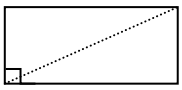
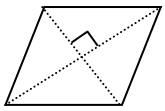
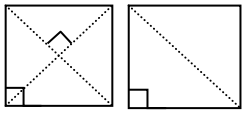
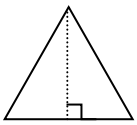
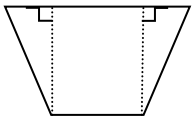
Geometry Name: _____ Section: _____ Date: _____

APPLYING THE PYTHAGOREAN THEOREM TO DIAGONALS AND ALTITUDES

RECTANGLE	RHOMBUS	SQUARE	TRIANGLE	TRAPEZOID
Rt. △'s are formed by diagonals 	Diagonals are ⊥ forming Rt. △'s 	Rt. △'s are formed by diagonals 	Altitudes are ⊥ to base forming Rt. △'s 	Altitudes are ⊥ to bases forming Rt. △'s 

PROBLEM SET 8-1R: Draw a picture to justify your work. Show all work.

1. Which set of numbers could be the lengths of sides of a right triangle?
   a. 4, 6, $\sqrt{40}$
   b. 2, 6, $\sqrt{40}$
   c. 2, 18, 20
   d. 4, 36, 40

2. The ratio of the lengths of the legs of a right triangle is 5: 12. What is the ratio of the length of the shorter leg to that of the hypotenuse?

   a. 13 : 5 b. $\sqrt{119}$: 5 c. 5 : 13 d. 5 : $\sqrt{119}$

3. If the length of a side of a square ABCD is 5, find the length of AC.

4. A rectangle has a diagonal of length 12 and one side of length 6. What is its perimeter?

5. The length of each side of a rhombus is 13. If the length of the shorter diagonal is 10, find the length of the longer diagonal.

Determine if the following conditions meet Pythagorean triplets and include a drawing for questions 6-8:

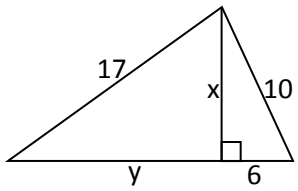
6. In a right triangle ΔABC, $\measuredangle C$ is the right angle. If AC is 1 cm more than BC and AB is 2 cm more BC, find the lengths of the three sides.

7. In rectangle ABCD, AB = x, BC = x + 7, and diagonal BD = x + 8. Find BD.

8. The length of a rectangle is 7 inches more than its width. If the diagonal has a length of 17 inches, find the dimensions of the rectangle.

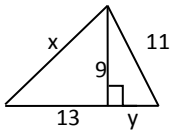
Solve for x and y using triplets.

9.

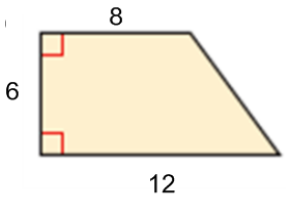


Find the perimeter of each figure. Give your answers in simplest radical form.

10.

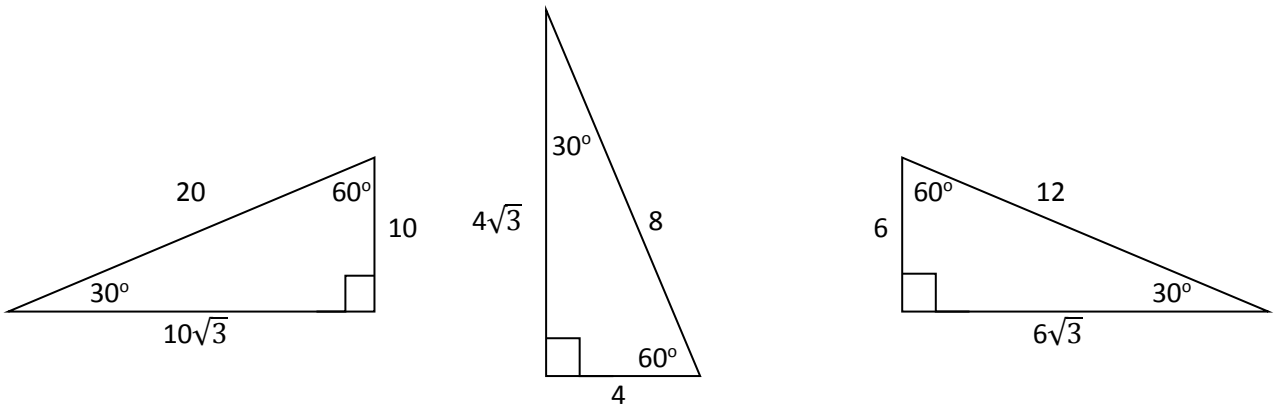


11.



12. In class, we investigated a skateboarding ramp that was built at a 30^o angle such that the ramp was 20 feet long for the rider and 10 feet high off the ground. We found that the distance of the base of the ramp along the ground was $10\sqrt{3}$ feet using the Pythagorean Theorem. More likely, all we would have probably known was the measurement of the base of the ramp of $10\sqrt{3}$ feet. Could we have found the length and height of the ramp? How?

    Using the right triangles below, see if you can discover a pattern or ratio that exists between the sides and their locations (hint, redraw with the same orientation if you need):



a) My conjecture about the ratio of short leg: long leg: hypotenuse is _____:_____:_____
for a triangle whose angles are 30^o - 60^o - 90^o

b) Using your conjecture, find the length and height of a ramp that is 30^o with a base length of $15\sqrt{3}$ feet.

13. Construct equilateral triangle ABC with a side length of 2 inches in the space below. Then construct the altitude $\overline{CD}$ (perpendicular from a point off the line) where D is the point of intersection with the base $\overline{AB}$.

Fill in the measures of the following:

i. $m\measuredangle ADC =$ _____ ° and $m\measuredangle BDC =$ _____ °

ii. $m\measuredangle A =$ _____ ° and $m\measuredangle B =$ _____ °

iii. $m\measuredangle ACD =$ _____ ° and $m\measuredangle BCD =$ _____ °

iv. AC = _____ inches = BC

v. AD = _____ inches = BD

vi. CD = _____ inches (use the Pythagorean Theorem to answer in simplest radical form)

A ——————————————— B