Bergen County Mathematics League

Good Luck To You — Good Luck To All

Contest #4 (Calculators Allowed) — **2012-2013**

Part I *Time Limit: 12 minutes* Answers must be exact *or* have 4 (or more) significant digits, correctly rounded.

4-1. If $ax + by = x^2 + xy$, $a - b = 2$, and $a + b = 2x$, write an **EQUATION** expressing y explicitly in terms of x.

4-2. The distances from point A on an ellipse to its foci F and F' are 1 and 3 respectively. If the distance between the foci is the same as the length of the minor axis, what is $m\angle AFF'$?

Part II *Time Limit: 12 minutes*

4-3. There are two roads from A to B. One is $\overline{AB}$, and the other is a semicircle whose diameter is $\overline{AB}$, is $114m$ longer. How long is $\overline{AB}$ (to the nearest meter)?

4-4. In a vote, 600 men and 600 women cast ballots on an issue. Twice as many women as men voted for the issue. The "for" majority obtained by the women was 4 times the "against" majority obtained by the men. How many men voted for the issue? [Note: A majority is the amount by which the greater number of votes exceeds the remainder of the votes.]

Part III *Time Limit: 12 minutes*

4-5. Consecutive midpoints of the sides of a rectangle are joined to form a quadrilateral whose perimeter is 12. How long is each radius of the circle that circumscribes this rectangle?

4-6. If a, b, and c are different numbers, what is the simplified expression for

$$\frac{x(x-b)(x-c)}{(a-b)(a-c)} + \frac{x(x-c)(x-a)}{(b-c)(b-a)} + \frac{x(x-a)(x-b)}{(c-a)(c-b)}?$$

***Notice*: There will be no repeated theme on the next contest.**

Answers

4-1. $y = x$ or equivalent EQUATION, solved for y

4-2. 90 or 90°

4-3. 200 or $200m$

4-4. 250

4-5. 3

4-6. x