

DUSO Mathematics League 2016 - 2017

Contest #3.

Calculators are not permitted on this contest.

Part I.

ALGEBRA I

Time Limit: 10 minutes

The word "compute" calls for an exact answer in simplest form.

3 - 1. Three students work afterschool jobs. Alex earns \$30 per hour. Bridget earns \$40 per two hours. Carl earns \$30 every three hours. The students all work the same number of hours in a week. Compute the number of hours they each would have to work to earn exactly \$2016 altogether. Round your answer to the nearest tenth.

3 - 2. Given that $4^a = 8$, $8^b = 12$, and $12^c = 16$, compute the product $a \cdot b \cdot c$.

Part II.

GEOMETRY

Time Limit: 10 minutes

The word "compute" calls for an exact answer in simplest form.

3 - 3. Given triangle ABC , where side \overline{CB} is extended through B to D , and \overline{AD} is drawn. Suppose that $AC = AB = BD$, and that $m\angle CAB$ is four times as large as $m\angle ACB$. Compute $m\angle CAD$ in degrees.

3 - 4. Under a reflection in line ℓ , the image of $P(3, 6)$ is $P'(1, 10)$. The image of $Q(2, 9)$ after a reflection in ℓ is $Q'(a, b)$. Compute $a + b$.

Part III.

ALGEBRA II / ADVANCED TOPICS

Time Limit: 10 minutes

The word "compute" calls for an exact answer in simplest form.

3 - 5. Let $f(x) = x^6 - 3x^4 + 5x^2 - 7$. If $f(7) = 110684$, compute $f(-7)$.

3 - 6. In $\triangle TRG$, $\sin T = \frac{5}{13}$ and $\sin R = \frac{8}{17}$. Compute $\sin G$.

Author: George Reuter - coachreu@gmail.com - Reviewer: Michael Curry - currymath@gmail.com