Bergen County Mathematics League

Good Luck To You

Good Luck To All

Contest #1 (No Calculators) **2013-2014**

Part I *Time Limit: 12 minutes* On contests #2, #4, and #6, ***any S.A.T. calculator will be allowed.***

1-1. Ali spent two-thirds of her money and misplaced three-quarters of the remainder, leaving herself with $18. With how many dollars did Ali start?

1-2. If different letters represent different digits, if identical letters represent identical digits, and if A = 5, find the value of the base-ten numeral "ABCCBD" in the multiplication alphametic shown at the right.

$$\begin{array}{r} \text{ABCCBD} \\ \times\quad 5 \\ \hline \text{CDEEFGH} \end{array}$$

Part II *Time Limit: 12 minutes*

1-3. If $a = \frac{1+\sqrt{3}}{2\sqrt{2}}$, $b = \frac{-1+\sqrt{3}}{2\sqrt{2}}$, and $c = \frac{\sqrt{3}}{2}$, what is the value of $\frac{a^2+b^2-c^2}{2ab}$? Express your answer as a fraction in simplest form.

1-4. A cyclist bicycled from A to B at 20 km/hr, returned by the same route at 30 km/hr, and averaged x km/hr for the whole journey. What is the value of x?

Part III *Time Limit: 12 minutes*

1-5. If Ann decreased the circumference of a circle by 20%, by what percent did she decrease the area of the circle?

1-6. What are all ordered pairs of integers (x,y) which satisfy $x^2 + 2x + y^2 = 4$?

***Reminder*: A question next meet will repeat the theme of question 1-6.**

Answers

1-1. 216 or $216

1-2. 562268

1-3. $\frac{1}{2}$

1-4. 24

1-5. 36 or 36%

1-6. (−3,−1), (−3,1), (−2,−2), (−2,2), (0,−2), (0,2), (1,−1), (1,1)