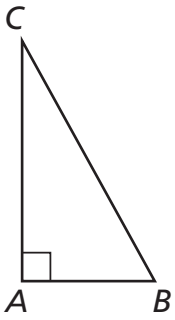
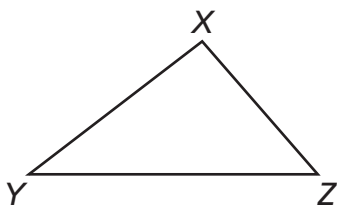
6.5 Start Thinking

Examine the triangle and determine the largest angle and the longest side. What is the relationship between the largest angle and the longest side in the triangle?

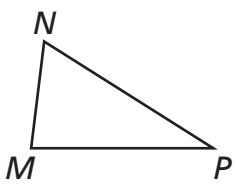
1.



2.



3.



6.5 Warm Up

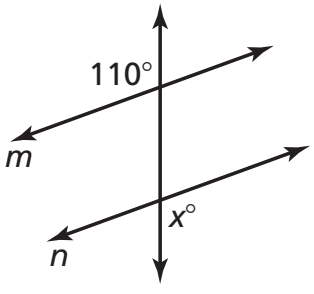
Complete the phrase with the most logical conclusion.

1. If there is no right angle in a triangle, then…
2. If two lines do not have the same slope, then…
3. If a quadrilateral does not have four right angles, then…
4. If no two angles of a triangle are congruent, then…
5. If the sum of the measures of the interior angles of a polygon is not 180°, then…
6. If a triangle does not contain three congruent angles, then…

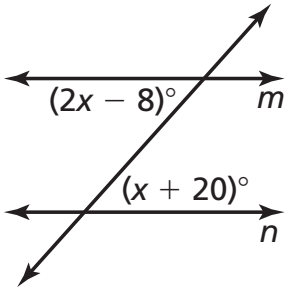
6.5 Cumulative Review Warm Up

Find the value of *x* that makes *m* || *n*.

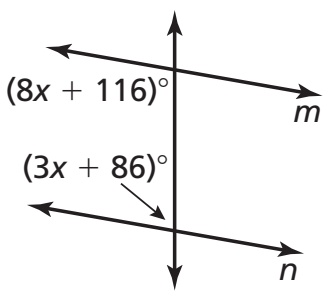
1.



2.



3.

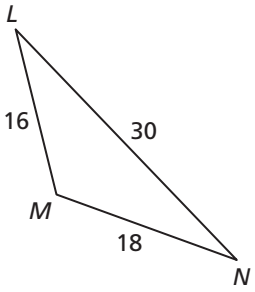


Name_____ Date _____

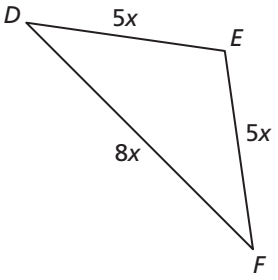
6.5 Practice A

In Exercises 1 and 2, list the angles of the given triangle from smallest to largest.

1.

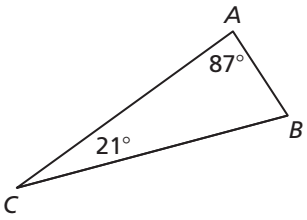


2.

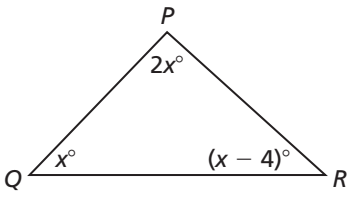


In Exercises 3 and 4, list the sides of the given triangle from shortest to longest.

3.



4.



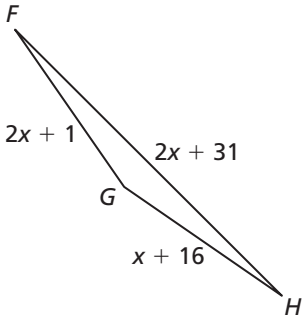
In Exercises 5 and 6, is it possible to construct a triangle with the given side lengths? Explain.

5. 15, 37, 53

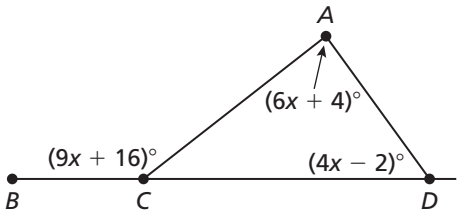
6. 9, 16, 8

7. Write an indirect proof that a triangle has at most one obtuse angle.

8. Describe the possible values of x in the figure shown.



9. List the angles of the given triangle from smallest to largest. Explain your reasoning.



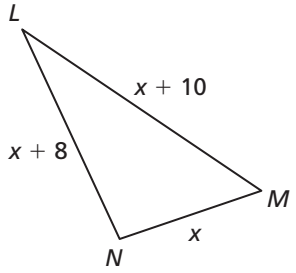
10. The shortest distance between two points is a straight line. Explain this statement in terms of the Triangle Inequality Theorem (Theorem 6.11).

Name _____ Date _____

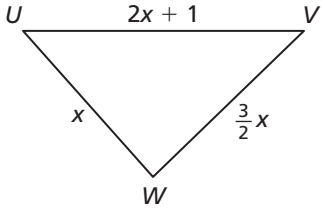
6.5 Practice B

In Exercises 1 and 2, list the angles of the given triangle from smallest to largest.

1.

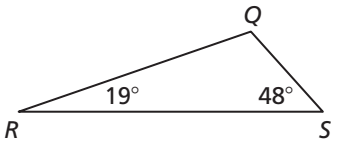


2.

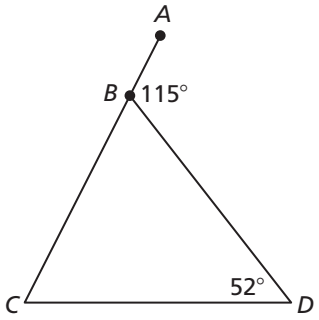


In Exercises 3 and 4, list the sides of the given triangle from shortest to longest.

3.



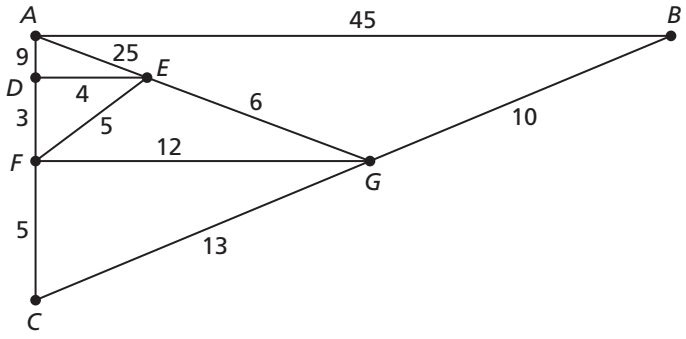
4.



5. Write an indirect proof that a right triangle has exactly two acute angles.

6. Is it possible to construct a triangle with side lengths $5(2x - 6)$, $3x + 80$, and $x^2 + 41$ if $x = 9$? Explain.

7. The figure shows several triangles, with labeled side lengths. Which of the triangles are labeled correctly? Explain.



8. Your friend claims that if you are given the three angle measures of a triangle, you can construct a triangle that obeys the Triangle Inequality Theorem (Theorem 6.11), even if you are not given any of the side lengths. Is your friend correct? Explain your reasoning.

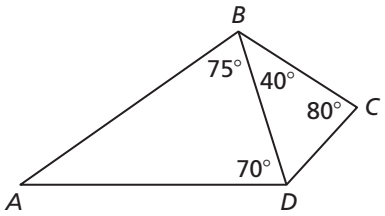
Name_____ Date _____

6.5 Enrichment and Extension

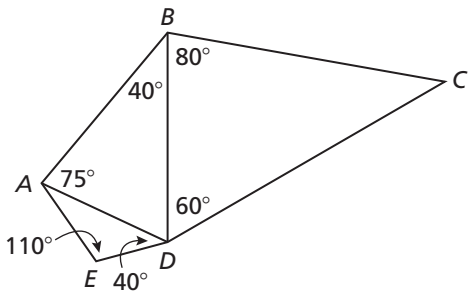
Inequalities in One Triangle

In Exercises 1 and 2, list the sides in order from shortest to longest.

1.



2.



In Exercises 3 and 4, prove the statement.

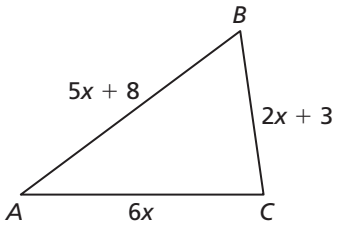
3. The length of any one median of a triangle is less than half the perimeter of the triangle.

4. The sum of the lengths of the three medians of a triangle is greater than half the perimeter of the triangle.

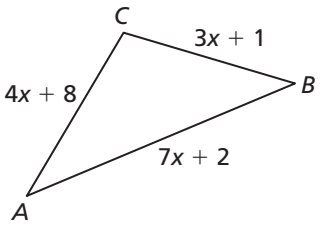
5. For what combinations of angle measures in an isosceles right triangle are the congruent sides shorter than the base of the triangle? Longer than the base of the triangle?

6. If $m\angle A < m\angle B < m\angle C$, describe the possible values of x.

a.



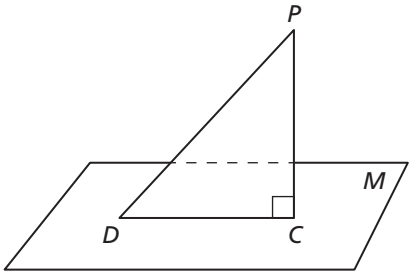
b.



7. Prove that a perpendicular segment is the shortest line segment from a point to a plane.

Given: $\overline{PC} \perp$ plane M

Prove: $PD > PC$



Name _____ Date _____

6.5 Puzzle Time

What Do You Get When You Cross A Snake With A Kangaroo?

Write the letter of each answer in the box containing the exercise number.

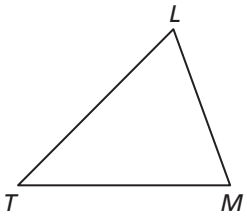
Complete the sentence.

1. If one side of a triangle is longer than another side, then the angle opposite the _____ side is larger than the angle opposite the other side.
2. If one angle of a triangle is larger than another angle, then the side opposite the _____ angle is longer than the side opposite the other angle.
3. The sum of the lengths of any two sides of a triangle is _____ the length of the third side.

Complete the step for an Indirect Proof.

4. Identify the statement you want to _____.
5. Assume _____ that this statement is false by assuming that its opposite is true.
6. Reason _____ until you reach a contradiction.
7. Point out that the desired conclusion must be true because the _____ proves the temporary assumption false.

Use the diagram.



8. $m\angle T = 35°$, $m\angle L = 51°$; Identify the longest side.
9. $m\angle T = 35°$, $m\angle L = 51°$; Identify the shortest side.

Answers

P. $\overline{TL}$

A. permanently

U. longer

T. smaller

J. logically

R. systematically

A. $\overline{LM}$

E. larger

N. $\overline{TM}$

M. greater than

H. equal to

O. contradiction

K. disprove

R. prove

L. truth

P. temporarily

Y. shorter

9		6	1	3	8		4	7	5	2