Elimination Tournament Round 1

3nd Annual WSMA Math Bowl

March 2, 2013

Problem 1

A video rental store has two rental plans. Plan A has a yearly payment of $30 and each video can be rented for $2.50. Plan B has a yearly payment of $25 and each video can be rented for $3.50. If you intend on renting 40 videos over the next two years, which plan will be cheaper?

Problem 2

You have a standard deck of 52 playing cards. What is the probability of drawing a royal card (J, Q, K) that is not a spade? Simplify your answer as a fraction.

Problem 3

Find the 7^{th} term of the following geometric sequence: $1, -3, 9$ ….

Problem 4

Find the sum of the prime factors of 2013.

Problem 5

Find the area of a triangle whose vertices in the Cartesian coordinate plane are (1, 2), (3, 12), and (6, 12).

Problem 6

$F(x) = x^3$ is transformed into a new function, $G(x)$, through the following transformations:

- horizontal dilation by a factor of five,
- vertical dilation by a factor of 3,
- translation 7 units along the positive *x*-axis,
- translation 8 units along the negative *y*-axis.

Find $G(x)$.

Problem 7

A farmer has 40 feet of fencing. If he can only create a rectangle with integer side lengths, what is the difference between the maximum and minimum areas the farmer could enclose?

Problem 8

Angle A of triangle ABC is divided by an angle bisector that intersects with side BC at point D. If AB=13, BD=10, DC=2.3, and AC=2, find the length of AD.

Problem 9

Solve the following equation:

$$\sqrt{x+3} - \sqrt{x-3} = 1$$

Extra Question

Triangle OAB is positioned on a Cartesian plane where O(0,0), A(2,4), and B(3,1). If the line y=kx passes through point O and intersects with AB so that the area of triangle OAB is split into two triangles with equal areas, find the value of k.