1950), p. 210, in the Mathematical Quickies section, see *Mathematical Quickies*, by C. W. Trigg.



Taking AB = a, AC = b, BC = c and denoting BD = x, we obtain as above

$$a^2 = cx \text{ and } b^2 = c(c - x),$$

which perhaps more transparently leads to the same identity.

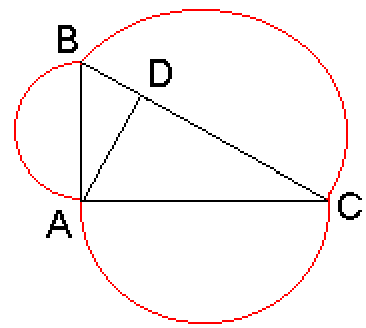
In a private correspondence, Dr. France Dacar, Ljubljana, Slovenia, has suggested that the diagram on the right may serve two purposes. First, it gives an additional graphical representation to the present proof #6. In addition, it highlights the relation of the latter to proof #1.

R. M. Mentock has observed that a little trick makes the proof more succinct. In the common notations, c = b cos A + a cos B. But, from the original triangle, it's easy to see that cos A = b/c and cos B = a/c so c = b (b/c) + a (a/c). This variant immediately brings up a question: are we getting in this manner a trigonometric proof? Not really, although a trigonometric function (cosine) makes here a prominent appearance. The ratio of two lengths in a figure is a shape property meaning that it remains fixed in passing between similar figures, i.e., figures of the same shape. That a particular ratio used in the proof happened to play a sufficiently important role in trigonometry and, more generally, in mathematics, so as to deserve a special notation of its own, does not cause the proof to depend on that notation.

Michael Brozinsky came up with a variant of the proof that I believe could be properly referred to as *lipogrammatic*.

Finally, it must be mentioned that the configuration exploited in this proof is just a specific case of the one from the next proof - Euclid's second and less known proof of the Pythagorean proposition. A separate page is devoted to a proof by the similarity argument.

Proof #2



The next proof is taken verbatim from Euclid VI.31 in translation by Sir Thomas L. Heath. The great G. Polya analyzes it in his *Induction and Analogy in Mathematics* (II.5) which is a recommended reading to students and teachers of Mathematics.

In right-angled triangles the figure on the side subtending the right angle is equal to the similar and similarly described figures on the sides containing the right angle.

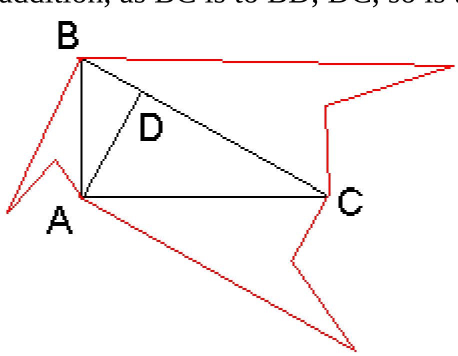
Let ABC be a right-angled triangle having the angle BAC right; I say that the figure on BC is equal to the similar and similarly described figures on BA, AC.

Let AD be drawn perpendicular. Then since, in the right-angled triangle ABC, AD has been drawn from the right angle at A perpendicular to the base BC, the triangles ABD, ADC adjoining the perpendicular are similar both to the whole ABC and to one another

And, since ABC is similar to ABD, therefore, as CB is to BA so is AB to BD

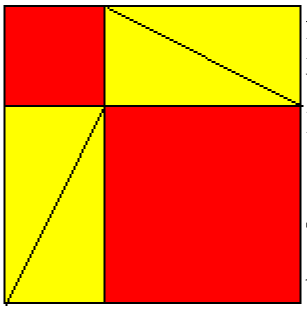
And, since three straight lines are proportional, as the first is to the third, so is the figure on the first to the similar and similarly described figure on the second. Therefore, as CB is to BD, so is the figure on CB to the similar and similarly described figure on BA.

For the same reason also, as BC is to CD, so is the figure on BC to that on CA; so that, in addition, as BC is to BD, DC, so is the figure on BC to the similar and similarly described figures on BA, AC.



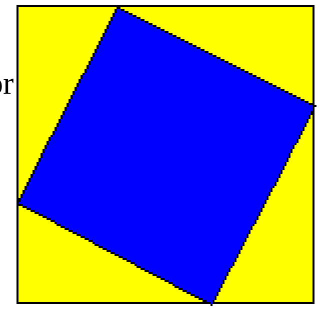
But BC is equal to BD, DC; therefore the figure on BC is also equal to the similar and similarly described figures on BA, AC.

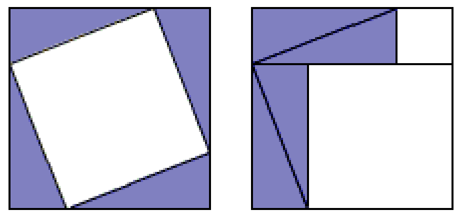
Proof #3



Another proof stems from a rearrangement of rigid pieces. Loomis (pp. 49-50) mentions that the proof "was devised by Maurice Laisnez, a high school boy, in the Junior-Senior High School of South Bend, Ind., and sent to me, May 16, 1939, by his class teacher, Wilson Thornton."

The proof has been published by Rufus Isaac in *Mathematics Magazine*, Vol. 48 (1975), p. 198.

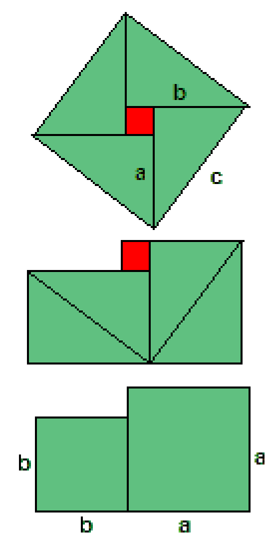




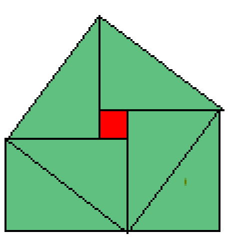
Proof #4

This and the next 3 proofs came from R. B. Nelsen, Proofs Without Words, *MAA, 1993*

The triangles in Proof #3 may be rearranged in yet another way that makes the Pythagorean identity obvious.



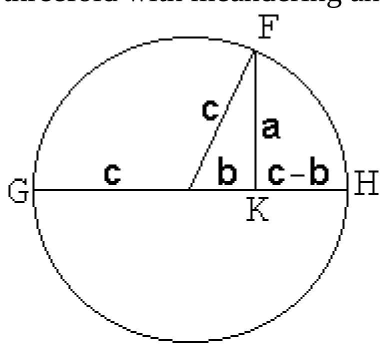
The first two pieces may be combined into one. The result appear in a 1830 book *Sanpo Shinsyo* - *New Mathematics* - by Chiba Tanehide (1775-1849), [H. Fukagawa, A. Rothman, *Sacred Mathematics: Japanese Temple Geometry*, Princeton University Press, 2008, p. 83].



Proof #5

Draw a circle with radius c and a right triangle with sides a and b as shown. In this situation, one may apply any of a few well known facts. For example, in the diagram three points F, G, H located on the circle form another right triangle with the altitude FK of length a. Its hypotenuse GH is split in two pieces: (c + b) and (c - b). So, we get $a^2 = (c + b)(c - b) = c^2 - b^2$.

Loomis attributes this construction to the great Leibniz, but lengthens the proof about threefold with meandering and misguided derivations.



Lesson plans and classroom activities

The unit will be composed by 5-6 lessons, and each lesson is a block period long (75-90min). Each lesson will have individual lesson plan, aligned to the Common Core State Standars

Lesson 1

First lesson is a refresher lesson on right triangles, basic vocabulary for right triangle (right angle, legs, hypotenuse). Students will review the Pythagorean Theorem that they learned in middle school. The Pythagorean theorem states that the sum of the squares of the lengths of the two other sides of any right triangle will equal the square of the length of the hypotenuse, or, in mathematical terms, for the triangle shown down, $a^2 + b^2 = c^2$. Integers that satisfy the conditions $a^2 + b^2 = c^2$ are called "Pythagorean triples."
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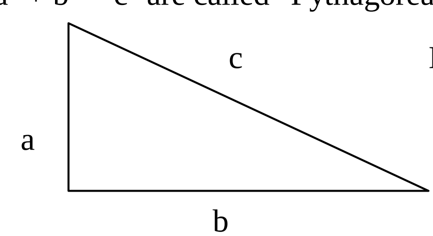


Examples of Pythagorean triples:

3, 4, 5 6, 8, 25 12, 16, 20

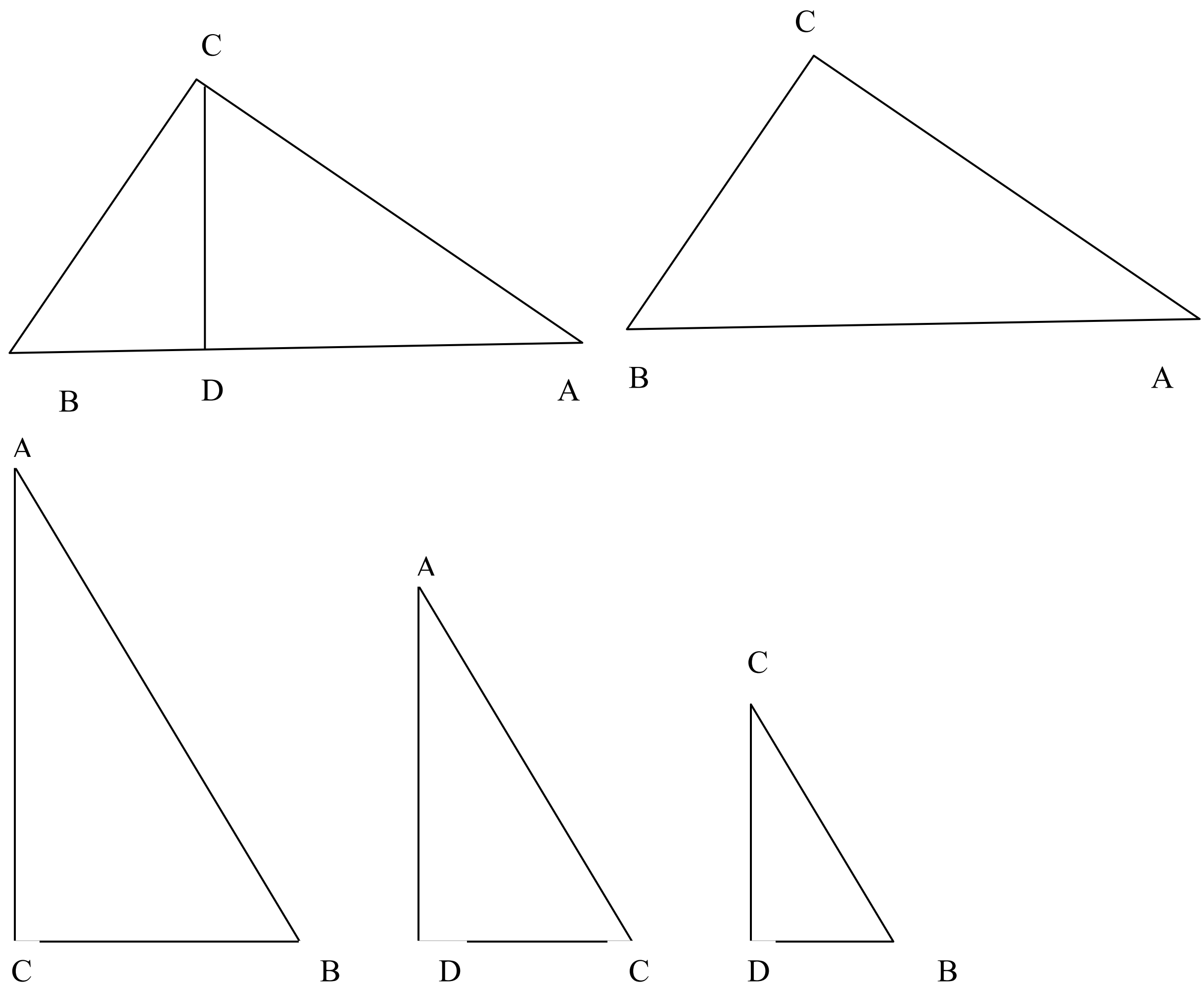
If the relationship is not an equality, then there are 2 other possibilities:

1) for $a^2 + b^2 > c^2$ there is an acute triangle

2) for $a^2 + b^2 < c^2$ there is an obtuse triangle

I order to see the fun part of geometry I will show students two animated demonstrations[3] of the Pythagorean Theorem. After showing the video, students will have a hands on activity: we will use different color construction paper, wax paper, markers, rulers and scissors to illustrate the demonstration on Pythagorean Theorem, using similarity of right triangles.

On wax paper, given triangle ABC, with right angle A, we will draw the altitude from the right angle. We will copy triangle ABC, without the altitude CD, on a different piece of wax paper. Using different colors, we label each vertex with the same color and we will cut initial triangle through CD. Next step is to paste the 3 triangle beside each other, so students can observe the similarity between them.



The length of AB= c AC= a, BC= b, CD= h, AD= d, and BD= e. Triangles ADC and ACD are similar and if we write the similarity statement we will have :

$\frac{AC}{AB} = \frac{AD}{AC}$. When we substitute the values of the lengths of the side, we will have $\frac{a}{c} = \frac{d}{a}$. We use the cross multiplication property and the new relationship is $a^2 = cd$.

Also, triangles BDC and BCA are similar, so if we write the similarity statement we will have : $\frac{BC}{BA} = \frac{BD}{BC}$. When we substitute the values of the lengths of the side, we will have $\frac{b}{c} = \frac{e}{b}$. We use the cross multiplication property and the new relationship is $b^2 = ce$.

Then we will add the two relationships and we will have:

$$a^2 + b^2 = cd + ce$$
$$a^2 + b^2 = c(d + e)$$

But $d + e = c$, and when we substitute, we will have:

$$a^2 + b^2 = c \cdot c$$
$$a^2 + b^2 = c^2$$

Students are expected to write on the construction paper this proof, so they will have a model to use for next activities.

After I present them this proof of the Pythagorean Theorem, I will reveal them that there are others way to prove the theorem and I refer them to the link[1] and hand out the booklet with those proofs. At this time, I will introduce the activities they need to choose from and according to their learning style, I will divide them in groups. The activities are: tri-fold presentation, bedtime Pytagoras, dramatize your Math, selling Math, rap your Math.

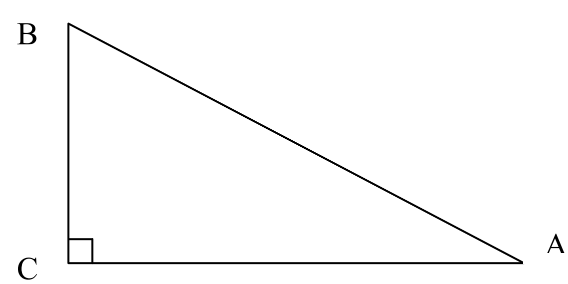
Lesson2-Lesson3

We will be focused on the trigonometric ratios, to find sine, cosine, tangent in a right triangle. As we know the definition for the basic trigonometric ratios are:

sinA=$\frac{opposite}{hypotenuse}$

cosA=$\frac{adjacent}{hypotenuse}$

tanA= $\frac{opposite}{adjacent} = \frac{\sin A}{\cos A}$



In order for my students to better memorize the formulas, I will encourage them to use mnemonics, and the most common is the one using the first letters from each word that forms the ratio:

Sine = **O**pposite/ **H**ypotenuse **SOH**

Cosine= **A**djacent/ **H**ypotenuse **CAH**

Tangent = **O**pposite/ **A**djacent **TOA**

So, the "shortcut" it will be **SOH – CAH – TOA.** And to make it even easier and more entertaining for students I will show them a fun video that I founded on Youtube[4] . At this point of the lesson I will assign Rap your Math activity to my aural (auditory-musical) group. They will be asked to rap about Pythagoras and the theorem. They must write their lyrics and rap it either for the class or preferably on video. They can video using a camera, a phone or the iPad that my school granted me. To give them a start point, I will tell them my little poem that I came up with when I applied for CTI:

Geometry is fun
Let's make it done
Be the wiz
To master the quiz

Lesson3-Lesson 6

These lessons will be held in the computer lab or if you have enough computers in your classroom or other ways to access internet (laptops or iPads cart) you can have them in your room. Students will start their research for each activity. The activities are as follow:

Bedtime Pytagoras

The group that is doing a children's book will search sites that show how to create one, using construction paper, scissors, markers and glue. One way to create the book is to fold 3-4 construction papers, hamburger style. Inside of the crease of one paper, students will mark 2 equidistant points from the margins of the line, for example 1in each from the margin. Using scissors, they will cut through each 1 inch segment. All other papers will have the same 2 points, but this time the cut will be made along the inside line segment. Then first paper will be inserted through the inside cut of the other pages and after arranging them to fit, our book is created. As a title, they can you *Bedtime Pytagoras* or *Mystery Puzzle* or any other creative title they can come with. The book will be based on an interesting riddle I found online[5]. The riddle says that a boy buys a fishing pole that is 6' 3" long. As he steps on the bus to return home, the driver tells him that he can't take anything on the bus longer than 6'. The boy goes back to town, buys one more thing, and the bus driver allows him on the bus. What did he buy, and what did he do with it?

Answer: The boy bought a 6' long box and he placed the fishing pole diagonally across the box. If the pole fit exactly across the diagonal, what are the dimensions of the box?

To solve this riddle students need to use Pythagorean theorem in the right triangle that has as hypotenuse the fishing pole and a leg equal to 6'. In order to have an accurate answer, first step is to convert the units of the sides lengths. We conclude that c=6'3"= (6*12+3)in=75in and a= 6'= (6*12)in=72in. Having the relationship between the lengths of the sides $a^2 + b^2 = c^2$ we substitute the values that we know.

$72^2 + b^2 = 75^2$

$b^2 = 75^2 - 72^2$

$b^2 = 441$, so b= 21in=1'9''.

In order to ride the city bus, the boy needs to buy a 6' to 1'9'' box to fit the fishing pole diagonally. He needs to use his math learning to discover the answer and get home!

The book will include each step of the solving process and also it will have some pictures or cartoons. I have had some very talented students, with really creative skills that could draw a cartoon character for the book and some scenes, to make it more interesting and funny for kids.

Dramatize your Math

Students that are mostly kinesthetic learners will comprise another group that will perform a play, which will include creating the décor and the costumes. The stage must have some specific details from that period, and the main scene will have place inside the secret school of Pythagoreans. One student will be Pythagoras, so he needs to research how people were dressed like during that period. He will also need to have some scholars around him to show the proof. It is known[6] that The Pythagoreans formed a league or a sect. They did not eat meat or beans; they could not wear clothes made of wool; they could not pick up anything that had fallen, stir a fire with iron, etc. The sect was divided between the akousmatikoi (hearers) and the mathematikoi (learned). They formed first "school" (from schole, "leisure"), defined as a way of life. And, perhaps because of their situation as foreigners, they understood themselves as following the spectator's way of life (in contrast with those who buy and sell, and those who run in the stadium). This is the bios theoretikos, the contemplative or theoretic life. The main difficulty to overcome: the body and its necessities, which subdue man. It is necessary to free one self from these. The body is a tomb -- one must triumph over it, but not lose it. To do so requires that one attain the state of enthusiasm. In this way, one attains a self-sufficient, theoretic life -- a life not tied to the necessities of the body, a divine life.

Having this in mind, the play will consist of 3 acts. First act will have Pythagora surrounded by his disciples and he has drawn a 1 by 1 square. He wants to demonstrate that this square creates a diagonal of length the root of 2. This number is irrational. Greeks, at that time, thought all numbers could be represented as fractions. So much so, that learning this became a secret in Pythagoras' school. One member let the secret slip and legend is that he was thrown from a ship!

Second act will consist on how the scholar betrayed the secret vow and revealed it to the outside world. The scene will take place on a public square, and the scholar seats on a cubic little stage, so everyone could see him. He uses the base of his podium, saying that is 1 by 1 feet and sustaining that there are other numbers than fractions: irrational numbers. One person in the crowd is Pythagora himself, but he is disguised. Hearing his scholars saying, he decided to leave the public square, without confronting him.

Third act has the same décor as the first one, Pythagora surrounded by his scholars, but this time he is not showing any proofs, he is revealing what he had seen in the public square. After a short trial, all of them decide that the betrayer has to be thrown from a ship.

Selling Math

Another group will use create an advertisement to sell 2 proofs of the theorem. Each ad must make it sound like their proof is the best, clearest and most interesting. Why would someone want that particular proof? By "selling" two proofs, students will learn that different proofs have different strengths. Further, each advertisement must point out why someone needs the theorem and how it is applicable to real life problems. For example painters need to know how high they can lean a ladder on a wall, in order to have access to the top of the wall for painting it. If he needs to paint a 9' wall in a 14' by 16' room, what is the maximum length of a ladder that he uses in this process. Students will have to use their critical thinking skills to solve the problem using Pythagorean theorem. The ladder will be the hypotenuse, the wall and the floor are the legs. They need to see that the length of the legs must have values less or equal than 9 and 14. They also need to consider that an average male person has at least 6', so the ladder is touching the wall at least 5' from the floor, but it cannot be less than 1' because the painter might fall. Having all this conditions, students need to create a solid advertisement so they can "sell" their proof.

Frame your Math

My visual students will create a tri- fold presentation of one the proofs that they choose. I can suggest them to use the proof involving similar right triangles and wax paper, since is part of the Common Core State Standards. They can create like a picture frame or a canvas, and the "picture" would be the proof itself.

At the end of the unit, I am planning to have an after school event, where each group will present their final product. This event everybody will be opened to the public: teachers, staff, administration, students, parents and any member of our community.

Resources

Bibliography for Teachers

1."IB learner profile." International Baccalaureate. www.ibo.org (accessed June 2, 2012). I used this Website to find information about students learning styles.

2."Pythagorean Theorem and its many proofs." Interactive Mathematics Miscellany and Puzzles. http://www.cut-the-knot.org/pythagoras/index.shtml#9 (accessed July 21, 2012). I used this source to present different ways to prove Pythagorean Theorem that I will use for this unit.

3."Annotated animated proof of the Pythagorean Theorem." Davis Associates, Inc. Home Page . http://www.davis-inc.com/pythagor/proof2.html (accessed July 21, 2012).

"NOVA Online | The Proof | Pythagorean Puzzle | Theorem." PBS: Public Broadcasting Service. http://www.pbs.org/wgbh/nova/proof/puzzle/theorem.html (accessed July 21, 2012). This two Websites will help visual learners to see an animated proof of the Pythagorean Theorem

4. "Gettin' Triggy Wit It (WSHS Math Rap Song) - YouTube." YouTube. http://www.youtube.com/watch?v=t2uPYYLH4Zo (accessed September 27, 2012). This you tube video will help students to create their own video clip about Pythagorean Theorem. The video is made by teachers and students from Westerville South High School, Westerville, Ohio.

5. "Riddle #104 - The Fishing Pole - YouTube." YouTube. http://www.youtube.com/watch?v=EBDDsULVLcg&feature=plcp (accessed November 3, 2012). I used this resource as a start point for the kids book, where students need real life example that use Pythagorean Theorem

6. "Introduction to the Pythagoreans." Drury University. http://www.drury.edu/ess/history/ancient/pythagoreans1.html (accessed December 6, 2012). This Website is a helpful resource for the group that is creating a play. It contains information about how ancient Greek life was during Pythagorean schools.

Reading List for Students

"IB learner profile." International Baccalaureate. www.ibo.org (accessed June 2, 2012). I used this Website to find information about students learning styles.

"Pythagorean Theorem and its many proofs." Interactive Mathematics Miscellany and Puzzles. http://www.cut-the-knot.org/pythagoras/index.shtml#9 (accessed July 21, 2012). I used this source to present different ways to prove Pythagorean Theorem that I will use for this unit.

"Annotated animated proof of the Pythagorean Theorem." Davis Associates, Inc. Home Page . http://www.davis-inc.com/pythagor/proof2.html (accessed July 21, 2012).

"NOVA Online | The Proof | Pythagorean Puzzle | Theorem." PBS: Public Broadcasting Service. http://www.pbs.org/wgbh/nova/proof/puzzle/theorem.html (accessed July 21, 2012). This two Websites will help visual learners to see an animated proof of the Pythagorean Theorem

"Gettin' Triggy Wit It (WSHS Math Rap Song) - YouTube." YouTube. http://www.youtube.com/watch?v=t2uPYYLH4Zo (accessed September 27, 2012). This you tube video will help students to create their own video clip about Pythagorean Theorem. The video is made by teachers and students from Westerville South High School, Westerville, Ohio.

"Riddle #104 - The Fishing Pole - YouTube." YouTube. http://www.youtube.com/watch?v=EBDDsULVLcg&feature=plcp (accessed November 3, 2012). I used this resource as a start point for the kids book, where students need real life example that use Pythagorean Theorem

"Introduction to the Pythagoreans." Drury University. http://www.drury.edu/ess/history/ancient/pythagoreans1.html (accessed December 6, 2012). This Website is a helpful resource for the group that is creating a play. It contains information about how ancient Greek life was during Pythagorean schools.

List of Materials for Classroom Use

Construction paper

Patty paper (wax paper)

Scissors

Glue sticks

Tri fold presentation board

Markers