

**#1 Geometry – Hustle**  
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---

The perimeter of a regular  $n$ -gon is 144. If this  $n$ -gon has integral side lengths, how many distinct values of  $n$  exist?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

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**#2 Geometry – Hustle**  
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How many of the lattice points that are inside or on the circle  $(x+3)^2 + (y+2)^2 = 25$  are also in the first quadrant but not on either axis?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#2 Geometry – Hustle**  
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**#3 Geometry – Hustle**  
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A convex hexagon has interior angle measures (in degrees) that are integers forming an arithmetic progression. What is the degree measure of the largest possible interior angle in such a hexagon?

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Round 1 2 3 4 5

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**#4 Geometry – Hustle**  
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A certain regular polygon has 5 times as many diagonals as it has sides. What is the sum of the number of sides and the number of diagonals for this polygon?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#4 Geometry – Hustle**  
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Round 1 2 3 4 5

**#5 Geometry – Hustle**  
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Line  $a$ :  $2x - 5y = 17$

Line  $b$ : perpendicular to  $a$ , through  $(2,3)$

Line  $c$ : parallel to  $b$ , through  $(-1,4)$

Line  $d$ : perpendicular to  $c$ , through  $(5,-2)$

Line  $e$ : parallel to  $d$ , through  $(9,7)$

If these five lines are all in the same plane,  
what is the  $y$ -coordinate of the  $y$ -intercept of  
line  $e$ ?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

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**#6 Geometry – Hustle**  
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---

When two triangles are congruent, 6 pairs of pieces are congruent (3 pairs of sides and 3 pairs of angles). What is the greatest number of pairs or pieces (sides and/or angles) which can be congruent in two triangles that are not themselves congruent?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

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Round 1 2 3 4 5

**#7 Geometry – Hustle**  
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In triangle  $ABC$ ,  $m\angle A = (2x + 25)^\circ$ ,  
 $m\angle B = (7x - 14)^\circ$ , and the measure of the  
exterior angle at vertex  $C$  is  $(4x + 76)^\circ$ . What is  
the degree measure of the smallest interior  
angle of triangle  $ABC$ ?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

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Round 1 2 3 4 5

**#8 Geometry – Hustle**  
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In geometry and other areas of mathematics, there is a type of proof which tries to show that the contrapositive of the original statement is true, and it generally begins by temporarily assuming the negation of the conclusion you are actually trying to prove. What is the name of a proof of this type?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#8 Geometry – Hustle**  
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Round 1 2 3 4 5



**#9 Geometry – Hustle**  
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In the land of liars and truth-tellers (each person must always tell the truth or always lie), four citizens are asked by a foreigner how many liars are among this group of four citizens. Citizen A says there are three liars, while Citizens B, C, and D all say that all four of them are liars. How many of the four citizens are actually lying?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#9 Geometry – Hustle**  
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Round 1 2 3 4 5

**#10 Geometry - Hustle**  
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What is the sum of the enclosed areas of the inscribed and circumscribed circles for an equilateral triangle whose enclosed area is  $36\sqrt{3}$ ?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#10 Geometry - Hustle**  
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Round 1 2 3 4 5

**#11 Geometry - Hustle**  
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A circle with enclosed area  $49\pi$  and a circle with radius of length 10 have their centers positioned 15 units apart. What is the length of a common external tangent for these circles between the two points of tangency?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#11 Geometry - Hustle**  
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Round 1 2 3 4 5

**#12 Geometry - Hustle**  
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In regular decagon  $ABCDEFGHIJ$ , what is the degree measure of  $\angle DFH$ ?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#12 Geometry - Hustle**  
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Round 1 2 3 4 5

**#13 Geometry - Hustle**  
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What is the locus of points equidistant from two given points?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#13 Geometry - Hustle**  
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Round 1 2 3 4 5

**#13 Geometry - Hustle**  
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Round 1 2 3 4 5

**#14 Geometry – Hustle**  
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In a certain right triangle, it is known that the perimeter is 180, the sum of the interior angles is  $180^\circ$ , and the sine of the smallest interior angle is  $\frac{3}{5}$ . What is the area enclosed by this triangle?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#14 Geometry – Hustle**  
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Round 1 2 3 4 5

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Round 1 2 3 4 5

**#15 Geometry - Hustle**  
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---

Two distinct circles are concentric. A chord of the larger circle is drawn tangent to the smaller circle. If the length of this chord is 18, what is the positive difference between the areas of the circles?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#15 Geometry - Hustle**  
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Two distinct circles are concentric. A chord of the larger circle is drawn tangent to the smaller circle. If the length of this chord is 18, what is the positive difference between the areas of the circles?

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Round 1 2 3 4 5

**#16 Geometry - Hustle**  
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---

A triangle has sides of lengths 27, 36, and 42.  
If the bisector of the largest interior angle is drawn, find the positive difference in the perimeters of the two triangles into which this angle bisector divides the original triangle.

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#16 Geometry - Hustle**  
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A triangle has sides of lengths 27, 36, and 42.  
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**#16 Geometry - Hustle**  
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Round 1 2 3 4 5



**#17 Geometry - Hustle**  
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What is the smallest possible perimeter for a right triangle whose enclosed area is 81?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#17 Geometry - Hustle**  
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---

What is the smallest possible perimeter for a right triangle whose enclosed area is 81?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#17 Geometry - Hustle**  
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---

What is the smallest possible perimeter for a right triangle whose enclosed area is 81?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#17 Geometry - Hustle**  
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---

What is the smallest possible perimeter for a right triangle whose enclosed area is 81?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#18 Geometry - Hustle**  
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A sphere with radius of length 9 is melted down and recast as a cone with base radius of length 9. What is the height of the cone?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#18 Geometry - Hustle**  
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---

A sphere with radius of length 9 is melted down and recast as a cone with base radius of length 9. What is the height of the cone?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#18 Geometry - Hustle**  
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A sphere with radius of length 9 is melted down and recast as a cone with base radius of length 9. What is the height of the cone?

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Round 1 2 3 4 5

**#18 Geometry - Hustle**  
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A sphere with radius of length 9 is melted down and recast as a cone with base radius of length 9. What is the height of the cone?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#19 Geometry - Hustle**  
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A right rectangular prism has faces with areas of 80, 80, 60, 60, 120, and 120. What is the volume of this solid?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#19 Geometry - Hustle**  
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---

A right rectangular prism has faces with areas of 80, 80, 60, 60, 120, and 120. What is the volume of this solid?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#19 Geometry - Hustle**  
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A right rectangular prism has faces with areas of 80, 80, 60, 60, 120, and 120. What is the volume of this solid?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#19 Geometry - Hustle**  
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A right rectangular prism has faces with areas of 80, 80, 60, 60, 120, and 120. What is the volume of this solid?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#20 Geometry - Hustle**  
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---

Square  $ABCD$  has perimeter 20. Equilateral triangle  $ABE$  is drawn such that  $E$  is in the interior of square  $ABCD$ . What is the sum, in degrees, of the measures of  $\angle DEA$  and  $\angle DBE$ ?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#20 Geometry - Hustle**  
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Round 1 2 3 4 5

**#21 Geometry - Hustle**  
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---

What is the minimum number of lines which must be drawn in a plane in order to separate the plane into 40 non-overlapping regions?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#21 Geometry - Hustle**  
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---

What is the minimum number of lines which must be drawn in a plane in order to separate the plane into 40 non-overlapping regions?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#21 Geometry - Hustle**  
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---

What is the minimum number of lines which must be drawn in a plane in order to separate the plane into 40 non-overlapping regions?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#21 Geometry - Hustle**  
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What is the minimum number of lines which must be drawn in a plane in order to separate the plane into 40 non-overlapping regions?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#22 Geometry - Hustle**  
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Fifteen distinct circles are drawn in the same plane. What is the maximum number of points in the plane that are common to at least two of the circles?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#22 Geometry - Hustle**  
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---

Fifteen distinct circles are drawn in the same plane. What is the maximum number of points in the plane that are common to at least two of the circles?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#22 Geometry - Hustle**  
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---

Fifteen distinct circles are drawn in the same plane. What is the maximum number of points in the plane that are common to at least two of the circles?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#22 Geometry - Hustle**  
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Fifteen distinct circles are drawn in the same plane. What is the maximum number of points in the plane that are common to at least two of the circles?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#23 Geometry - Hustle**  
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A solid has a surface area of 36 square units.  
The maximum possible volume for a solid of  
this type can be expressed as  $\frac{36}{n}$  cubic units.

What is the value of  $n$ ?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#23 Geometry - Hustle**  
**MA<sup>©</sup> National Convention 2016**

---

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Round 1 2 3 4 5

**#23 Geometry - Hustle**  
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**#23 Geometry - Hustle**  
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---

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What is the value of  $n$ ?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#24 Geometry - Hustle**  
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---

What is the area enclosed by a triangle whose sides have lengths 13, 14, and 15?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#24 Geometry - Hustle**  
**MA<sup>©</sup> National Convention 2016**

---

What is the area enclosed by a triangle whose sides have lengths 13, 14, and 15?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#24 Geometry - Hustle**  
**MA<sup>©</sup> National Convention 2016**

---

What is the area enclosed by a triangle whose sides have lengths 13, 14, and 15?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#24 Geometry - Hustle**  
**MA<sup>©</sup> National Convention 2016**

---

What is the area enclosed by a triangle whose sides have lengths 13, 14, and 15?

Answer : \_\_\_\_\_

Round 1 2 3 4 5



**#25 Geometry - Hustle**  
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A coin with radius of length 1 inch lands face down in the bottom of a box that is 16 inches by 16 inches with a height of 4 inches. What is the probability that the coin is at least 2 inches away from the closest edge of the bottom of the box?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#25 Geometry - Hustle**  
**MA<sup>©</sup> National Convention 2016**

---

A coin with radius of length 1 inch lands face down in the bottom of a box that is 16 inches by 16 inches with a height of 4 inches. What is the probability that the coin is at least 2 inches away from the closest edge of the bottom of the box?

Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#25 Geometry - Hustle**  
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Answer : \_\_\_\_\_

Round 1 2 3 4 5

**#25 Geometry - Hustle**  
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Answer : \_\_\_\_\_

Round 1 2 3 4 5

