



Question # 1
Geometry Team Round
Florida Blue Key Invitational 2008

- A = The number of sides in the regular n-gon that has exterior angles of 24°
B = The largest value of n so that a regular n-gon has integral interior angles
C = The number of diagonals in a regular decagon.

Evaluate: $A - \frac{B \cdot C}{180}$



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Evaluate: $A - \frac{B \cdot C}{180}$



Question # 2
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If the volume of a sphere is tripled, the radius of the sphere is changed by a factor of A .

If the volume of a right, rectangular prism is quadrupled, the length is doubled and the width is multiplied by $\frac{2}{3}$, then the height is changed by a factor of B .

If the volume of a square based pyramid is doubled and the height is quadrupled, then the side of the base is changed by a factor of C .

What is the value of $A^6 B^2 C^2$?



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Question # 3
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A = The area of a hexagon with apothem $2\sqrt{3}$?

B = The area of a rectangle with length 24 inscribed in a circle with radius 13?

C = The area of a parallelogram with sides 6 and 10 that form a 30° angle?

D = The area of a sector of a circle with radius of length 12 and a sector perimeter of $5\pi + 24$?

Evaluate: $\frac{AC}{B} + \frac{D}{\pi}$



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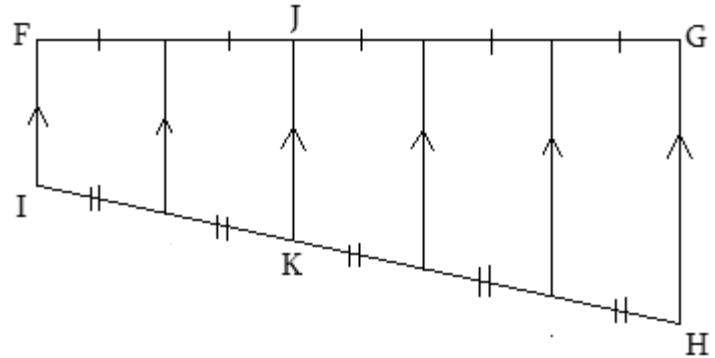


Question # 4
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Given the following diagram of quadrilateral $FGHI$, $\overline{FI} = 6$, $\overline{GH} = 21$, $\overline{FI} \perp \overline{FG}$ and the area of quadrilateral $FJKI$ is 60.

- A = The length of \overline{JK} .
- B = The length of \overline{FJ} .
- C = The area of quadrilateral $FGHI$.

What is $A + 3B + C$?

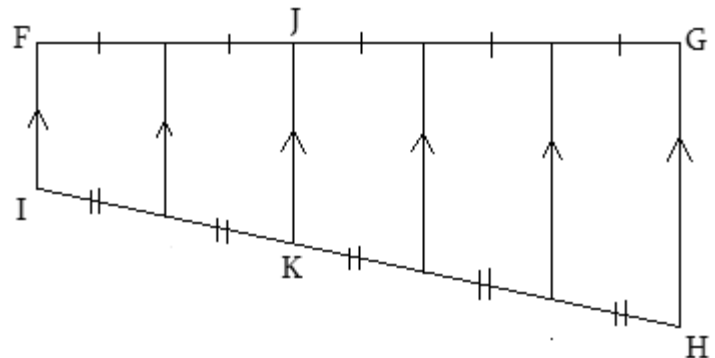


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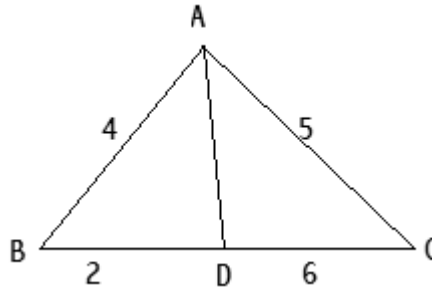
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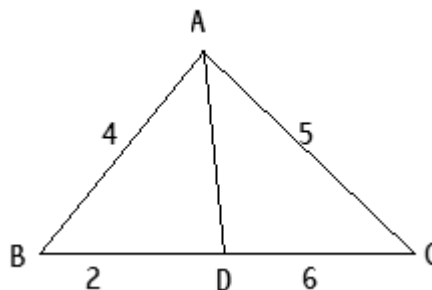
Question # 5
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Find the length of \overline{AD} given $\overline{AB} = 4$, $\overline{AC} = 5$, $\overline{BD} = 2$ and $\overline{CD} = 6$.



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Question # 6
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A = The exact number of degree measure of the acute angle formed by the hour and minute hands of a clock at 2:10 AM.

B = The exact number of degrees traveled by the tip of the minute hand on an analog clock between 4:00 PM on Tuesday, 08/14/2007, 2:10 AM on Wednesday, 08/15/2007.

C = The exact length, in inches, traveled by the tip of a 4 inch long minute hand on an analog clock between 4:00 PM on Tuesday, 08/14/2007, 2:10 AM on Wednesday, 08/15/2007.

Evaluate: $\frac{AC}{\pi B}$



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Evaluate: $\frac{AC}{\pi B}$



Question # 7

Geometry Team Round

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For each of the following, if the information given is sufficient to prove 2 triangles are similar, give it a value of 1. If the information given is sufficient to prove 2 triangles are congruent but not similar, give it a value of 2. If the information given is sufficient to prove 2 triangles are both similar and congruent give it a value of 3. If no conclusions can be made, give the statement a value of 0.

- A. In $\triangle ABC$, $\overline{AB}=4$, $\overline{AC}=5$ and $m\angle BAC = 60^\circ$. In $\triangle DEF$, $\overline{DE}=10$, $\overline{DF}=8$, and $m\angle EDF = 60^\circ$.
- B. $\triangle GHI$ is right, with $m\angle GHI = 90^\circ$ and $\overline{GH} = 3$. $\triangle JKL$ is right, with $m\angle JKL = 90^\circ$ and $\overline{JK} = 3$.
- C. Triangles MNO and MPO which are formed from connecting the vertices of kite MNOP, given $MN=NO$.
- D. Triangles QRS and TUV are both isosceles right triangles.
- E. Triangles WYA and XYA formed through segment \overline{WX} and its perpendicular bisector \overline{YZ} , which intersects the segment at point A.
- F. Any pair of right triangles that have side lengths that are different pairs of primitive Pythagorean Triples.

Determine the sum of the values given to each of the above statements.



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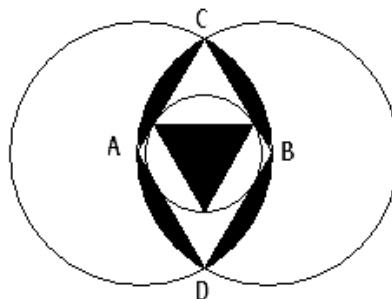
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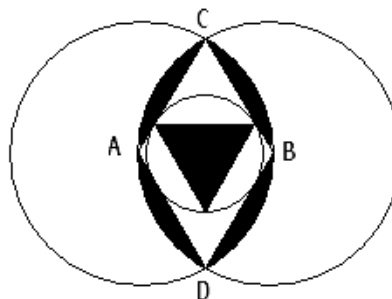
Question # 8
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Circles A and B both have radius 2 units and pass through the other's center. Quadrilateral ACBD is formed by connecting the centers and the intersections of the circles. A smaller circle is inscribed in ACBD and an equilateral is then inscribed inside this circle. Find the exact area of the shaded region.



Question # 8
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Question # 9
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Segment AB has endpoints $A(2,-2)$ and $B(5,1)$. Segment CD is a perpendicular bisector of AB. If C lies on the y -axis and the midpoint of CD is its intersection with AB, what is the sum of the coordinates of point D?



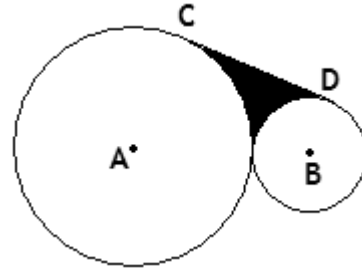
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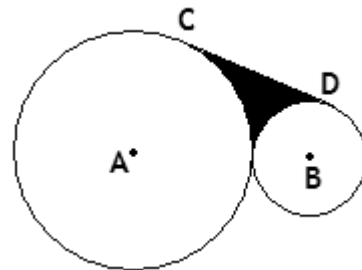
Question # 10
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Circles A and B have radii 6 and 2 respectively and are tangent to each other. \overline{CD} is a common external tangent. Find the exact area of the shaded region.



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Question # 11
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Anisha circumscribes a regular octagon around a circle with radius R , to approximate the circle's area. What is the area of the surrounding octagon?



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Question # 12
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Donald Trump is rich. So rich in fact that he has recently bought the entire Cartesian Coordinate Plane. Trump plans to build a triangular vegetable garden that will grow the world's most delicious rutabaga. The garden has vertices at $(0,3)$, $(4,0)$ and $(-5,-9)$. To protect his crop, Trump plans on keeping a guard duck in the lot. He wants to keep the duck on a leash so it will not run away and keep the leash as short as possible while still allowing the duck to be able to reach all areas of the garden. The area outside the

garden that the duck can graze is in the form $\frac{A^2\pi}{B} - \frac{C}{D}$, where A, B, C, and D are integers.

Find $A - C + \frac{B}{D}$.



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Question # 13
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Determine the number of true statements below (remember, a true statement must ALWAYS be true):

- If a point B is equidistant from the end points of a segment, B is the midpoint of the segment
- If two lines do not intersect, then the lines are parallel.
- An isosceles triangle can be obtuse.
- Any two circles are similar.
- In triangle ABC, if D lies on \overline{AC} such that \overline{BD} is the angle bisector of $\angle ABC$ then $AD = CD$.
- A convex polygon is defined to be one where any diagonal drawn between two vertices lies entirely inside the polygon.
- Every line has a perpendicular bisector.



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Question # 14
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What is the number of degree measures of an interior angle in a regular G -gon where G is the number of books in Euclid's Elements?



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Question # 15
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$\triangle RSW$ is equilateral with side length 4. Segment AP , of length 1, is drawn in so that $\overline{AP} \parallel \overline{RW}$,
A is on \overline{RS} and P is on \overline{SW} . What is the shortest distance from \overline{AP} to \overline{RW} .



Question # 15
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