"indirect proof"

Geometry 5.5 (skipping 5.4...not in standards)

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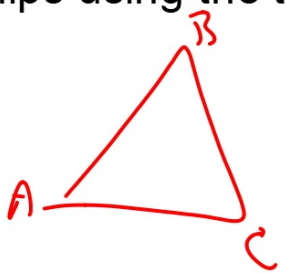
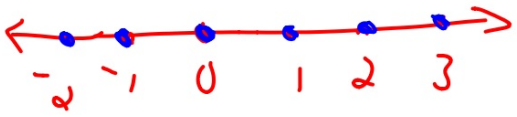
Use the triangle inequality theorem to identify possible triangles
Prove triangle relationships using the triangle inequality theorem

triangle sum theorem
inequality
integer
whole number



$\angle A + \angle B + \angle C = 180$

activity: spaghetti



Can you create a triangle?

Use a ruler to break spaghetti to the indicated lengths.
Measure in centimeters.
Be as accurate as possible.
Can a triangle be formed?

Make a table in your notes to record your observations.

Side 1	Side 2	Side 3	Triangle? (Y/N)	Comments
5	5	3	y	isos.
8	12	5	y	obt.
3	3	8	no	
7	8	12	y	
2	8	12	no	

Build & Verify

?	?	?	yes	7 11 5
?	?	?	no	3 3 3

4 4 4 8 8 12
6 7 6
yes

no

1	12	2 2 8	1 6 7
2	12 9	2 2 9	5 1 1

How do you tell whether a triangle is possible?
Record your conjecture in sentence form.

Example 1 Identify Possible Triangles Given Side Lengths

Is it possible to form a triangle with the given side lengths? If not, explain why not.

a. 8 in., 15 in., 17 in.

$23 > 17$

Theoretically:

$S + S > \ell$

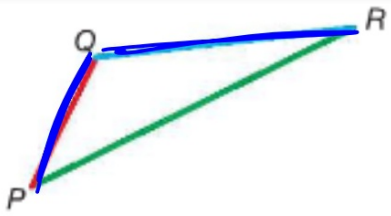
Theorem 5.11 Triangle Inequality Theorem

The sum of the lengths of any two sides of a triangle must be greater than the length of the third side.

Examples $PQ + QR > PR$

~~$QR + PR > PQ$~~

~~$PR + PQ > QR$~~



Practically:

GuidedPractice

1A. 15 yd, 16 yd, 30 yd

31 > 30

yes

1B. 2 ft, 8 ft, 11 ft

10 < 11

no

1 ft 13 in 5 in

↓

12 in 17 > 13

yes

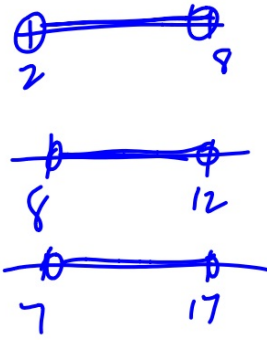
Measure and break 2 pieces of spaghetti (cm) as accurately as possible.
What is the smallest 3rd side that will still form a triangle? Explain.
What is the largest 3rd side that will still form a triangle? Explain

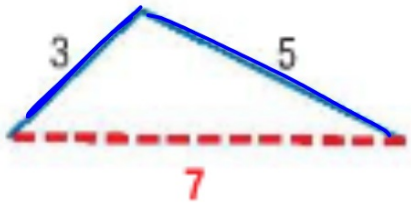
Side 1 Side 2 Smallest? Largest? Explain

Side 3
Side Side2 sm lg

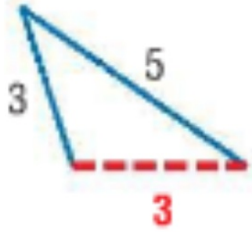
3	7	>4	<10	$4<x<10$
5	3	>2	<8	$2<x<8$
10	2	>8	<12	$8<x<12$
12	5	>7	<17	$7<x<17$

- shortest + longest



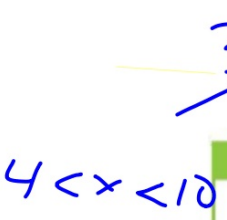


$2 < x < 8$



The third side has to be more than..... but less than....

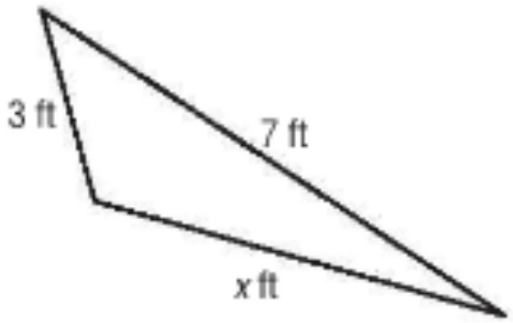
What is the range? (number line is helpful)
Which whole numbers are in it?
between



Standardized Test Example 2 Find Possible Side Lengths

If the measures of two sides of a triangle are 3 feet and 7 feet, which is the *least* possible whole number measure for the third side?

A 3 ft B 4 ft C 5 ft D 10 ft



$4 < n < 22$

What is the range?
What number is not in it?

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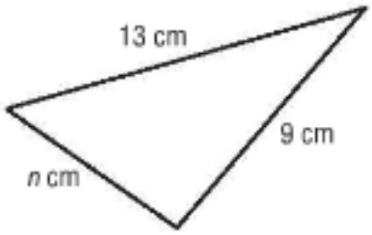
2. Which of the following could *not* be the value of n?

F 7

G 10

H 13

J 22



Is it possible to form a triangle with the given side lengths? If not, explain why not.

6. 4 ft, 9 ft, 15 ft

7. 11 mm, 21 mm, 16 mm

8. 9.9 cm, 1.1 cm, 8.2 cm

9. 2.1 in., 4.2 in., 7.9 in.

Find the range for the measure of the third side of a triangle given the measures of two sides.

12. 4 ft, 8 ft

$4 < x < 12$

13. 5 m, 11 m

Only answer w. whole numbers if they specifically say!

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6-17, 20, 21