

MATH5 CLASSWORK 18

April, 8 20018

Recall: Square root of a (denoted \sqrt{a} is a number whose square is equal to a . For example: square root of 25 is 5, because $5^2 = 25$.

We discussed that

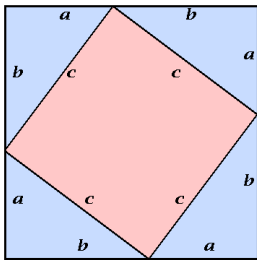
$$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$$
$$\sqrt{a + b} \neq \sqrt{a} + \sqrt{b}$$

Square roots naturally appear in geometry:

Pythagorean Theorem: In a right triangle with legs a , b and hypotenuse c , one has

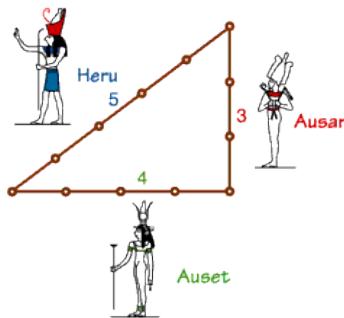
$$a^2 + b^2 = c^2 \quad \text{or} \quad c = \sqrt{a^2 + b^2}$$

A proof of this theorem is illustrated below:



In this square, the total area is
 $(a + b) \times (a + b) = a \times (a + b) + b \times (a + b) = a^2 + ab + ab + b^2 = a^2 + 2ab + b^2$
On the other hand, the area of each triangle is $\frac{1}{2}ab$; and the area of shaded square is c^2 . Thus, we get $a^2 + 2ab + b^2 = 4 \cdot \frac{1}{2}ab + c^2$, which gives
$$a^2 + b^2 = c^2$$

Egyptian triangle:

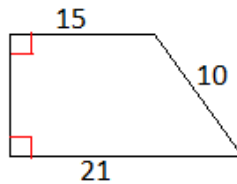


Geometry is an art. It is a doodle done with pencil, ruler and compass. Usually a solution to geometry problem should be accompanied by a relevant geometrical doodle done with a pencil.

MATH5 HOMEWORK 18

April 8, 2018

1. Can you find a right triangle where all sides are whole numbers and the hypotenuse is 13?
2. If, in a right triangle, one leg has length 1 and the hypotenuse has length 2, what is the other leg?
3. Find $\sqrt{2^6 \cdot 7^2}$ [use square root properties we discussed]; $\sqrt{\frac{1}{16}}$; $\sqrt{\frac{4}{9}}$.
4. Find the height and area of the figure below. Lengths of three sides are given; the two marked angles are right angles.



5. **Take some positive number $x < 100$** and using calculator (or computer) calculate the number $\frac{x}{2} + \frac{1}{x}$. Call the result x and repeat the same calculation with the new x . Do it 10 times. We will compare the results in class.

| x | $\frac{x}{2} + \frac{1}{x}$ |
|-------------|-----------------------------|
| Initial x | result_1 |
| result_1 | result_2 |
| result_2 | result_3 |
| result_3 | |
| | |
| result_9 | result_10 |

result_10 =

6. Please watch about perpendicular bisectors, 12 min, get comfortable

<https://www.khanacademy.org/math/geometry-home/triangle-properties/perpendicular-bisectors/v/circumcenter-of-a-triangle>