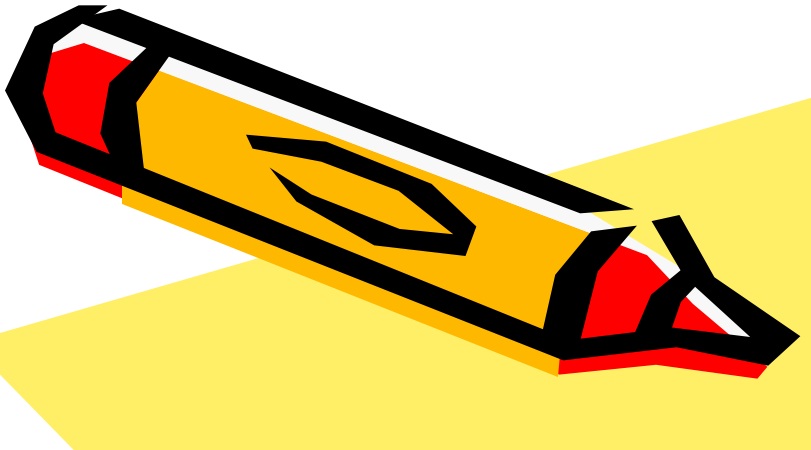
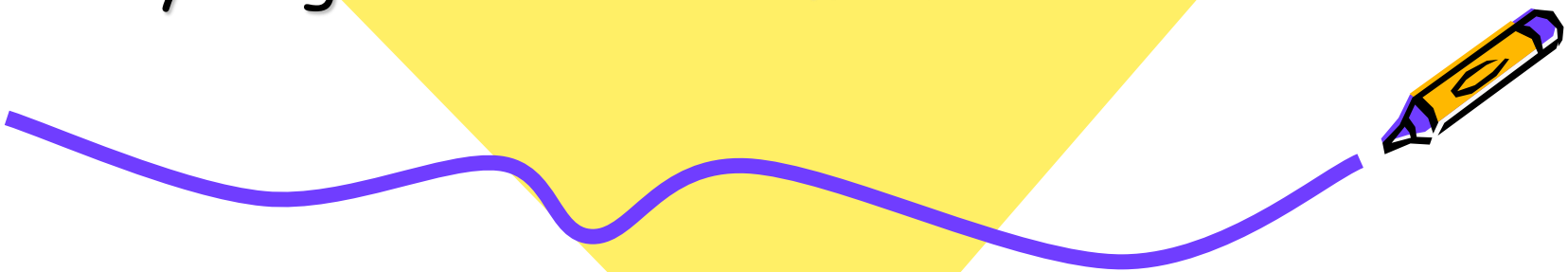


Geometry

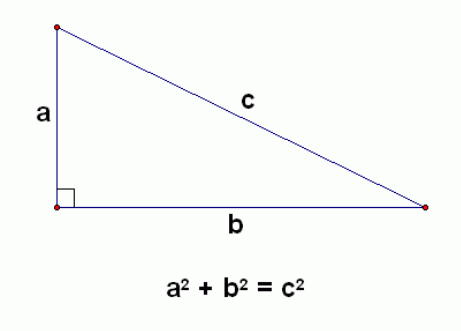
Pythagorean Theorem and its Converse



Recall Pythagorean Theorem

Pythagorean Theorem is used for right triangles.

In any right triangle, the sum of the squares of the measures of the legs is equal to the hypotenuse squared.



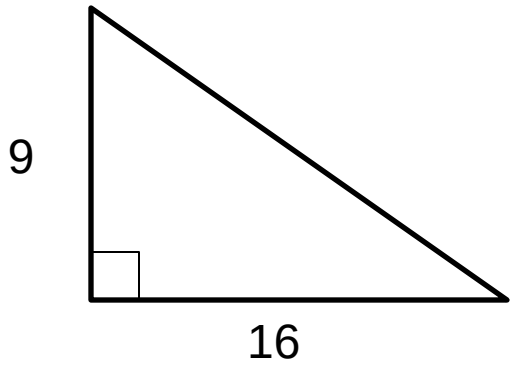
$$a^2 + b^2 = c^2$$

a and b represent the legs. c represents the hypotenuse (the longest side).

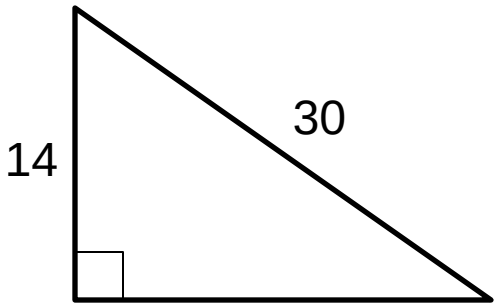
Pythagorean Theorem

Find the missing side of each right triangle.
Round to the nearest tenth.

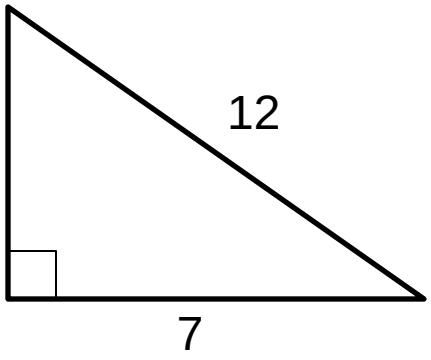
a)



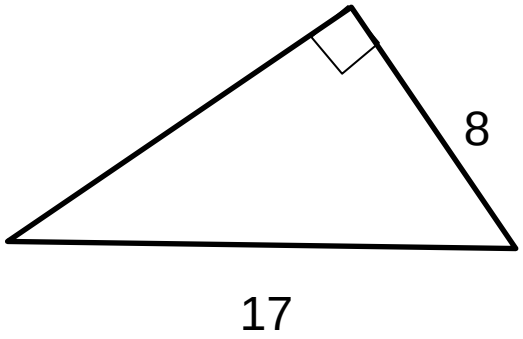
b)



c)



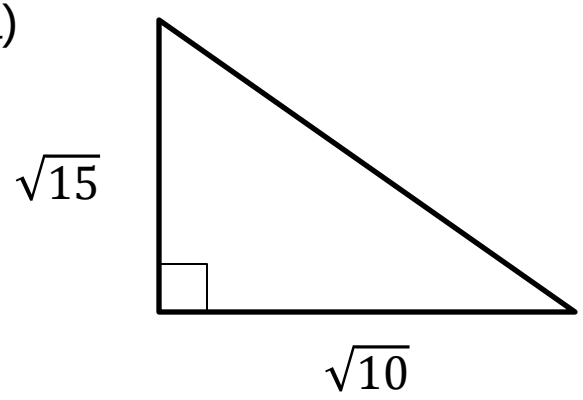
d)



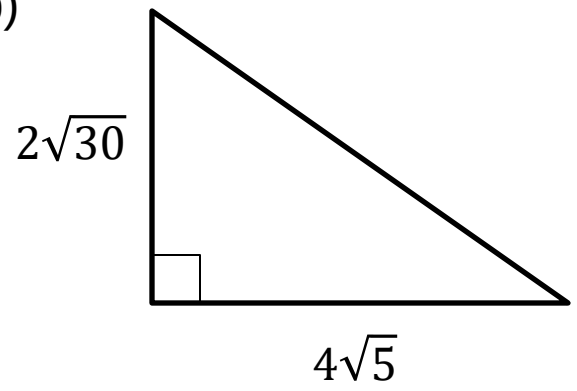
Pythagorean Theorem

Find the missing side of each right triangle.
Leave all answers in simplest radical form.

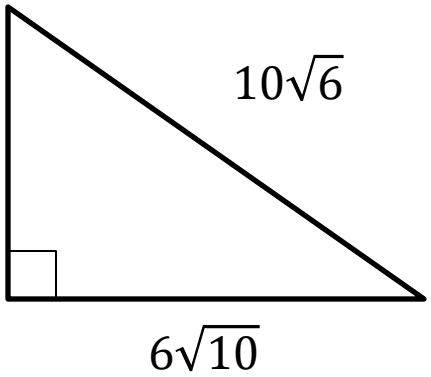
a)



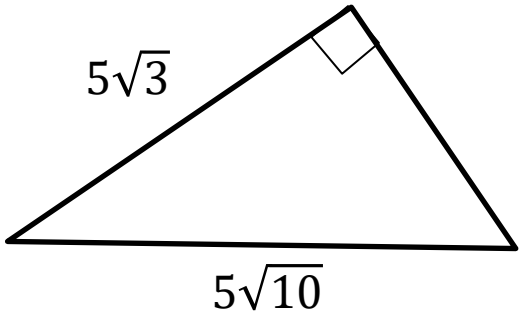
b)



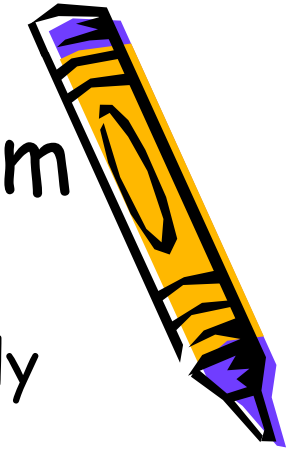
c)



d)



Converse of Pythagorean Theorem



The Converse of Pythagorean Theorem simply tells us that we can use the Pythagorean Theorem to determine if the 3 given measurements will form a right triangle.

Since we know that the Pythagorean Theorem will work for any right triangle, we can test 3 measurements to see if they form a right triangle.

Converse of Pythagorean Theorem

Determine is the given measures form a right triangle:

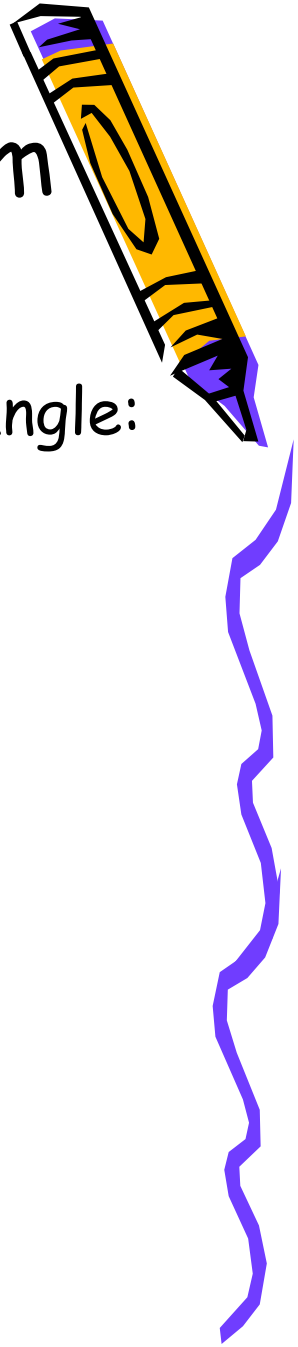
Ex.) 9,40,41

$$a^2 + b^2 = c^2$$
$$9^2 + 40^2 = 41^2$$
$$81 + 1600 = 1681$$
$$1681 = 1681$$

Note that the largest value must go in for c

Since the 3 values given satisfy the Pythagorean Theorem, we can conclude that they will form a right triangle.

Converse of Pythagorean Theorem



Determine if the given measures form a right triangle:

a) 25, 20, 15

b) 18, 34, 39

c) 1.6, 3.0, 3.4

Converse of Pythagorean Theorem

What if we determine that the given measurements do not form a right triangle?

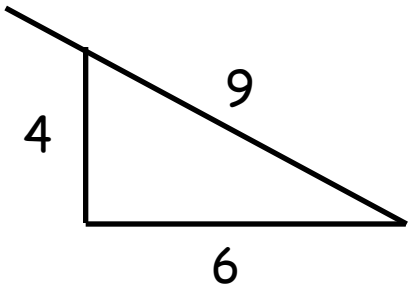
We can use the results to classify the triangle as acute or obtuse.

To keep it simple…
If the c^2 value is too big, it pushes the angle open making it an obtuse triangle.

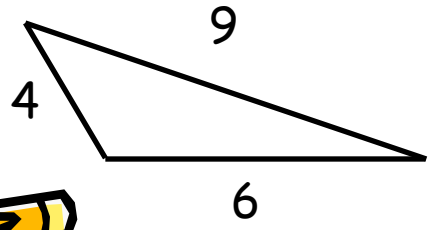
If the c^2 value is too small, it pulls the angle in making it an acute triangle.

Converse of Pythagorean Theorem

What kind of triangle is formed by sides measuring 4, 6, 9?



Clearly not a right triangle, 9 is way too long.



By tilting the 4 side out and bringing the 9 side down to meet it, we can see that the result is an <u>obtuse triangle</u>.

Converse of Pythagorean Theorem

Given the following measurements, classify the triangle as acute, right, or obtuse.

Ex.) 4, 6, 9

$$a^2 + b^2 = c^2$$
$$4^2 + 6^2 = 9^2$$
$$16 + 36 = 81$$
$$52 = 81$$

Note that the largest value must go in for c

We know this is not a right triangle. Since the value for c^2 results in a number that is too large, this is an <u>obtuse triangle</u>.

Converse of Pythagorean Theorem

Given the following measurements, classify the triangle as acute, right, or obtuse.

Ex.) 10, 20, 18

$$a^2 + b^2 = c^2$$
$$10^2 + 18^2 = 20^2$$
$$100 + 324 = 400$$
$$424 = 400$$

Note that the largest value must go in for c

We know this is not a right triangle. Since the value for c^2 results in a number that is too small, this is an <u>acute triangle</u>.

Converse of Pythagorean Theorem

Given the following measurements, classify the triangle as acute, right, or obtuse.

a) 20, 28, 21

b) 18, 34, 39

c) 17, 8, 15

d) 13, 15, $2\sqrt{14}$

e) 8, 16, $7\sqrt{5}$

f) $5\sqrt{3}$, 5, 12