

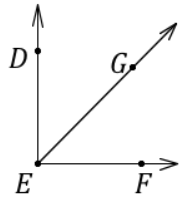
#1 Geometry – Hustle
MA@ National Convention 2017

$$m\angle DEG = (x + 3y)^\circ \text{ and } m\angle GEF = (2x + y)^\circ$$

$\angle DEG$ is complementary to $\angle GEF$

$$\angle DEG \cong \angle GEF$$

Find $x + y$.



Answer : _____

Round 1 2 3 4 5

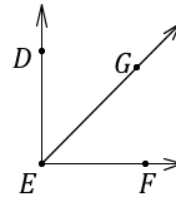
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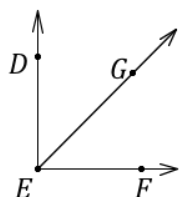
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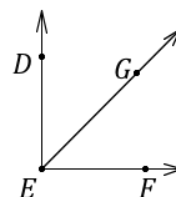
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#2 Geometry – Hustle
MA[©] National Convention 2017

A plane is partitioned into 2 regions by one line and into 4 regions by two intersecting lines. Into a maximum of how many disjoint regions do 5 coplanar lines partition a plane if no 2 of the lines are parallel and no 3 of the lines are concurrent?

Answer : _____

Round 1 2 3 4 5

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Answer : _____

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#3 Geometry – Hustle
MA[©] National Convention 2017

The length of a side of a square 6. Find the area enclosed by a circle that is circumscribed about the square.

Answer : _____

Round 1 2 3 4 5

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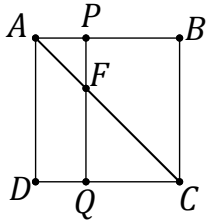
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Round 1 2 3 4 5

#4 Geometry – Hustle
MA[©] National Convention 2017

$ABCD$ is a square with sides that measure 5.
 $AP = DQ = 2$. Find the ratio of the area of $\triangle APF$ to the area of $\triangle FQC$, written as a reduced fraction of positive integers.

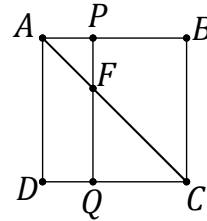


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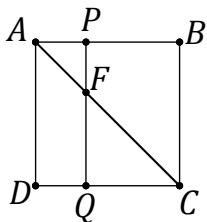


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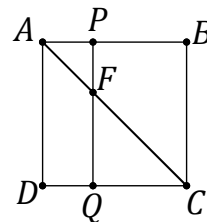


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Answer : _____

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#5 Geometry – Hustle
MA[©] National Convention 2017

Find the sum of the altitudes in a triangle with sides 5, 12, and 13.

Answer : _____

Round 1 2 3 4 5

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#6 Geometry – Hustle
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If a point inside a sphere is selected at random, what is the probability that the point is nearer to the surface of the sphere than to the center of the sphere?

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Round 1 2 3 4 5

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#7 Geometry – Hustle
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In $\triangle ABC$, $m\angle BAC = 30^\circ$, $AC = 12$ and $BC = 6\sqrt{2}$.
Find the smaller possible length of side AB .

Answer : _____

Round 1 2 3 4 5

#7 Geometry – Hustle
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#8 Geometry – Hustle
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The diameter, height, and slant height of a cone equal the base, height, and side length, respectively, of an isosceles triangle. The area enclosed by the triangle is 16 and its height is twice the length of its base. The outer surface area of the cone can be written as $n\pi$. Find the value of n .

Answer : _____

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#9 Geometry – Hustle
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A circle has a diameter of 20. How far from the center of the circle is a chord of length 16?

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#10 Geometry – Hustle
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Cowboy Bob is in an outhouse 10 meters south of a linear river that travels east to west. He needs to pick up his horse that is 14 meters south of the river. The outhouse and Bob's horse are $2\sqrt{29}$ meters apart. If Bob would like to wash his hands in the river before picking up his horse, what is the least distance he could travel in the entire trip from his outhouse to his horse, in meters?

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#11 Geometry - Hustle
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The lengths of the sides of a triangle are 9, 12, and 14. If an angle bisector is drawn to the side that measures 14, find the lengths of the segments on the side that measures 14 formed by the intersection of the angle bisector and the side.

Answer : _____

Round 1 2 3 4 5

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#12 Geometry - Hustle
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The distance between the centers of two circles is 20. If one of the circles has a radius of 5 and the other circle has a radius of 17, find the length of the common external tangent between its tangency points to the two circles.

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#13 Geometry – Hustle
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Jacob builds a fence for his dog Clover. The fence is shaped like a rectangle with width 30 and length $3\sqrt{3}$. Jacob puts Clover on a leash with a length of 6 and attaches the end of the leash to a corner inside the fence. If Jacob closes the entrance, how much area can Clover cover? Write the answer as a single fraction.

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#14 Geometry - Hustle
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Find the distance between the lines

$$y = -\frac{4}{3}x + 5 \text{ and } y = -\frac{4}{3}x + \frac{20}{3}.$$

Answer : _____

Round 1 2 3 4 5

#14 Geometry - Hustle
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#15 Geometry - Hustle
MA@ National Convention 2017

A segment that measures $15+5\sqrt{3}$ is folded to create a $30^\circ-60^\circ-90^\circ$ triangle. Two of these triangles are put together to form an equilateral triangle. Four of these equilateral triangles are put together to form a tetrahedron. Two of these tetrahedrons are put together to form an octahedron. Find the volume of this octahedron.

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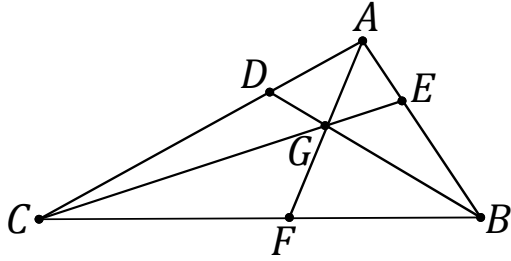
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#16 Geometry - Hustle
MA@ National Convention 2017

If $\frac{AE}{EB} = \frac{1}{2}$ and $\frac{CF}{FB} = \frac{5}{4}$ and $\frac{AD}{DC} = \frac{2}{5}$, find $\frac{AG}{AF}$.

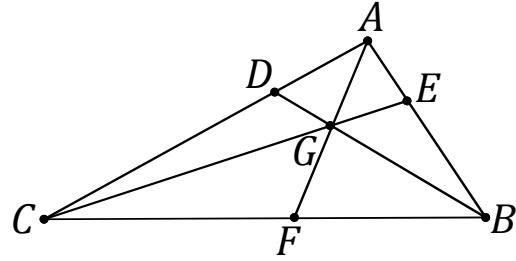


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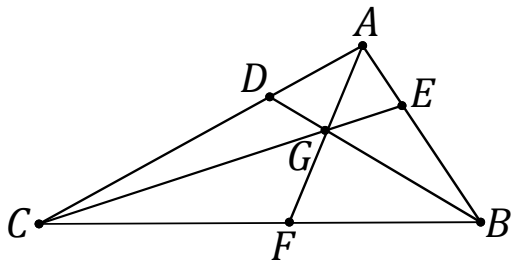


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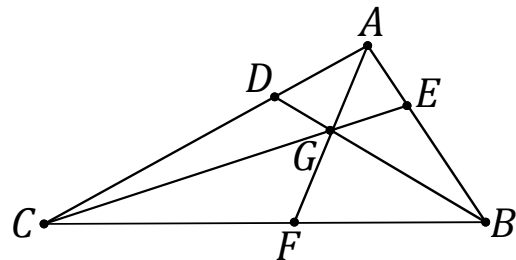


Answer : _____

Round 1 2 3 4 5

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Answer : _____

Round 1 2 3 4 5

#17 Geometry - Hustle
MA $\text{\textcircled{C}}$ National Convention 2017

A rhombus has diagonals of length $2\sqrt{5}$ and $\sqrt{7}$. Find the perimeter of the rhombus.

Answer : _____

Round 1 2 3 4 5

#17 Geometry - Hustle
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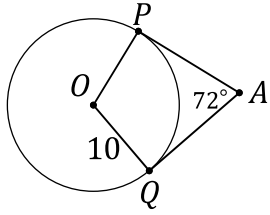
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#18 Geometry - Hustle
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Given circle O with tangent segments \overline{AP} and \overline{AQ} . Find the area of the region bounded by minor \widehat{PQ} , \overline{OP} , and \overline{OQ} .

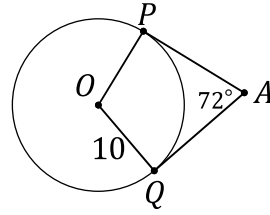


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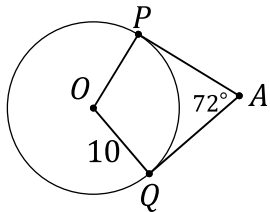


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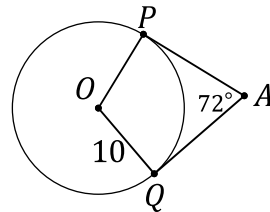


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#19 Geometry - Hustle
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Circles A , B , and C are externally tangent. The radii of the circles are 9, 13, and 16, respectively. Find the area enclosed by $DABC$.

Answer : _____

Round 1 2 3 4 5

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$ABCD$ is a trapezoid in which $\overline{AB} \parallel \overline{CD}$. \overline{RS} is the midsegment of trapezoid $ABCD$. If $AB = x^2 - x$, $RS = 2x^2 + 2x - 3$, and $CD = x^2 - 3$, find the numerical value of RS .

Answer : _____

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Answer : _____

Round 1 2 3 4 5

#21 Geometry - Hustle
MA[©] National Convention 2017

Find the volume of the frustum of a pyramid if the area of the base of the pyramid is 64, the distance from the apex of the pyramid to the smaller base of the frustum is 5 and the height of the pyramid is 8.

Answer : _____

Round 1 2 3 4 5

#21 Geometry - Hustle
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Find the volume of the frustum of a pyramid if the area of the base of the pyramid is 64, the distance from the apex of the pyramid to the smaller base of the frustum is 5 and the height of the pyramid is 8.

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Answer : _____

Round 1 2 3 4 5

#22 Geometry - Hustle
MA Θ National Convention 2017

$\hat{u} = \begin{pmatrix} 1 \\ 2 \\ 5 \end{pmatrix}$ and $\hat{v} = \begin{pmatrix} 4 \\ -2 \\ -3 \end{pmatrix}$. Find $\hat{u} \cdot \hat{v}$. Write your answer in i, j, k form.

Answer : _____

Round 1 2 3 4 5

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MA Θ National Convention 2017

$\hat{u} = \begin{pmatrix} 1 \\ 2 \\ 5 \end{pmatrix}$ and $\hat{v} = \begin{pmatrix} 4 \\ -2 \\ -3 \end{pmatrix}$. Find $\hat{u} \cdot \hat{v}$. Write your answer in i, j, k form.

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Answer : _____

Round 1 2 3 4 5

#23 Geometry - Hustle
MA \odot National Convention 2017

Find the center of the circle through the points
 $(-3, 5)$, $(3, 3)$, and $(6, 12)$.

Answer : _____

Round 1 2 3 4 5

#23 Geometry - Hustle
MA \odot National Convention 2017

Find the center of the circle through the points
 $(-3, 5)$, $(3, 3)$, and $(6, 12)$.

Answer : _____

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 $(-3, 5)$, $(3, 3)$, and $(6, 12)$.

Answer : _____

Round 1 2 3 4 5

#24 Geometry - Hustle
MA \odot National Convention 2017

In $\triangle ABC$, $m\angle B = 45^\circ$, $a = 7$, and $c = 5$. Find b^2 .

Answer : _____

Round 1 2 3 4 5

#24 Geometry - Hustle
MA \odot National Convention 2017

In $\triangle ABC$, $m\angle B = 45^\circ$, $a = 7$, and $c = 5$. Find b^2 .

Answer : _____

Round 1 2 3 4 5

#24 Geometry - Hustle
MA \odot National Convention 2017

In $\triangle ABC$, $m\angle B = 45^\circ$, $a = 7$, and $c = 5$. Find b^2 .

Answer : _____

Round 1 2 3 4 5

#24 Geometry - Hustle
MA \odot National Convention 2017

In $\triangle ABC$, $m\angle B = 45^\circ$, $a = 7$, and $c = 5$. Find b^2 .

Answer : _____

Round 1 2 3 4 5

#25 Geometry - Hustle
MA \odot National Convention 2017

The measure of one interior angle of a regular polygon is 144° . Give the seven-letter name of this polygon.

Answer : _____

Round 1 2 3 4 5

#25 Geometry - Hustle
MA \odot National Convention 2017

The measure of one interior angle of a regular polygon is 144° . Give the seven-letter name of this polygon.

Answer : _____

Round 1 2 3 4 5

#25 Geometry - Hustle
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The measure of one interior angle of a regular polygon is 144° . Give the seven-letter name of this polygon.

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The measure of one interior angle of a regular polygon is 144° . Give the seven-letter name of this polygon.

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