2-100. For a different triangle ΔABC where $AB = 3$ units and $BC = 4$ units, Roiri found that $AC = 25$. Donna is not sure that is possible. What do you think? Visualize this triangle and explain if you think this triangle is possible or not.

2-101. PINK SLIP

Oh no! During your last shift at the Shape Factory everything seemed to be going fine--until the machine that was producing triangles made a huge CLUNK and then stopped. Since your team was on duty, all of you will be held responsible for the machine's breakdown.

Luckily, your boss has informed you that if you can figure out what happened and how to make sure it will not happen again, you will keep your job. The last order the machine was processing was for a triangle with sides 3 cm, 5 cm, and 10 cm.

a. Use the snap sticks provided by your teacher to investigate what happened today at the factory. Can a triangle be made with *any* three colors? If not, what condition(s) would make it impossible to build a triangle? Try building triangles with the side colors listed below:

(1) orange, red, purple no
(2) orange, red. yellow yes
(3) green purple, yellow yes
(4) orange, purple, blue no

b. For those triangles that could not be built, what happened? Why were they impossible?

If the base was longer than the 2 sides together it didn't work.

c. Use the snap sticks to investigate the restrictions on the three side lengths that can form a triangle. For example, if two sides of a triangle are 5 cm and 12 cm long, respectively, what is the longest side that could join these two sides to form a triangle? (Could the third side be 12 cm long? 19 cm long?) What is the shortest possible length that could be used to form a triangle? (Does 5 cm work? 9 cm?)

17 must be less than

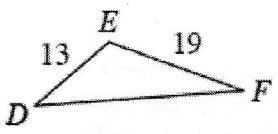
difference btwn biggest + smallest has to be bigger than the 3rd side

d. Write a memo to your boss explaining what happened. If you can convince your boss that the machine's breakdown was not your fault *and* show the company how to fix the machine so that this does not happen again, you might earn a promotion!

2-102. The values found in parts (a) and (c) of problem 2-101 were the *minimum* and *maximum* limits for the length of the third side of any triangle with two sides of lengths 5 cm and 12 cm. The fact that there are restrictions on the side lengths that may be used to create a triangle is referred to as the **Triangle Inequality**.

Determine the minimum and maximum limits for each missing side length in the triangles below.

a.



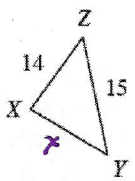
$13+19=32$

$\overline{DF} < 32$

$19-13=6$

$\overline{DF} > 6$

b.

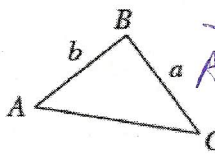


$14+x=15$

$x=1$

$\overline{XY} > 1$

c.

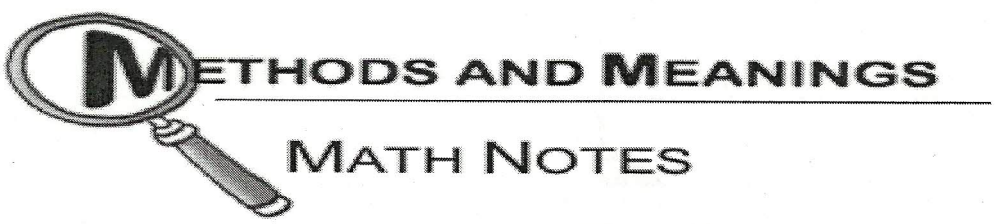


$\overline{AC} < a+b$

$\overline{AC} > |a-b|$

2-103. LEARNING LOG

In a Learning Log entry, explain how you can tell if three sides will form a triangle or not. Draw diagrams to support your statements. Title this entry, "Triangle Inequality" and include today's date.



Right Triangle Vocabulary

Several of the triangles that you have been working with in this section are right triangles, that is, triangles that contain a 90° angle. The two shortest sides of the right triangle (the sides that meet at the right angle) are called the **legs** of the triangle and the longest side (the side opposite the right angle) is called the **hypotenuse** of the triangle.