DUSO Mathematics League 2012 - 2013

Contest #2. **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.

2 - 1. The value of 85 coins (all either nickels or dimes) is \$6.60. Compute the number of nickels.

2 - 2. Sage's father is 3 years older than her mother. Sage's age is $\frac{1}{3}$ of her father's age. When Sage was born, the sum of her parents' ages was 45. Compute Sage's present age.

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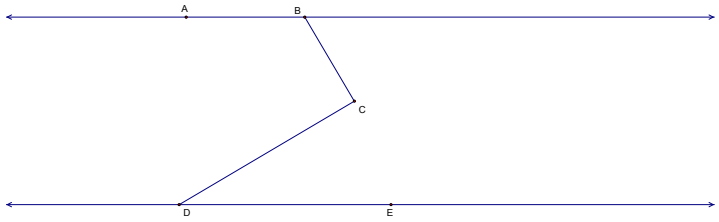
Part II. **GEOMETRY** *Time Limit: 10 minutes*

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

2 - 3. The surface area of a cube is numerically equal to the volume of the cube. Compute the length of one side of the cube.

2 - 4. Consider the diagram. $\overline{AB} \parallel \overline{DE}$, $m\angle ABC = 120°$, $m\angle CDE = 30°$, and $CD = 10$. If C is $3\sqrt{3}$ units away from line AB, compute the distance BD.



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Part III. **ALGEBRA II / ADVANCED TOPICS** *Time Limit: 10 minutes*

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

2 - 5. The letters of the word CHEESE are arranged randomly to form a six-letter "word". Compute the probability that the three E's will be together in this arrangement.

2 - 6. Compute the interval of values of x for which $|2x - 1| + |2x + 1| > |4x|$.

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Contest #2. **TEAM ROUND** **Calculators are not permitted on this contest.**

T-1. For two acute angles A and B (measured in degrees), we have $\sin A + \sin B = \dfrac{\sqrt{8}+\sqrt{12}}{4}$ and $\sin A \cdot \sin B = \dfrac{\sqrt{96}}{16}$. If $A < B$, compute (A, B).

T-2. Adam and Beth, working together, paint $\frac{2}{3}$ of a wall. Carly, who could paint the whole wall by herself in 8 hours, joins Adam and Beth, and they three together finish painting the wall in 2 hours. Compute the total number of hours Beth spent painting the wall.

T-3. Compute the sum of the infinite series: $\frac{1}{3} + \frac{4}{9} + \frac{7}{27} + \frac{10}{81} + \frac{13}{243} + \cdots$

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