

Bergen County Mathematics League

Good Luck To You



Good Luck To All

Contest #6 (Calculators Allowed)

2013-2014

Part I *Time Limit: 12 minutes*

Answers must be exact *or* have 4 (or more) significant digits, correctly rounded.

- 6-1. Let A , B , C , and D be four different weights. When placed on a balance, the following observations are made: A and B exactly balance C and D . A and C together outweigh B and D together. C is lighter than D . Arrange the weights in order, with the *HEAVIEST* first.
- 6-2. If $A = 8^{2014}$ and $B = 4^{2014}$, what is the value of $\log_B A$?
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Part II *Time Limit: 12 minutes*

Answers must be exact *or* have 4 (or more) significant digits, correctly rounded.

- 6-3. What are both ordered pairs of positive integers (x,y) , with $x \leq y$, for which the area of an x by y rectangle is equal to its perimeter?
- 6-4. What real value of x satisfies $\sqrt{7x} - \sqrt{3x} = 7 - 3$?
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Part III *Time Limit: 12 minutes*

Answers must be exact *or* have 4 (or more) significant digits, correctly rounded.

- 6-5. Though Al has as many brothers as sisters, his sister has twice as many brothers as sisters. Including Al, there are B brothers and S sisters in Al's immediate family. What is the ordered pair (B,S) .
- 6-6. If $0 < x < \frac{\pi}{4}$ and $\sin x + \cos x = \frac{\sqrt{5}}{2}$, what is the value of $\sin x - \cos x$?

Notice: A question next meet will repeat the theme of question 6-2.

Answers

- 6-1. A, D, C, B
- 6-2. $\frac{3}{2}$ or 1.5
- 6-3. $(3,6), (4,4)$
- 6-4. $10 + 2\sqrt{21}$
- 6-5. $(4,3)$
- 6-6. $\frac{-\sqrt{3}}{2}$