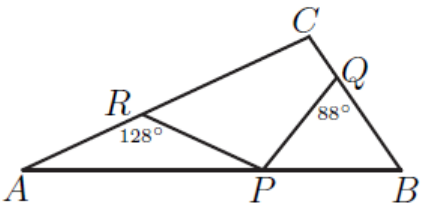
Name:_____ Date:_____

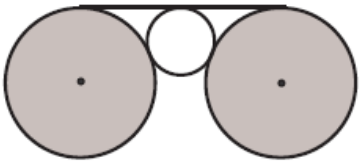
Math Challengers Geometry Questions

A circle has area 300π units^2. An equilateral triangle is inscribed in the circle. What is the perimeter of this equilateral triangle?

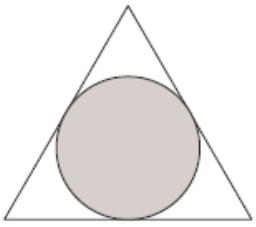
In the diagram below, $AR = PR$ and $PQ = BQ$. Also, $\angle ARP$ has measure 128 degrees, and $\angle PQB$ has measure 88 degrees. What is the degree measure of $\angle ACB$?



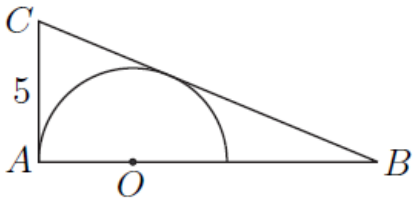
The two large shaded circles each have radius 1, and the distance between their centres is 5/2. The large circles and the small circle are tangent to the same line, and are on the same side of that line. The small circle lies between the two large circles and is tangent to them. What is the radius of the small circle? Express your answer as a common fraction.



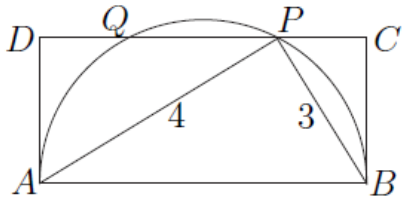
Each side of the triangle has length 2 units. What is the number of square units in the area of the inscribed circle? Express your answer in terms of π.



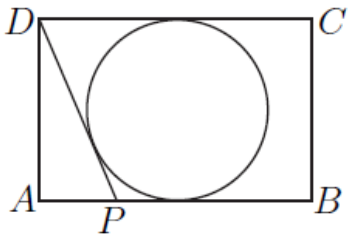
Let $\triangle ABC$ be right-angled at A. A semicircle with radius 3 units has center O on the line AB, passes through A, and is tangent to the line segment BC. If AC has length 5 units, what is the length of AB? Express your answer as a common fraction. (The diagram is not drawn to scale.)



The picture below (not drawn to scale) shows a rectangle $ABCD$, and a semi-circle with AB as diameter. The semi-circle meets side CD of the rectangle at P and Q. If the distance from A to P is 4 units, and the distance from B to P is 3 units, what is the distance from P to Q? Express your answer as a common fraction.

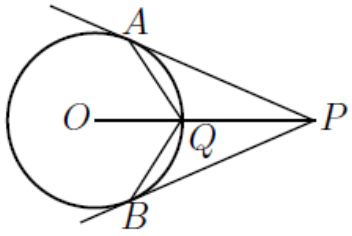


In the figure below, $ABCD$ is a rectangle whose length AB is 6 cm and whose width BC is 4 cm. A circle of radius 2 cm is drawn, with its center at the center of the rectangle. Point P on AB is such that DP is tangent to the circle. What is the length of DP (in cm)? Express your answer as a common fraction.

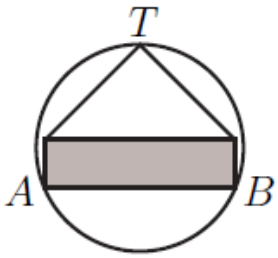


A triangle has vertices $A(0,0)$, $B(13,0)$, and $C(5,7)$. The triangle is inscribed in a circle. What are the coordinates of the center of the circle? Express your answer in the form (x,y), where x and y are common fractions.

The diagram shows a circle, and two tangent lines PA and PB. The points A, B, and Q are on the circle, and Q is on the line segment that joins the centre O of the circle to P. Suppose that the measure of $\angle APB$ is $34°$. What is the degree measure of $\angle AQB$?

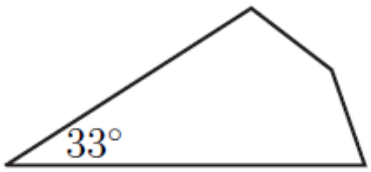


The shaded rectangle below has base AB of length 4, and has height 1. An isosceles triangle is erected with base the side opposite to AB. The triangle is right-angled at T. A circle is drawn passing through A, B, and T. What is the radius of the circle? Express your answer as a common fraction.

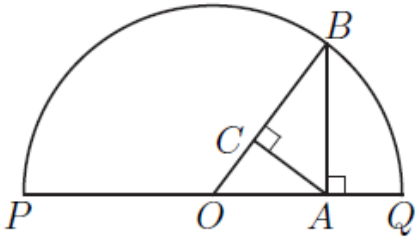


A semicircle has the same area as a circle of radius 1. What is the radius of the semicircle? Express the answer in simplest radical form.

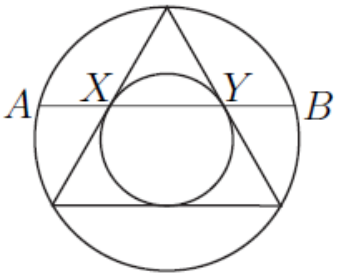
The measures of the four interior angles of a 4-sided convex polygon form an arithmetic progression. The smallest angle has degree measure $33°$. What is the degree measure of the second smallest angle?



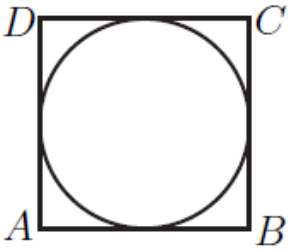
The figure below is a half-circle with centre O. Given that $PA = 13$ and $AQ = 3$, what is the length of OC? Express your answer as a common fraction.



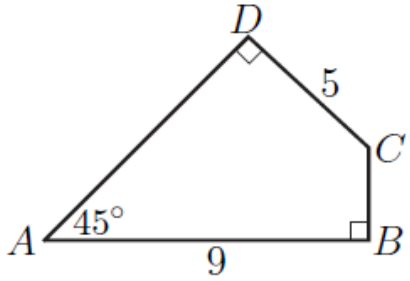
In the picture below, an equilateral triangle is inscribed in the large circle, and the smaller circle is inscribed in the equilateral triangle. Let X and Y be two of the points at which the smaller circle is tangent to the equilateral triangle. Suppose the line through X and Y meets the larger circle at A and B. What is the value of $\frac{AB}{XY}$?



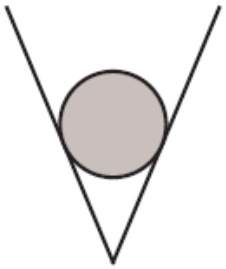
In the diagram below, a circle of radius greater than 9 cm is inscribed in the square $ABCD$. A point P on the circle is 8 cm from side AB of the square, and 9 cm from side AD. What is the radius of the circle?



In the quadrilateral $ABCD$, the angle at A is $45°$, and the angles at B and D are right angles. Side AB has length 9 cm, and side CD has length 5 cm. What is the area of the quadrilateral $ABCD$?



A spherical ball of radius 2 is dropped into a cup. The cup is a right-circular cone, with the radius of the top equal to 5 and the height equal to 12. When the ball reaches as low as it can, how far is the bottom of the ball from the vertex of the cone? Express your answer as a common fraction.



In the figure below, C is on the line segment BD, and $\angle ABC$ has measure $45°$. Also, we have $AB = 10$, and $AC = AD = 9$. What is the length of CD? Express your answer in the form $\sqrt{N}$, where N is an integer. For example, an answer of $\sqrt{160}$ is of the right form.