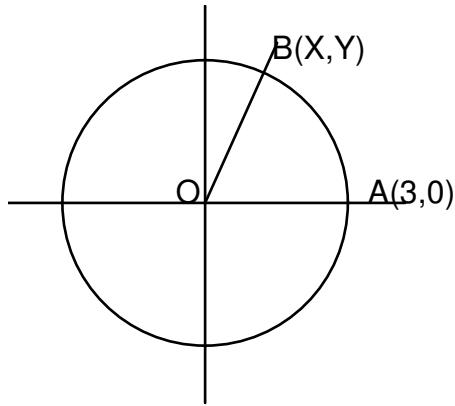


1.



The diagram above is a circle with a center O , at the origin. The circle passes through the points $A(3, 0)$ and $B(X, Y)$. If the measure of $\angle BOA = 60^\circ$, find the following:

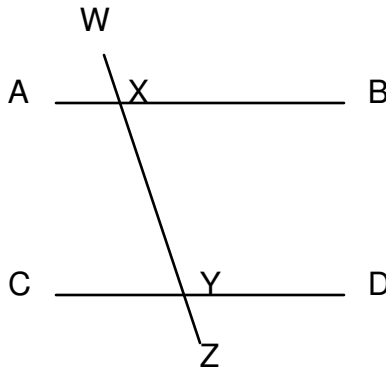
- $a =$ the value of X
- $b =$ the value of Y
- $c =$ the area of circle O
- $d =$ the length of arc AB

Find the exact value of the following expression: $\frac{ad}{bc}$

2. Find the area of the triangular region enclosed by the lines

$$4x - 3y = 0, 4x + 3y = 24, \text{ and } x = 0$$

3.

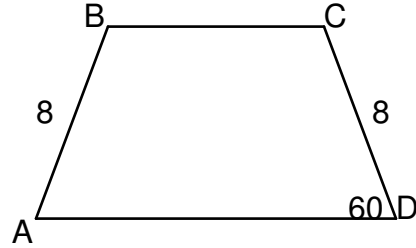


In the figure above, $\overline{AB} \parallel \overline{CD}$, $\angle BXW = (9E - 13)^\circ$, $\angle DYZ = (7E - 15)^\circ$. Find the following:

- $a = \angle AXY$ in degrees
- $b = \angle DYZ$ in degrees
- $c =$ the sum of $\angle BXW$ and $\angle CYZ$

Plug the results into the following expression: $c - (a - b)$

4. A = the area of a regular hexagon with a side length of 6.

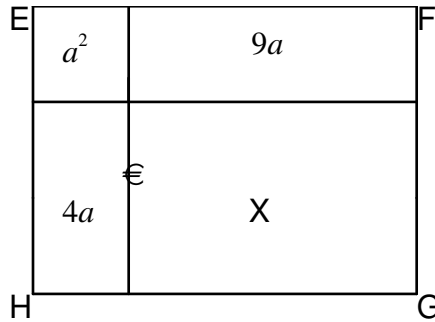


B = Given that segment BC is parallel to segment AD, BC = 10, find the area of trapezoid ABCD.

Find the exact value of the following expression: $\frac{A}{B}$

5. If the number of sides of a regular polygon is increased by five, the number of degrees in each interior angle is increased by 12. Find the number of degrees in each interior angle of the new polygon.

6.



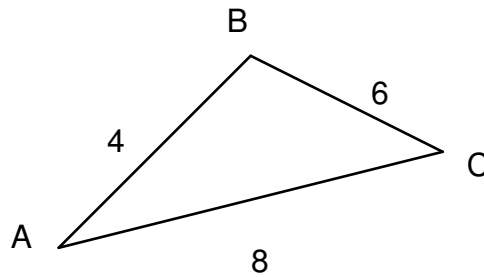
The above figure EFGH is a rectangle. It is broken up into a square, and three smaller rectangles. The area of each region are given. Find the following:

A = the value of X

B = given that the area of rectangle EFGH is 266, find the value of a.

Find the exact value of the following expression: $A - B$

7.



Given triangle ABC, find the following:

a = length of the altitude from point B to side AC.

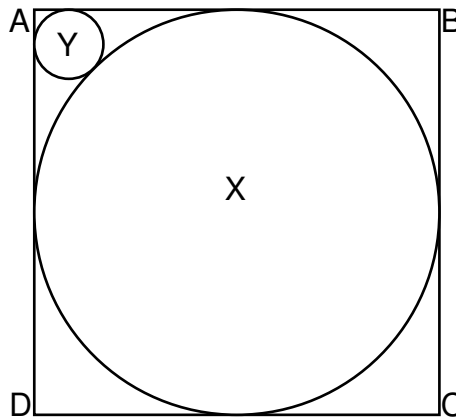
b = length of the altitude from point A to side BC.

c = length of the altitude from point C to side AB.

Find the value of the following expression:

$$\frac{a+b+c}{3}$$

8.



In the above figure, circle X is the largest circle that can be inscribed in the square ABCD. Circle Y is inscribed between circle X and square ABCD. Circle Y is tangent to two adjacent sides of square ABCD and also tangent to circle X. What is the ratio of the radius of circle Y to that of circle X?

9. A = the value, in degrees, of the largest angle of a triangle in which the ratio of the angles of the triangle are 4:5:6.

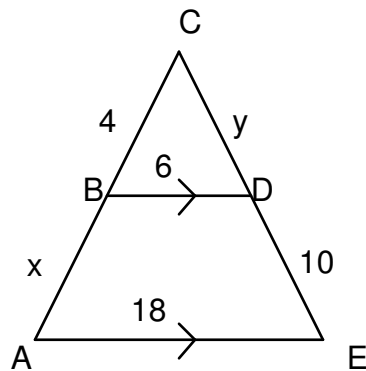
B = the number of square inches in the area of a right triangle with hypotenuse of length 12 and legs with lengths in the ratio 2:1.

Find the exact value of the following expression:

$$\frac{A}{B}$$

10. Polygon X is a hexagon with three angles of 90° , 100° , and 110° . The other three angles are in the ratio of 12:14:16. Polygon Y is a regular polygon with each interior angle the same as the largest angle of Polygon X. How many diagonals does Polygon Y have?

11. A regular octagon is formed by cutting off the corners of a 8 inch by 8 inch square. Find the perimeter of the octagon in inches.



12.

Using the diagram above, find the following:

a = the value of x

b = the value of y

c = the area of triangle BCD

d = the area of triangle ACE

Find the value of the following expression: $\frac{abd}{c}$

13. The area of a circle is 143π units greater than its circumference. Find the length of the circle's diameter. (Ignore the difference between square units and units).

14. The lines $Ax + 6y = B$ and $5x - 2y = C$ are perpendicular and both lines contain the point $(3, 6)$. Find the value of $(A + B + C)$.

15. Find the equation for the perpendicular bisector of the longest side of a triangle having vertices at $(-2, -6)$, $(4, 7)$, and $(9, -7)$ in the form $Ax + By = C$, where A, B, C are integers and $A > 0$.