

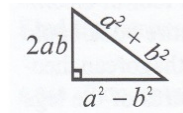
HOMEWORK 22

MAR 22, 2020

PYTHAGORA'S THEOREM

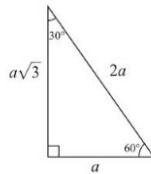
In a right triangle with legs a and b , and hypotenuse c , the square of the hypotenuse is the sum of squares of each leg. $c^2 = a^2 + b^2$. The converse is also true, if the three sides of a triangle satisfy $a^2 + b^2 = c^2$, then the triangle is a right triangle. Some Pythagorean triples are: (3,4,5), (5,12,13), (7,24,25), (8,15,17), (9,40,41), (11,60,61), (20,21,29).

To generate such Pythagorean triples, choose two positive integers a and b , ($a > b$). Then plug the values into the sides as shown:



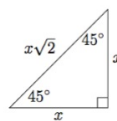
Can you explain why this method works?

THE 30-60-90 TRIANGLE



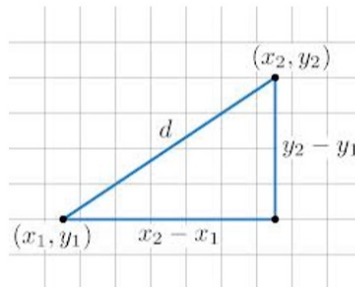
In a right triangle, if one of the angles is given as 30° or 60° then this triangle is called 30-60-90 triangle and you know the ratio of the sides. If the smaller leg is a then the hypotenuse is $2a$ and using Pythagora's theorem one can find the altitude to be $a\sqrt{3}$.

THE 45-45-90 TRIANGLE



Given that an angle of a right triangle is 45° , you can compute the other angle and it will also be 45° . This triangle is half a square, when the square is folded along its diagonal.

DISTANCE BETWEEN TWO POINTS



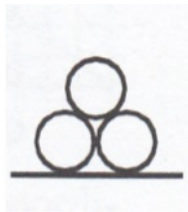
The distance between points (x_1, y_1) and (x_2, y_2) can be calculated using Pythagora's theorem in the given right triangle. If the hypotenuse is d then $d^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$, $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

MIDPOINT OF A LINE SEGMENT

The midpoint of a segment with endpoints (x_1, y_1) and (x_2, y_2) is the point with coordinates $(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$

HOMEWORK

1. What is the area of a regular hexagon whose side is 5cm?
2. Find the distance between (5,-4) and (0,-1) on the coordinate plane. What is the midpoint?
3. What is the height of three congruent stacked circles with a radius of 12 cm?



4. In a trapezoid ABCD with bases AD and BC, $\angle A = 90^\circ$, and $\angle D = 45^\circ$. It is also known that $AB = 10$ cm, and $AD = 3BC$. Find the area of the trapezoid.
5. Given 2 concentric circles, chord AB is 8cm long and tangent to the smaller of two concentric circles. A and B are points on the larger circle. What is the area between the 2 circles?
6. A circle is inscribed in an equilateral triangle. What fraction of the area of the triangle is inside the circular region? Express your answer as a common fraction in simplest radical form in terms of π
7. In a right triangle ABC, BC is the hypotenuse. Draw AD perpendicular to BC, where D is on BC. The length of BC=13, and AB=5. What is the length of AD?
8.
$$\frac{1}{1 + \frac{2}{3 + \frac{1}{6 + 12}}} =$$
9. What is the sum of the first 100 positive odd integers?
10. Find the sum of $\frac{2}{5} + \frac{4}{25} + \frac{8}{125} + \dots$