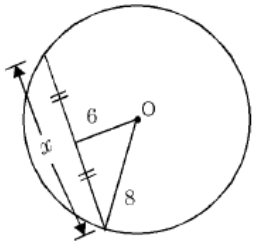
Name:_____ **Date:**_____

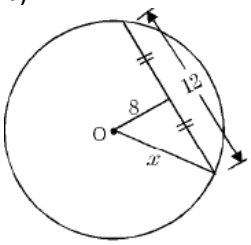
Math 8Honors: 4.3 Challenging Problems and Applications of the Pythagorean Theorem

1. Given each of the following circles geometry problems, find the length of the missing side "x"

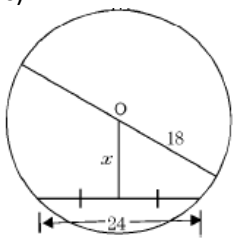
a)



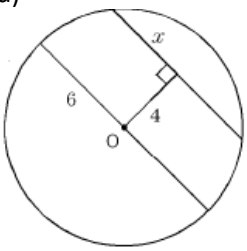
b)



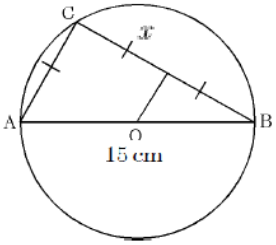
c)



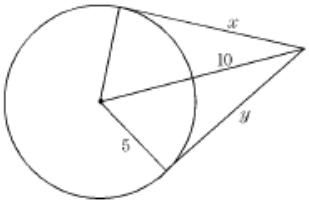
d)



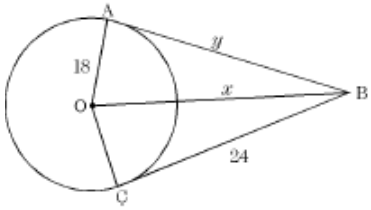
e)



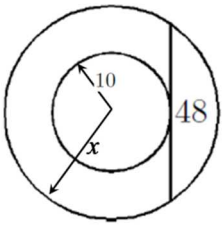
f)



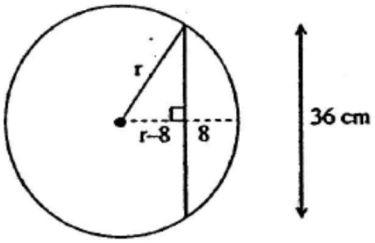
g)



h)



i)

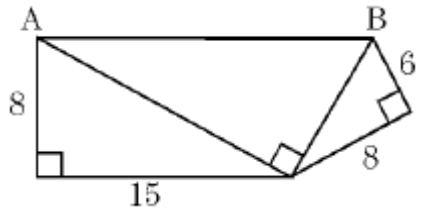


2. Dave drove 5km North, 2 km West, 1 km South and 8 km east. How far is he from his starting point?

3. The perimeter of a square is 96cm^2, what is the length of the diagonal?

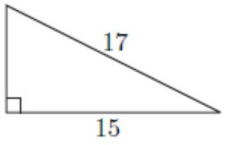
4. Two sides are right triangle are 3cm and 4cm. What are the possible lengths of the third side?

5. Find the length of segment AB in the diagram:

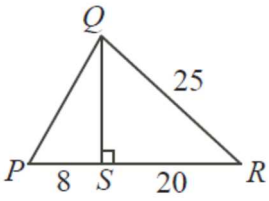


6. Prove that if one leg of a right triangle and the hypotenuse are consecutive values, then the other leg must be an odd number.

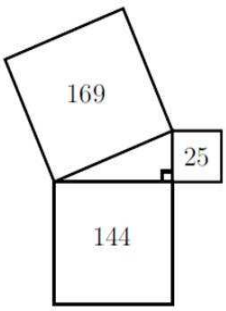
7. In the right-angled triangle below, the hypotenuse has length 17 units and one of the legs has length 15 units. How many units2 are in the area of the triangle?



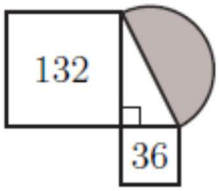
8. In the diagram, what is the perimeter of ΔPQR ?



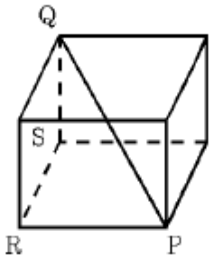
9. Given the areas of the three squares in the figure, what is the area of the interior triangle?



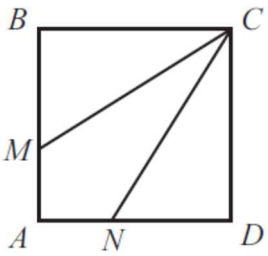
10. Squares are erected on the legs of a right-angled triangle. These squares have areas 36 and 132 as shown. A semicircle (Shaded) is drawn with hypotenuse as diameter. What is the area of the semi-circle? Give your answer in terms of pi.



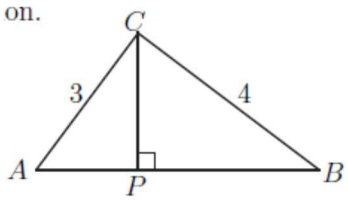
11. Given that RS = 4cm, PR = 7cm, and QS = 5cm, what is the length of QP?



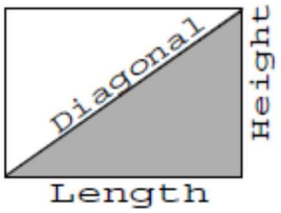
12. Square ABCD has sides of length 3. Segments *CM* and *CN* divide the squares area into three equal part. How long is segment *CM?*



13. Triangle ABC has a right angle at C. Side CA has length 3, and side CB has length 4. Point P on AB is such that CP is perpendicular to AB. What is the ratio of the length of AP to the length of PB? Express your answer as a common fraction.

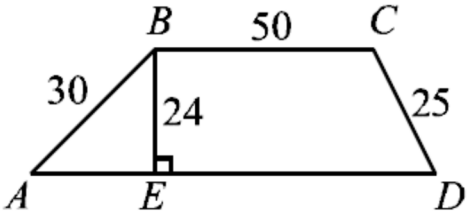


14. Many television: screens are rectangles that are measured by the length of their diagonals. The ratio of the horizontal length to the height in a standard television screen is 4:3. The horizontal length of a "27-inch" television screen is closest, in inches, to which of the following?

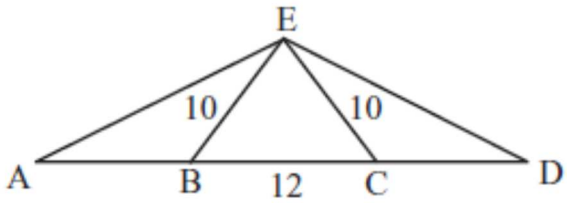


$a)20 \quad b)20.5 \quad c)21 \quad d)21.5 \quad e)22$

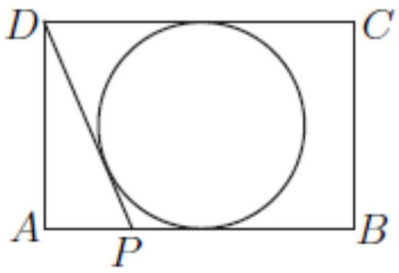
15. What is the perimeter of trapezoid ABCD?



16. Points A, B, C, and D lie on a line, in that order, with AB=CD and BC=12. Point *E* is not on the line, and *BE=CE=10*. The perimeter of ΔAED is twice the perimeter of ΔBEC. Find *AB.*



17. In the figure below, ABCD is a rectangle whose length AB is 6cm and whose width BC is 4cm. A circle of radius 2cm is drawn, with its center at the center of the rectangle. Point P on AB is such that DP is tangent to the circle. What is the length of DP (in cm)? Express your answer as a common fraction.



Euclid 2002 #10

10. A triangle is called *Heronian* if each of its side lengths is an integer and its area is also an integer.
A triangle is called *Pythagorean* if it is right-angled and each of its side lengths is an integer.

(a) Show that every Pythagorean triangle is Heronian.

(b) Show that every odd integer greater than 1 is a side length of some Pythagorean triangle.

(c) Find a Heronian triangle which has all side lengths different, and no side length divisible by 3, 5, 7 or 11.