# Bergen County Mathematics League

Good Luck To You — Good Luck To All

**Contest #2 (Calculators Allowed)** — **2012-2013**

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

2-1. In isosceles $\triangle ABC$, the base is $\overline{BC}$. Altitudes $\overline{BD}$ and $\overline{CE}$ intersect at $P$. If $EB = EP$, what is $m\angle BAD$?

2-2. How many triangles (both overlapping and non-overlapping) are formed when all 5 sides and 5 diagonals of a regular pentagon are drawn?

---

**Part II** *Time Limit: 12 minutes*

2-3. On a certain building project, rules called for each bricklayer in a crew to lay a quota of $b$ bricks per day. If each bricklayer's daily quota were reduced by 200, 5 more bricklayers would be needed to maintain the crew's daily quota. If the individual quota reduction had been 100, only 2 additional bricklayers would have been needed. What is the value of $b$?

2-4. For what value of $p$ do the equations $x^3+px^2-3x+4 = 0$ and $x^3+px^2-5x+8 = 0$ have a common solution?

---

**Part III** *Time Limit: 12 minutes*

2-5. A 120 degree arc of a circle has endpoints at $(\sqrt{6},0)$ and $(0,-\sqrt{6})$. What is the length of a radius of this circle? [Note: Your answer must be in simplest form.]

2-6. If $a \neq b$, what are the four ordered pairs of integers $(a,b)$ for which $a^b = b^a$?

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

---

## Answers

2-1. 45 or 45°

2-2. 35

2-3. 600

2-4. -3/2 or exact equivalent

2-5. 2

2-6. (2,4), (4,2), (-2,-4), (-4,-2)