

1st Pytheagle Mathematical Competition

July 26, 2009

1. Find the smallest integer p such that $2^m + 3^n = p^2$ where $m, n \geq 1$.

2. Find abc when:

$$10a + 9b + 8c = 63$$

$$9a + 8b + 10c = 45$$

$$8a + 10b + 9c = 54$$

3. Annie can do a job in 3 hours, Bob can do it in 4, Carter can do it in 5, and Daniel can do it in 6. Each person works on the job individually for 23 minutes. Then, they work together. How long will they have to work together to finish the job?

4. If $(x - 2k)$ is a factor of $x^4 + 3x^2 + kx + 6$, find the sum of all possible values of k .

5. Find the area of $\triangle ABC$ if $\overline{AC} = 25$, $\overline{AB} = 30$, and $\angle CAB = 45^\circ$.

6. Consider the polynomial $2x^4 + 3x^3 + 5x^2 + 7x + 11$ with roots r_1, r_2, r_3 , and r_4 . Find $r_1r_2r_3 + r_1r_2r_4 + r_1r_3r_4 + r_2r_3r_4$.