**Question #1 Theta Bowl**

**MAO National Convention 2012**

Let A = the arithmetic mean of 10 and 20

Let G = the geometric mean of 10 and 20

Let H = the harmonic mean of 10 and 20

**Find **

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**Question #2 Theta Bowl**

**MAO National Convention 2012**

Mr. Friedlander is visiting the Corn Palace in Mitchell, South Dakota. Lo and behold, the governor of South Dakota, Dennis Daugaard is there and Mr. Friedlander gets to meet him. Let d = the number of distinguishable permutations there for the word **DAUGAARD**.

Mr. Friedlander is visiting Cincinnati, Ohio for a baseball game. Let c = the number of distinguishable permutations for the word **CINCINNATI**.

Mr. Friedlander is visiting Mount Rushmore. If the presidents whose likenesses are carved on the mountain were to line up to go to the water fountain, p = the number of different ways these presidents could line up.

There are six students in the Mr. Friedlander Rocks club. Let s = the number of ways they can sit in a circle.

**Find d ÷ (s ÷ p) + c.**

**Question #2 Theta Bowl**

**MAO National Convention 2012**

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**Find d ÷ (s ÷ p) + c.**

**Question #3 Theta Bowl**

**MAO National Convention 2012**

Given f(x) = 20x5 – 5x4 + 4x3 – 2x2 + 10x – 1,

S = the sum of the roots

P = the product of the roots

T = the sum of the roots taken two at a time

H = the sum of the roots taken three at a time

**Find S + P + T + H.**

**Question #3 Theta Bowl**

**MAO National Convention 2012**

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S = the sum of the roots

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**Find S + P + T + H.**

**Question #4 Theta Bowl**

**MAO National Convention 2012**

Line A passes through the point (72, -4). Line B passes through the points (8, -6) and

(-1, 2).

*Part I*. Assume Line A is parallel to Line B. Write the equation of Line A in the form

y = m1x + b1.

*Part II.* Assume Line A is perpendicular to Line B. Write the equation of Line A in

the form y = m2x + b2.

**Find m1 • m2 + b1 - b2.**

**Question #4 Theta Bowl**

**MAO National Convention 2012**

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**Find m1 • m2 + b1 - b2.**

**Question #5 Theta Bowl**

**MAO National Convention 2012**

Consider the expansion of .

A = the sum of the coefficients of the expansion

B = the coefficient of the sixth term

C = the coefficient of the term that has no x in it.

**Find A + B + C.**

**Question #5 Theta Bowl**

**MAO National Convention 2012**

Consider the expansion of .

A = the sum of the coefficients of the expansion

B = the coefficient of the sixth term

C = the coefficient of the term that has no x in it.

**Find A + B + C.**

**Question #6 Theta Bowl**

**MAO National Convention 2012**

Given the equation -2y = x2 – 8x + 12

L = the length of the latus rectum

(h, k) are the coordinates of the vertex

M = the sum of the integral solutions for 



**Question #6 Theta Bowl**

**MAO National Convention 2012**

Given the equation -2y = x2 – 8x + 12

L = the length of the latus rectum

(h, k) are the coordinates of the vertex

M = the sum of the integral solutions for 



**Question #7 Theta Bowl**

**MAO National Convention 2012**

Let , where  is in lowest terms.

Let C = 

Nicholas has 8 blue socks and 4 red socks. Let  = the probability as a fraction in

lowest terms that Nicholas randomly chooses two blue socks in succession

without replacement.



**Question #7 Theta Bowl**

**MAO National Convention 2012**

Let , where  is in lowest terms.

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**Question #8 Theta Bowl**

**MAO National Convention 2012**

The Saturn V rocket was used to take astronauts to the Moon. It was the largest rocket ever assembled measuring 360 feet in height with a diameter of 32 feet and was cylindrical in shape. Let V = the volume of the Saturn V rocket in cubic feet if the rocket is considered as a solid cylinder.

As always, you are late to school and rush out of your house, get in your car and drive to school. Ten minutes after you leave for school, your mother, who is at your house, realizes you left your math homework. Being a great parent, she instantly gets in her car to catch you before you get to school. She knows she must catch you in 20 minutes and average 20 mph more than you. Let R = the speed that your mother averages in miles per hour in order to catch you in exactly 20 minutes.

**Find V ÷ R.**

**Question #8 Theta Bowl**

**MAO National Convention 2012**

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**Find V ÷ R.**

**Question #9 Theta Bowl**

**MAO National Convention 2012**

The sum of three negative integers is -228. The ratio of the smallest integer to the middle integer is two to three. The ratio of the middle integer to the largest integer is also two to three. List the three integers from smallest to largest.

**Question #9 Theta Bowl**

**MAO National Convention 2012**

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**Question #10 Theta Bowl**

**MAO National Convention 2012**

Chase and Ken are both heavyweights. In fact Chase weighs C pounds and Ken weighs K pounds. Chase finds the ratio of his own weight in pounds (C) to Ken’s weight in pounds (K) and then adds the ratio of Ken’s weight to his (Chase’s) weight to the former ratio. When two pounds are added to the sum of these ratios, and the result is divided by the sum of the reciprocals of their weights in pounds, they are surprised at the result. What is the result?

**Question #10 Theta Bowl**

**MAO National Convention 2012**

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**Question #11 Theta Bowl**

**MAO National Convention 2012**

Ten fair pennies are tossed in the air. Find the probability that at least two of the pennies land heads up assuming the pennies may only land heads up or tails up.

**Question #11 Theta Bowl**

**MAO National Convention 2012**

Ten fair pennies are tossed in the air. Find the probability that at least two of the pennies land heads up assuming the pennies may only land heads up or tails up.

**Question #12 Theta Bowl**

**MAO National Convention 2012**

A parabola has its focus located at  and directrix with equation . Find the equation of the

parabola in the form x = ay2 + by + c.

Find the equation for the hyperbola with vertices (-2, 6) and (-2, -4) and conjugate axis of length 8.

Write your equation in the form .

**Give the value of a • b ÷ h + rx • ry ÷ (c + k).**

**Question #12 Theta Bowl**

**MAO National Convention 2012**

A parabola has its focus located at  and directrix with equation . Find the equation of the

parabola in the form x = ay2 + by + c.

Find the equation for the hyperbola with vertices (-2, 6) and (-2, -4) and conjugate axis of length 8.

Write your equation in the form .

**Give the value of a • b ÷ h + rx • ry ÷ (c + k).**

**Question #13 Theta Bowl**

**MAO National Convention 2012**

The Richter Scale number of an earthquake is the base ten logarithm of the severity of the earthquake. The Lisbon earthquake of 1755 registered 9 on the Richter Scale while the Haiti earthquake of 2010 was a 7. Let A = how many times stronger the Lisbon earthquake was than the Haiti earthquake.

Cici is riding on a train that follows the path defined by y2 – 6y + x2 – 14x + 2 = 0 while Joyce is riding on another train whose path is defined by (x – 7)2 + (y – 3)2 = 35. If these paths are graphed on the same coordinate system, let C = the maximum number of possible collision points (intersections) for these paths.

The graphs defined by y = -2x2 + 8x + 27 and 2x + y = 15 intersect at point (L, M) where both L and M must be positive for the ordered pair to be valid. Let I = L + M.

**Find C + A • I**

**Question #13 Theta Bowl**

**MAO National Convention 2012**

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**Find C + A • I**

**Question #14 Theta Bowl**

**MAO National Convention 2012**

Given (3x)log3 = (5x)log5. Find x if x > 0.

**Question #14 Theta Bowl**

**MAO National Convention 2012**

Given (3x)log3 = (5x)log5. Find x if x > 0.