REVIEW + CLASSWORK
SEPT. 17, 2023

We are starting this semester with a review of some topics we learned last year.

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 below:
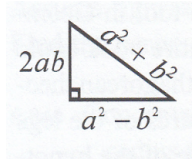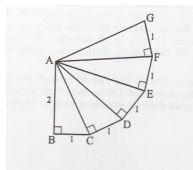

Can you explain why this method works?

Problem: 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?
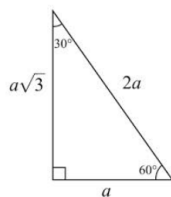
Problem: (Mathcounts) Find AB.
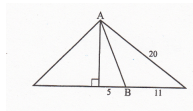
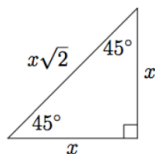**Problem**: (Mathcounts) Find AG.

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. We showed in class that 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. You can use Pythagora's theorem to calculate the hypotenuse.

Problem: What is the area of a regular hexagon whose side is 2cm?

Problem: What is the height of three congruent stacked circles with a radius of 12 cm?
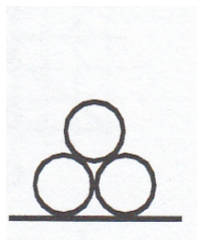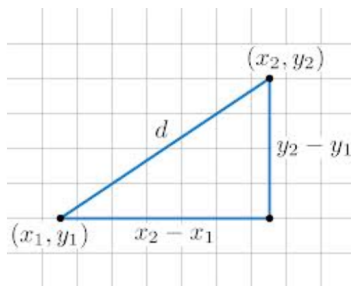
The distance between points (x_1, y_1) and (x_2, y_2) can be calculated using Pythagora's theorem in the given right triangle. The hypotenuse is d and we have $d^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$ and $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

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 $(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2})$

Exercise: Find the distance between (5,-4) and (-3,2) on the coordinate plane. What is the midpoint?

MISCELLANEOUS

$$\cfrac{1}{1 + \cfrac{2}{3 + \cfrac{1}{6 + 12}}} =$$

What is the sum of the first 100 positive odd integers?

Find the sum of $\dfrac{2}{5} + \dfrac{4}{25} + \dfrac{8}{125} + \dots$

Factorize:
(a) $100x^8y^2 - 16x^4y^6$ (b) $4x^2 - 4x + 1$ (c) $a^2 - 2a + 1$ (d) $a^4 - b^4$

Simplify:
(a) $\frac{1}{1+x} - \frac{1}{x-1}$ (b) $\frac{(1+1/x)}{x+1}$ (c) $\frac{1+1/x}{1-1/x}$