

2013 CIPHERING TIME TRIALS
THURSDAY, DECEMBER 12TH, 2013

Round 1

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Round 1

2013 Cipherring Time Trials
Thursday, December 12th, 2013

1. Evaluate: $-2 - (-3) - (-5)(-7) - 11$

2. How many positive integers are factors of 24300?

3. Two concentric circles have radii of 9 m and 16 m. What is the length of a chord of the larger circle that is tangent to the smaller circle?

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Round 2

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4. How many edges does a dodecahedron have?

5. What are the coordinates, in the form (x, y) , of the midpoint of the points $(27, -64)$ and $(49, 36)$?

6. How many subsets of the set of one-digit composite numbers contain at least one even number?

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7. What is the name of the point where the perpendicular bisectors of the three sides of a triangle meet?

8. What is the sum of the 35 smallest positive even integers?

9. If $m(n) = (2n + 3)(4n^2 - 5n - 6) + 7$, evaluate $m(3)$.

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10. What are the coordinates, in the form (x, y) , of the vertex of the parabola with equation $y = 3x^2 - 36x + 17$?

11. What is the 2013th term of an arithmetic sequence with a first term of 9876 and a common difference of -6?

12. In a right triangle with legs measuring 4 m and 10 m, what is the cosine of the smallest angle?

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13. Express in simplest radical form: $5\sqrt{432}$

14. What are the eigenvalue(s) of the matrix $\begin{bmatrix} 1 & -1 \\ 3 & 5 \end{bmatrix}$?

15. Express the base ten number 974_{10} in base eight.

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16. Arrange the letters in order of descending value (e.g. DCBA):

$$A = 5! \quad B = \sqrt{98765} \quad C = 4^4 \quad D = \frac{1.23 \times 10^4}{8.76 \times 10^5}$$

17. What is the length, in meters, of the altitude to the shortest side of a triangle with sides measuring 20 m, 21 m, and 39 m?

18. Bag U contains two red marbles and nine green marbles, while Bag V contains six red marbles and one green marble. A bag is chosen at random, and then a random marble is drawn from that bag. If the resulting marble turns out to be red, what is the probability that Bag U was selected?

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19. What is the solution, in the form (g, h, j) , of the system of equations $g + h = 3$, $h + j = 7$, and $g + j = 12$?

20. I own the first two books of the Perry's Hotter series, all of the Roar of the Lings trilogy, and the last book of the Peal of Whines series. If I wish to arrange them next to one another on a shelf, keeping books in the same series together, in how many ways can I do that?

21. Simplify in terms of $i = \sqrt{-1}$: $(7i^2 - 6i^3)\left(3 - \frac{2}{i}\right)$

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22. If Eddie can paint three houses in four days and Farah can paint five houses in six days, how many days would it take them to paint ten houses in a new cul-de-sac?

23. If $z(b) = \frac{b^2}{b-3}$, evaluate $z'(-4)$.

24. What is the sum of the positive two-digit integers that are not multiples of three?

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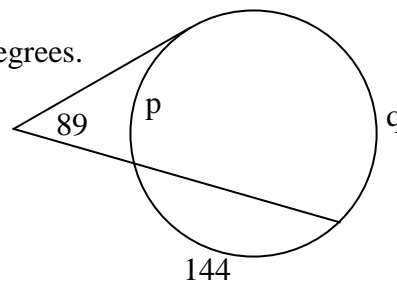
Round 9

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25. In the figure to the right, angle and arc measures are given in degrees.
What is the value of q ?

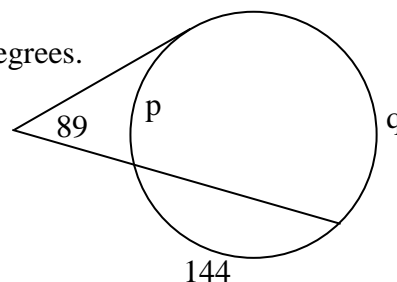


26. If the domain and range of the function $s(t) = \sqrt{\frac{1-t}{t+2}}$ are both subsets of the real numbers, express the domain in interval notation.

27. What is the population standard deviation of $\{3,4,6\}$?

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Round 10

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28. Captain Even has eight identical earrings he wishes to distribute among his three lieutenants. If all distributions are equally likely, what is the probability that each lieutenant receives an even number of earrings (0 counts as even)?

29. What value(s) of k satisfy $\frac{8k+7}{2k+3} = \frac{4k+5}{k-6}$?

30. A room is in the shape of a regular hexagonal prism with walls measuring 10 m long and a height of 3 m. If Randi has two square panels measuring 3 m on a side, what is the largest volume she can enclose in one of the room's corners?

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