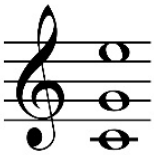
Triangle Inequality Theorem

I can use the Triangle Inequality Theorem to determine if three sides meet to form a triangle.

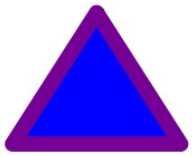
You will want to take good notes today because your assignment is an email journal entry explaining this lesson.

Before I can learn about the Triangle Inequality Theorem, I need to reflect on what I know about triangles.

First, I think of the prefix tri in the word triangle. I think of tricycles, triads and triatholons. These things all have three components.



I know a triangle has three sides.

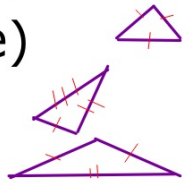


I can classify triangles by their sides:

Equilateral (all 3 sides the same)

Scalene (no sides the same)

Isosceles (2 sides the same)



I can also classify triangles by their angles:

Right (contains one 90 degree angle)

Obtuse (Contains one angle larger than 90 degrees)

Acute (contains three angles less than 90 degrees)

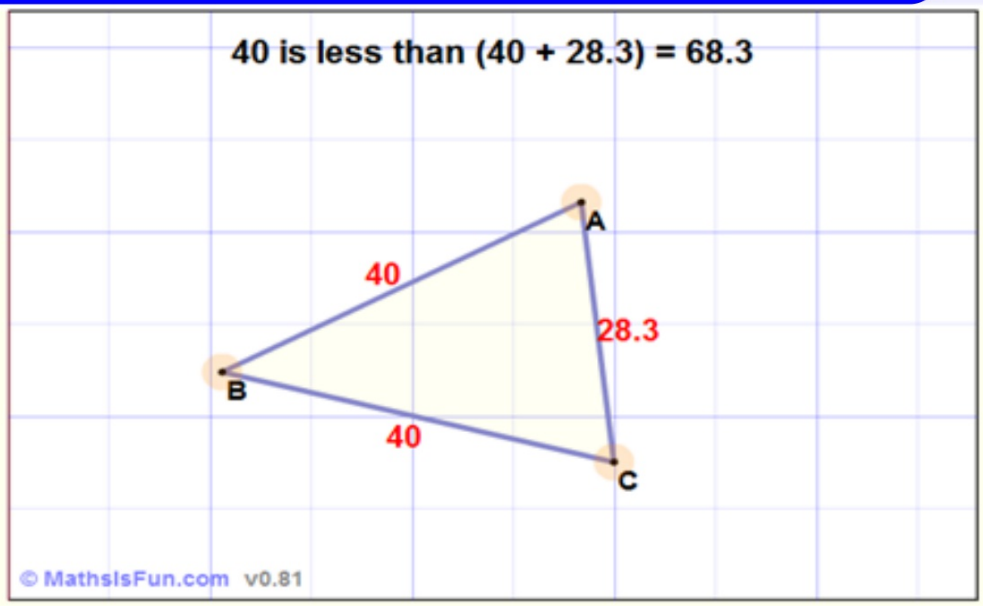
I'm ready to think about today's topic--
I can use the triangle inequality theorem to determine if three sides meet to form a triangle.

Bring on the theorem.

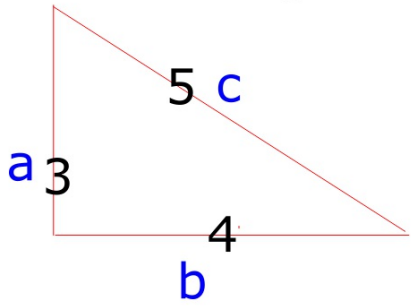
Triangle Inequality Theorem

Any side of a triangle must be shorter than the other two sides added together.

If it was longer, the other two sides coudn't meet!



I think it will help me to write the theorem down in an easier form.
I'm going to label the three sides of the triangle as a, b, and c.
I see the triangle has side lengths of 3, 4, and 5.



Write this down

The theorem states that any side of a triangle must be shorter than the other two sides. I will shorten this in math terms like this:

$a+b>c$ or plugging in the numbers $3+4>5$ and $7>5$

$b+c>a$ or plugging in the numbers $4+5>3$ and $9>3$

$a+c>b$ or plugging in the numbers $3+5>4$ and $8>4$.

Yes, side lengths of 3, 4, & 5 can form a triangle.

Note: This rule must be satisfied for all 3 conditions of the sides.

In other words, as soon as you know that the sum of 2 sides is less than (or equal to) the measure of a third side, then you know that the sides do not make up a **triangle** .

All 3 sets of sides must satisfy rule

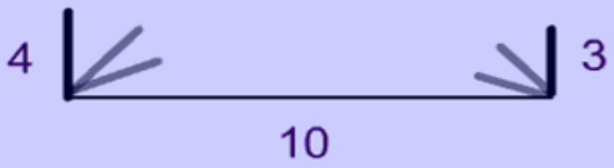
Side lengths {10,4,3}

$10 + 3 > 4$ ✓

$10 + 4 > 3$ ✓

$4 + 3 > 10$ ✗

As soon as 1 pair does not sum up to a greater length than the third, you know that the 3 sides CANNOT make a triangle .



Do I have to always check <u>all</u> 3 sets?

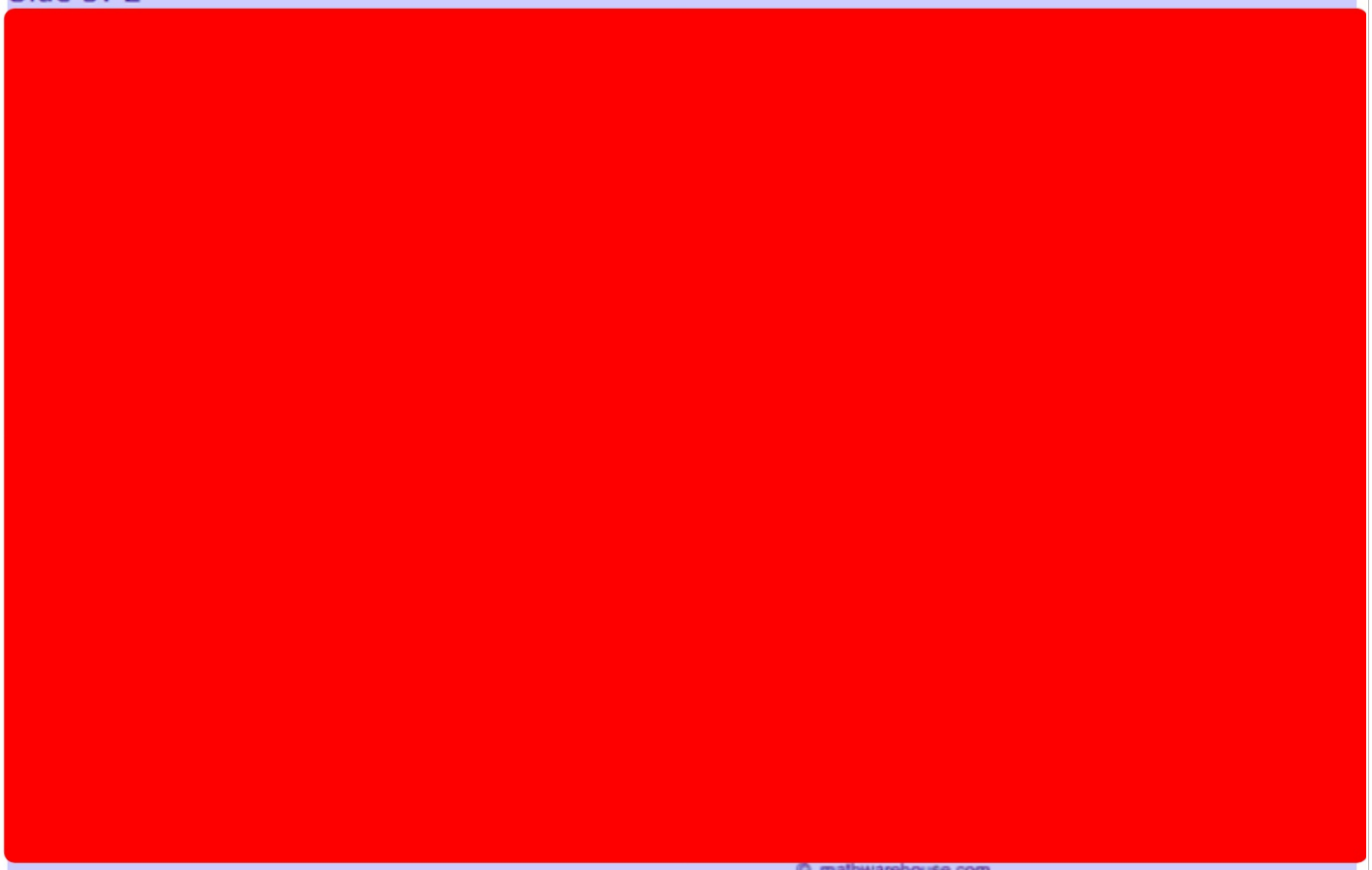
NOPE!

You only need to see if the two smaller sides are greater than the largest side!

Write this down:

Remember small side + small side must be greater than longest side.

Problem 1) Could a triangle have side lengths of
Side 1: 4
Side 2: 8
Side 3: 2



problem 2) Could a **triangle** have side lengths of
Side 1: 5
Side 2: 6
Side 3: 7

problem 3) Could a **triangle** have side lengths of
Side 1: 6
Side 2: 8
Side 3: 15

The Triangle Inequality Theorem would be useful to surveyors in plotting out new lots to see if lines could run north and south.

It could also be useful to determine distance between points on a map.

TRY THESE

Write your answers on notebook paper. Show your work.

For Items a through d, use the Triangle Inequality Theorem to determine whether a triangle can be formed with the given side lengths.

a. 8 in., 6 in., 4 in.

b. 3 cm, 4 cm, 7 cm

c. 7 yd, 4 yd, 4 yd

d. 8 m, 8 m, 8 m

You will table talk about your thoughts in just a few minutes.

Pretend that Don is a student who missed class for this activity. Compose an email message (to diane.royer@crbcrusders.org) explaining
1. the mathematical ideas you've learned today, including what the theorem means,
2. how you know what sides of the triangle to check as a short cut to the theorem.
3. an example of three side lengths that work, explaining why they work and
4. an example of three side lengths that do not work, explaining why they do not work.