Pythagoras – Episode 2

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Student Activity

7 8 **9** 10 11 12

TI-Nspire | Investigation | Student | 30 min

Introduction

Congratulations, arriving here means you have completed the first clue. What did we learn and what do we need to know about history to understand why the Pythagorean Circle were so concerned about their new theroem?

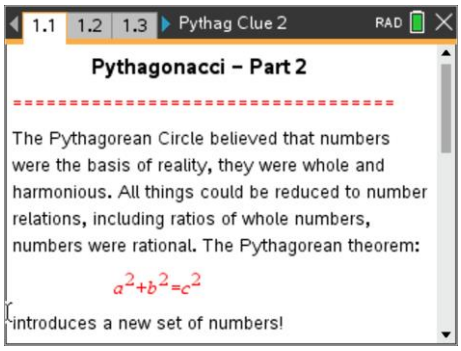
The Pythagorean Circle believed numbers were the basis of reality, they were whole and harmonious. All things could be reduced to number relations, including ratios of whole numbers, numbers were rational and applied to practical situations. Upon using the formula, the Pythagorean Circle realised that when **you pen these** numbers the results did not align with their beliefs. In a world where 'zero' was yet to be invented, the notion of a number that was not finite created an enormous amount of angst, confusion and potential ridicule. The quest to find answers to some of the simplest triangles was proving problematic.

Your quest continues, to succeed you must first understand the implications of the theorem!

Pythagoras

Open the TI-Nspire file: **Pythag Clue 2**

A series of triangles can be observed on page 1.2. Use the toggle



Clue 2:

Scroll through the collection of triangles. You will notice that some of the triangles appear as a different colour. Your task is to determine what is different (other than the colour), about these triangles.

Question: 1.

Scroll through the triangles using the slider/toggle:

a) Test each of the triangles on page 1.2 against the Pythagorean theorem.

b) Aside from the colour, what makes triangles 7, 8 and 9 particularly special?

The Pythagorean Circle needed tools to deal with the special cases. The Babylonians (1500BC) established a technique for computing the square-root of a number by hand.

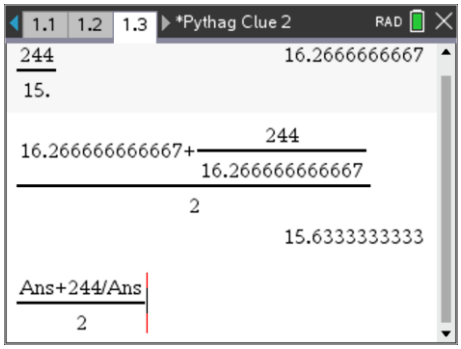
Suppose you want to calculate the square-root of 244. Start with an estimate, let's say 15, since $15^2 = 225$.

Step 1: Calculate $244 \div 15 \approx 16.26^{\bullet}$ [Corrected value]

Step 2: Average the **estimate** (15) and the **corrected value**.

$(15 + 16.26^{\bullet}) \div 2 \approx 15.63^{\bullet}$

Step 3: Repeat Steps 1 & 2 using the result from Step 2 as the new estimate. [See opposite]



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Question: 2.

Use 5 iterations of the Babylonian technique to establish an approximate square-root for 244.
Use an initial guess of 15.

Question: 3.

Use 5 iterations of the Babylonian technique to establish an approximate square-root for 244.
Use an initial guess of 16.

Question: 4.

Use 3 iterations of the Babylonian technique to establish an approximate square-root for 2.
Use an initial guess of 1.5.

Question: 5.

Use 3 iterations of the Babylonian technique to establish an approximate square-root for 200.
Use an initial guess of 14.

Navigate to problem 2, Page 1 (2.1) where the next clue is located.

To unlock the next clue, determine the last digit, that is the least significant in the multiplication of:

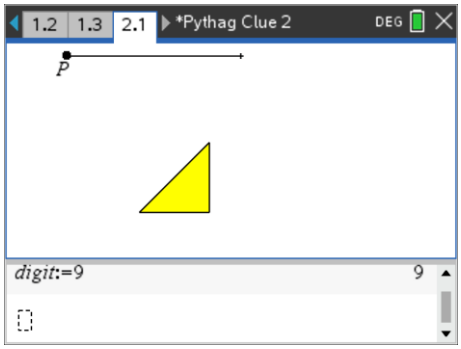
$$14.142135623731 \times 14.142135623731$$

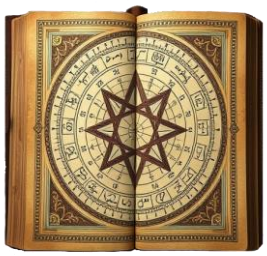
Once you have determined this quantity, store your answer in 'digit' as shown at the base of the screen (Calculator application).

To navigate to the base of the screen you can either click in the application or press ctrl + tab to switch application focus.

Once you have stored your result, drag point P slowly along the line.

Note: The digit is not a 9, which is why your next clue is not displayed.





Once you have the next clue, think carefully about your answer!
You will need to explain your answer to your teacher.
If your teacher is satisfied with your answer, you will be able to proceed with your quest.
Good luck.

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