

Grade 8 Maths – Pythagoras Theorem

Lesson title: Pythagoras Theorem: Intro

Date: 02/06/15

Curriculum links:

Investigate Pythagoras' Theorem and its application solving sample problems involving right-angled triangles (ACMMG222) (Year 9)

Carry out the four operations with rational numbers and integers, using efficient mental and written strategies and appropriate digital technologies (ACMNA183)

Choose appropriate units of measurement for area and volume and convert from one unit to another (ACMMG195)

General Capabilities:

Numeracy: Estimating and calculating with whole numbers

Using fractions, decimals, percentages, ratios and rates

Using measurement

Spatial reasoning

Literacy: Comprehending texts through listening, reading and viewing

Composing texts through speaking, writing and creating

Text knowledge

General Capabilities:

Numeracy: Estimating and calculating with whole numbers

Using fractions, decimals, percentages, ratios and rates

Using spatial reasoning

Using measurement

Literacy: Comprehending texts through listening, reading and viewing

Composing texts through speaking, writing and creating

Text knowledge

Outcomes:

- Students will understand and use Pythagoras' Theorem
- Students will communicate mathematical thinking coherently and clearly to others
- Students will see the use of Pythagoras' theorem in real world situations

Prerequisite knowledge:

- Understanding of decimals and units of measurements
- Solving equations using exponents and square roots
- Understanding of right-angles triangles and hypotenuses

Lesson Content:

Pythagorean Puzzle

Pythagoras PowerPoint

Introduction:

Students complete the Pythagorean Puzzle activity. Students are given three sheets; two sheets have diagrams and the third sheet is the cutting sheet. Students cut out shapes and paste these shapes into the large square on the diagrams. This exercise will show students that:

$$\text{Area A} + \text{Area B} = \text{Area C. } a^2 + b^2 = c^2$$

Students are asked why they discovered through this exercise

Teacher activities:

Show the Pythagoras PowerPoint

The PowerPoint highlights the real life implications of Pythagoras' theorem and introduces Pythagoras

Shows the theorem by completing triangles and filling in a table

Visual display of theorem with grids on squares

Visual displays to prove it only works for right-angled triangles

Work through examples calculating hypotenuse and short side

Learner activities:

Students listen

Complete an activity to help rediscover the theorem

Copy the triangle of the board and draw squares with gridlines to prove theorem.

Copy down the examples, answer questions about what is the hypotenuse, labelling the side a, b, & c, how to square on calculator, how to square root.

Closure:

Students pack away and wait to be dismissed.

Learner assessment:

Student's completion of the puzzles. Student's ability to rediscover the theorem themselves. Students ability to answer the questions during the PowerPoint presentation

Lesson evaluation:

The puzzle activity took a long time: Adjustment to use coloured cardboard to make it look more appealing and easier to work with. Also, complete in table groups to make the activity quicker.

Due to the long time on the Puzzle, only the beginning of the Pythagoras' PowerPoint was covered.

From a teaching point: due to nerves presentation of information was flat making it less interesting, waiting for all students to have the attention before speaking important, and keep an eye on wanders.

Overall, the lesson went well. Once I am more comfortable, it should become easier to present information. This was the first time in this class so I still have to learn student's name, but once I do, it should also make the lessons work better.

Lesson title: Pythagoras Theorem: L2	Date: 04/06/15
Lesson Content: Silent reading Pythagoras PowerPoint	
Introduction: Students silent read till 1:40pm – settle them down after lunch Ask students what they learnt last lesson Re-cap points from last lesson to refresh for all students and introduce to students who were away	
Teacher activities: Recap the PowerPoint slides proving the theorem works Students ask to draw their own triangles with squares that are gridded to prove it works. Work through examples of finding the hypotenuse – explain why we square the lengths and why we take the square root Work through examples of finding the short side	Learner activities: Students listen Complete exercise Copy down the examples, answer questions about what is the hypotenuse, labelling the side a, b, & c, how to square on calculator, how to square root.
Learner assessment: Students ability to answer the questions during the PowerPoint presentation and ability to do the calculations for the examples themselves	
Lesson evaluation: As it was Thursday, afternoon and all students present they were not as settled this lesson. Forgot Pythagoras triads so some students own triangles with squares did not work out perfectly. I should have had a list of required materials at the beginning of the lesson so students were prepared to copy and calculate the examples. I should have had a slide of write the equation and calculations steps out, instead I wrote this on the whiteboard. I did not fully account for the different levels of students, some being very fast and having nothing to occupy their time. For the lower end students I should have had sheets with the triangles on for them to fill in the examples. I need to move on once $\frac{1}{2}$ - $\frac{3}{4}$ students are ready. I should have given students a set of questions to practise calculating the hypotenuse before introducing the steps to calculate the short side. It was just too much new information to quickly. Improvements on the lesson design: remember triads, write list of materials on board, prepare for low-end students, have clear information they need to copy down, include practice questions for calculating the hypotenuse.	

<p>Lesson title: Pythagoras Theorem: L3</p>	<p>Date: 09/06/15</p>
<p>Lesson Content: Pythagorean Entry Ticket Pythagoras PowerPoint Questions</p>	
<p>Introduction: Students complete the entry ticket, which covers the basic skills students need to use Pythagoras theorem. This will indicate if students are having trouble with a particular aspect or which students do not understand at all. Walk around while doing this to check understanding. <i>On board – have list of what they will need for the lesson</i></p>	
<p>Teacher activities: Recap how to calculate the hypotenuse Give practice questions – move around guiding work and checking for understanding Recap how to calculate the short side of a triangle- big focus on rearranging the equation and the difference step (subtraction). Give the question sheet – move around guiding work and checking for understanding *For the students who were away- the three Pythagoras equations and steps for calculating both the long and short sides were written on the board and they copied into books.</p>	<p>Learner activities: Answer questions such as what is the hypotenuse, labelling the side a, b, & c, how to square on calculator, how to square root, what step do we do? – told they could refer back in books Practice calculating the hypotenuse by completing the questions provided. Copy down the examples and answer questions. For an example students complete the calculations in books themselves – one student selected to write steps on board for the whole class. Complete the question sheet – the sheet is designed for all entry levels. Easy question at the start that get harder to help show which students have a deep understanding.</p>
<p>Learner assessment: Students answer to the Pythagoras entry ticket. Student’s ability to answer the questions during the PowerPoint presentation and to complete the set questions.</p>	
<p>Lesson evaluation: Involving the students in the lesson through questioning and writing responses was successful. I also attempted using more praise with students, which they responded to well For the fast finishers I should get them to stick sheets in, rule up and date pages etc. I also need to work on ensuring all students are listening before giving instructions. For the lower end the examples were left up long enough they could work through them at their own pace. Overall, the majority of students seemed to have a good grasp of the theorem. Some students were confused as there were a mixture of finding the hypotenuse and short side questions in the future I would clearly state they will have both types of questions also write them a tip saying before calculating label the sides a, b, and c. The question were set so all students had an entry point.</p>	

Lesson title: Pythagoras Theorem: L4

Date: 11/06/15

Lesson Content:

Silent reading

Questions

Pythagoras Theorem Jeopardy

Introduction:

Students silent reading.

On board write - list of what they will need for the lesson

- *Tip: before answering a question label the sides a, b, c*
- *Draw triangle*
- *Leave space (for pythag equation)*
- *Steps for calculating the hypotenuse (c)*
- *Step 1. , Step 2. , Step 3.*
- *Leave space (for rearranged pythag equation)*
- *Steps for calculating the short side (a b)*
- *Step 1. , Step 2. , Step 3.*

Teacher activities:

Ask students questions to fill in the whiteboard. Students receive reward for answering questions.

Students work on questions given to them on Thursday last week. A set of extension questions were provided for the fast finishers. – move around helping students and checking for understanding.

Introduce Pythagoras Theorem Jeopardy. Write what students require (pen, scrap paper, calculators) what they need to do – get into small groups (min 3 members), choose name and character for team (one member tell me)

- Give them a time limit to be ready by

Learner activities:

Students answer questions:

- Q1. Label the triangle
- Q2. What is the Pythagoras equation?
- Q3. What is the first step, what's the second etc.
- Q4. What is the equation to find a? and b?
- Q5. Which step is different?

Complete the questions

Students work in teams to answer questions. There are three different question types each worth different amounts of points. Students put hands up once they have the answer.

Learner assessment:

Students ability to answer the questions correctly (both verbally and in books).

Lesson evaluation:

Students settled down nicely and silent read until 1:40pm. I thanked the students who were acting appropriately. This lesson I made a big effort to wait until I has all students full attention before speaking. The little quiz with prizes worked really well, once the released there were rewards students were much obliged to offer answers. A number of students got the extension questions which was a good sign, and moving around the answers they had gotten for the first set were for the majority all correct.

Improvements on the lesson design: use more colours when writing on the whiteboard.

Lesson title: Pythagoras Theorem: L5

Date: 16/06/15

Lesson Content:

Questions

Mathletics

Introduction:

Do one example on the board as a class.

On the board: list of required materials

- draw a triangle with measurements

Ask: What is the Pythagoras equation?

What is the equation if I want to calculate a? and b?

How do I label the triangle a, b c?

For this triangle what length are were determining?

Which equation do we use?

What is the first step? (Everyone do on calculators), second step etc.

Teacher activities:

Provide students with questions – move around helping students and checking for understanding.

There are harder questions (involving different units of measurements and word questions for early finishers).

Learner activities:

Students work on questions provided.

Students work on mathletics, especially if the class becomes fidgety with Pythagoras. This has questions set at appropriate levels of understanding

Learner assessment:

Students ability to answer the questions correctly (both verbally and in books).

Lesson evaluation:

Student's behaviour was a little unsettled at the beginning (possibly due to having a relief teacher) but they did settle down and worked well.

The little re-cap at the beginning of the lesson went well; students seemed to remember the main points. I used more colours on the board this time.

One student was moving around trying to sit with his friends. After a few warnings, he was sent outside and talked to.

I was happy with how the students worked and I spent some time moving around checking the answers students had gotten over the past few weeks. Overall, the majority seem to have grasped the concept well. After a bit of time (as they become unsettled) it was decided that students could move onto mathematics, which they settled down and worked on until the end of the lesson.

Future aims: Provide variety in the lessons so students to not get unsettled.