Week Two

Geometry

Desoto County Schools

Kuta Software - Infinite Geometry

Name_____

Area of Triangles and Quadrilaterals

Date_____ Period____

Find the area of each.

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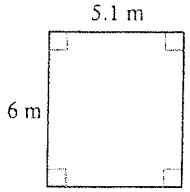

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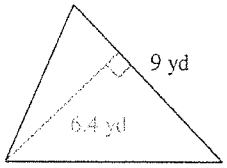

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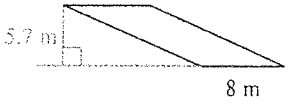

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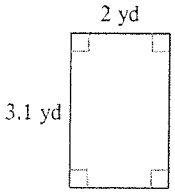

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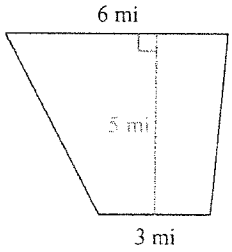

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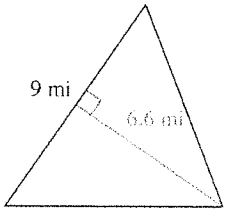

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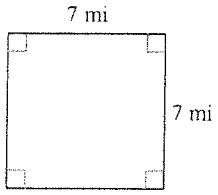

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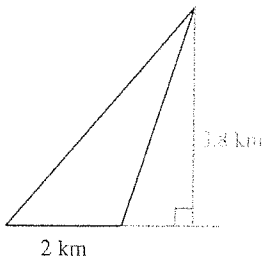

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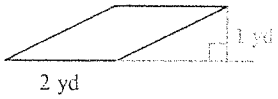

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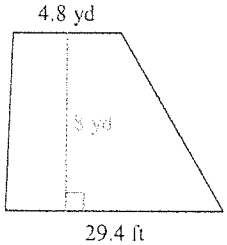

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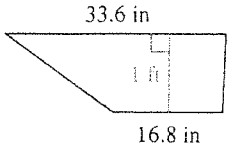

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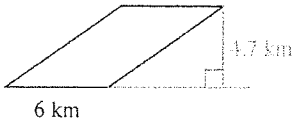

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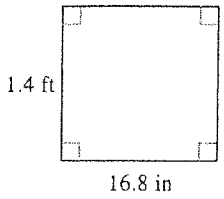

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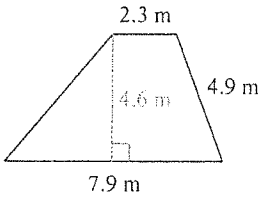

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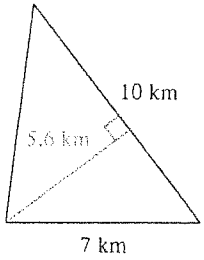

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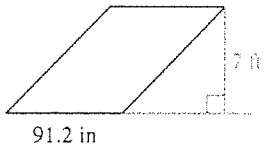

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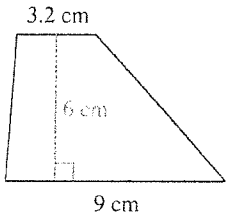

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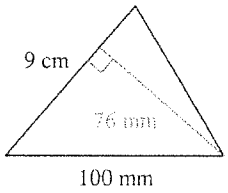

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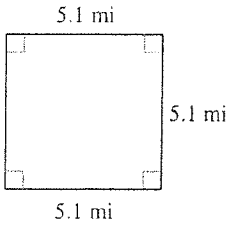

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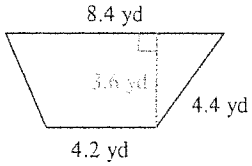


Critical thinking questions:

21) Sketch and label a trapezoid that has an area of 100 cm^2.

22) Change one number in the diagram you drew for the last question so that the area is now 200 cm^2.

SIDES LENGTHS OF TRIANGLES 2.3.1 and 2.3.2

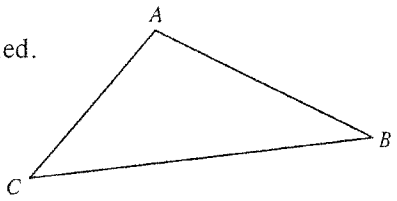
Using technology, students explore the Triangle Inequality, which determines the restrictions on the possible lengths of the third side of a triangle given the lengths of its other two sides. Using technology, students explore different ways to determine lengths of sides of triangles through calculation rather than measurement. Students use a method that reinforces the understanding of "square root" then use the method to apply the Pythagorean Theorem in right triangles.

See the Math Notes boxes in Lessons 2.3.1 and 2.3.2 for more information about right triangle vocabulary and the Pythagorean Theorem.

Example 1

The triangle at right does not have the lengths of its sides labeled. Can the sides have lengths of:

a. 3, 4, 5? b. 8, 2, 12?



At first, students might think that the lengths of the sides of a triangle can be any three lengths, but that is not so. The Triangle Inequality says that the length of any side must be less than the sum of the lengths of the other two sides. For the triangle in part (a) to exist, all of these statements must be true:

$$5 \overset{?}{<} 3+4,\ 3 \overset{?}{<} 4+5, \text{ and } 4 \overset{?}{<} 5+3.$$

Since each of them is true, we could draw a triangle with sides of lengths 3, 4, and 5.

In part (b) we need to check if:

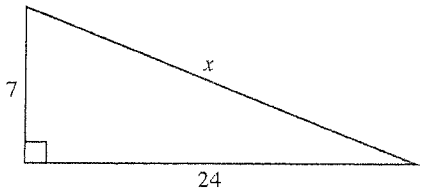
$$12 \overset{?}{<} 8+2,\ 8 \overset{?}{<} 2+12, \text{ and } 2 \overset{?}{<} 12+8.$$

In this case, only two of the three conditions are true, namely, the last two. The first inequality is not true so we cannot draw a triangle with side lengths of 8, 2, and 12. One way to make a convincing argument about this is to cut linguine or coffee stirrers to these lengths and see if you can put the pieces together at their endpoints to form a triangle.

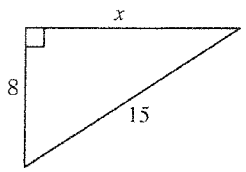
Example 2

Use the Pythagorean Theorem to determine the value of x.

a.



b.



The two sides of a right triangle that form the right angle are called the **legs**, while the third side, the longest side of the triangle, is called the **hypotenuse**. The relationship between the lengths of the legs and the hypotenuse is shown at right.

The Pythagorean Theorem

$$(\text{leg})^2 + (\text{leg})^2 = (\text{hypotenuse})^2$$

In part (a), this gives us: $7^2 + 24^2 = x^2$

$$49 + 576 = x^2$$

$$625 = x^2$$

To determine the value of x, use a calculator to find the square root of 625: $x = \sqrt{625}$, so $x = 25$.

Part (b) is a bit different in that the variable is not the hypotenuse. The solution is shown at right.

$$8^2 + x^2 = 15^2$$

$$64 + x^2 = 225$$

$$x^2 = 225 - 64$$

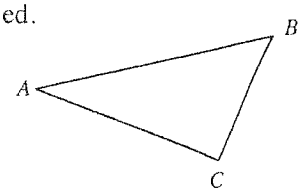
$$x^2 = 161$$

$$x = \sqrt{161}$$

$$x \approx 12.69$$

Problems

The triangle at right does not have any of the lengths of the sides labeled. Can the triangle have side lengths of:



1. 1, 2, 3?
2. 7, 8, 9?
3. 4.5, 2.5, 6?
4. 9.5, 1.25, 11.75?

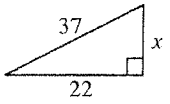
5. A square has an area of 144 square feet. What is the length of one of its sides?

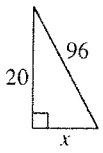
6. A square has an area of 484 square inches. What is the length of one of its sides?

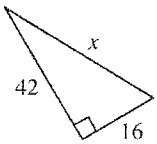
7. A square has an area of 200 square cm. What is the length of one of its sides?

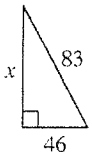
8. A square has an area of 169 square units. What is the perimeter of the square?

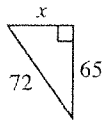
Use the Pythagorean Theorem to determine the value of x. Round answers to the nearest tenth.

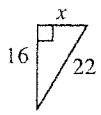
9. 

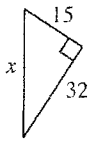
10. 

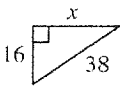
11. 

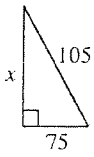
12. 

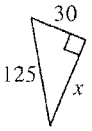
13. 

14. 

15. 

16. 

17. 

18. 

Solve the following problems.

19. A 12 foot ladder is six feet from a wall. How high on the wall does the ladder touch?

20. A 15 foot ladder is five feet from a wall. How high on the wall does the ladder touch?

21. A 9 foot ladder is three feet from a wall. How high on the wall does the ladder touch?

22. A 12 foot ladder is three and a half feet from a wall. How high on the wall does the ladder touch?

23. A 6 foot ladder is one and a half feet from a wall. How high on the wall does the ladder touch?

24. Could 2, 3, and 6 represent the lengths of sides of a right triangle? Justify your answer.

25. Could 8, 12, and 13 represent the lengths of sides of a right triangle? Justify your answer.

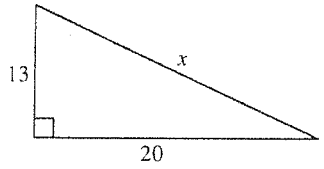
26. Could 5, 12, and 13 represent the lengths of sides of a right triangle? Justify your answer.

27. Could 9, 12, and 15 represent the lengths of sides of a right triangle? Justify your answer.

28. Could 10, 15, and 20 represent the lengths of sides of a right triangle? Justify your answer.

Use the Pythagorean Theorem to find the value of x. When necessary, round your answer to the nearest hundredth.

29.



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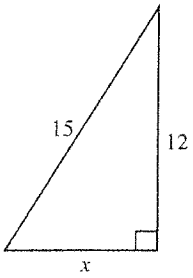

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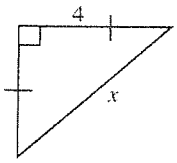

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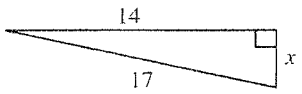

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Name_____

Multi-Step Pythagorean Theorem Problems

Date_____ Period____

Find the area of each triangle. Round intermediate values to the nearest tenth. Use the rounded values to calculate the next value. Round your final answer to the nearest tenth.

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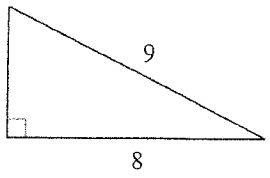

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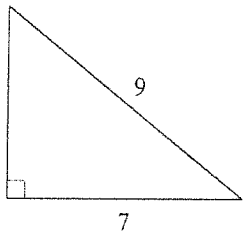

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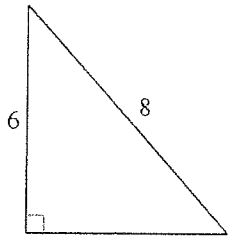

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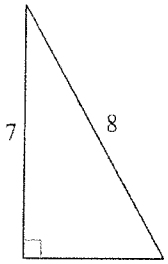

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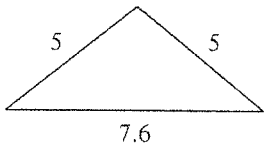

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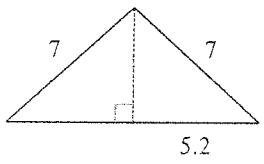

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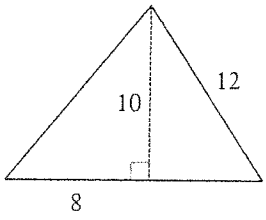

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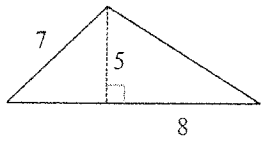

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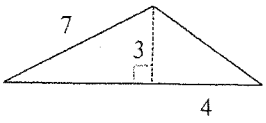

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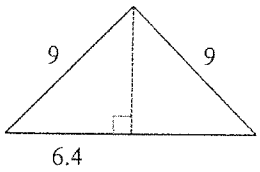

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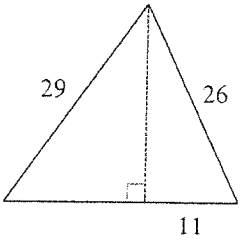

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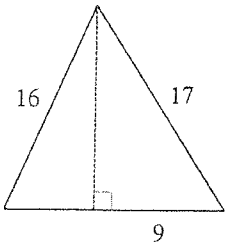

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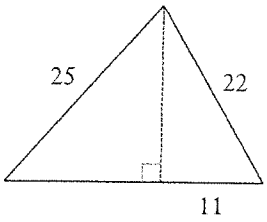

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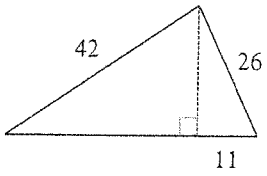
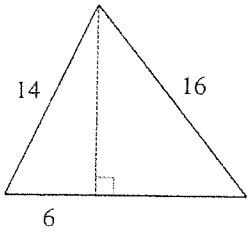
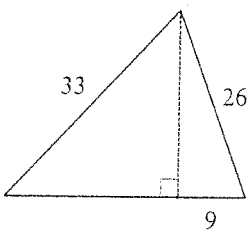


15)



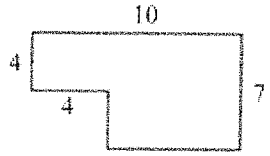
16)



NAME_____ DATE_____ CLASS_____

ACT MATH SKILLS PREP – AREA & PERIMETER

1. In the figure shown below, each pair of intersecting line segments meet at a right angle, and all the lengths are given in meters. What is the perimeter, in meters, of the figure?



A. 25
B. 26
C. 30
D. 34
E. Cannot be determined

2. A rectangular parking lot that is 5 feet longer than it is wide has an area of 104 square feet. How many feet long is the parking lot?

A. 4
B. 8
C. 13
D. 26
E. 52

3. The diagonal of a rectangular sheet of cardboard is 10 inches, and one side is 8 inches. What is the perimeter of the sheet of cardboard?

A. 18
B. 26
C. 28
D. 32
E. 36

4. The perimeter of a square is 36 inches. What is its area, in square inches?

A. 9
B. 16
C. 18
D. 64
E. 81

5. A certain rectangle is 3 times as long as it is wide. Suppose the length and width are both doubled. The perimeter of the second rectangle is how many times as large as the perimeter of the first rectangle?

A. 2
B. 3
C. 4
D. 5
E. 6

6. A rectangular garden has a length of x and a width of y. The garden has its length reduced by 4 feet and its width extended by 3 feet. What is the area of the new garden?

A. $(x+4)(y-3)$
B. $(x-4)(y+3)$
C. $x-y$
D. $x+y$
E. $12xy$