

WinMaC 2016

Guts Round

Set 1

1. **(3)** Spongebob spends \$5 on bubbles everyday. How much money does he spend on bubbles if he buys them for 4 days?

2. **(3)** What is the area of a triangle with side lengths 3, 4 and 5?

3. **(3)** How many uppercase Ls are in the uppercase letter W? (Note: the angles in the W are right and the angle in L is right too)

Team: _____

Set 2

4. **(4)** Felix really loves sushi! Today, he ate three less than two times what he yesterday. If he ate 9 pieces today, How many pieces of sushi did he eat yesterday?

5. **(4)** Venkitty loves to eat sanic mice. If he eats two sanic mice every 63 seconds, how many sanic mice can he eat in 2016 seconds?

6. **(4)** What is the largest attainable value by substituting 0, 1, 2, and 3 for a , b , c and d (not necessarily in that order) in the expression $\frac{a^b}{c} + d$?

Team: _____

WinMaC 2016

Set 3

7. (5) An experienced elite gamer plays 221 hours of game A and 323 hours of game B every month. If the gamer only plays those two games, then what fraction of his gaming time is spent on game A?

8. (5) An experienced magician can launch fireballs that do 200 damage per 1.25 seconds. By switching to thunder magic, he can do 125 damage per 0.8 seconds. How much more damage per second does the fireball do, compared to the thunder magic?

9. (5) An experienced wizard successfully casts a healing spell 80% of the time. If the wizard tries to cast a healing spell 3 times to successfully cast a healing spell, what is the probability he succeeds at least once?

Team: _____

Set 4

10. (5) Compute $2^2 + 4^2 + 6^2 + 8^2 + \dots + 12^2$.

11. (5) The amount of ways 6 people can sit in a round table with 5 seats and one person sitting on the floor be expressed as x^y , where x and y are positive integers. what is the sum of x and y ?

12. (5) Drake used to call you on your cell phone. Calling for the first 5 minutes costs a total of \$1, and each consecutive minute after that costs 95 cents. If Adele wanted to say hello from the other side to Drake, but only had twenty dollars in her pocket, then what is the maximum whole number of minutes that she can talk to him for?

Team: _____

WinMaC 2016

Set 5

13. (6) On a 16 by 16 chess board, you can place a maximum of n knights on the board such that no knights are attacking any other knights. What is the remainder when n is divided by 1000? (A knight is said to be attacked if another knight is two squares horizontally and one square vertically away, or two squares vertically and one square horizontally away.)

14. (6) I went to a party. If a total of 120 handshakes took place, then how many people were at the party, including me? (everyone shakes everyone else's hand once)

15. (6) Eminem is just gonna stand there and hear you cry. One day, Eminem asks you and your sister to fill a 500 liter pool with your tears. If you can fill a 100 liter pool in 24 hours, and your sister can fill a 200 liter pool in 72 hours, how many days will it take the both of you to fill the 500 liter pool together?

Team: _____

Set 6

16. (6) $\triangle ABC$ has integer side lengths. If \overline{AB} is 14 units and the altitude that is perpendicular to it is 12 units, how many units is the perimeter of $\triangle ABC$?

17. (6) Rectangle $ABCD$ has vertices A, B, C, D at $(0, 0), (20, 0), (20, 16),$ and $(0, 16)$ respectively. How many unit squares does AC pass through?

18. (6) For what integer values of x is $\frac{x^2+2x+1}{x^2+4x+4} \geq 2$ true?

Team: _____

WinMaC 2016

Set 7

19. (7) For positive x , $231x^5$ has exactly 3213 factors including 1 and itself. How many factors does x have?

20. (7) There are 3 numbers a, b, c such that the absolute value of the sum of any two of the numbers is the square of the last one. What is (a, b, c) if $a < b < c$? (the absolute value of a number is the positive difference of 0 and that number) Ex: absolute value of -1 is 1

21. (7) What is the sum of the number of vertices, squares(faces), and edges on a tesseract?

Team: _____

Set 8

22. (7) There exist two rectangles with one having length $n + 3$ and width $n + 5$ while the other one having length $k + 7$ and width $k - 1$. If the sum of the areas of the two rectangles is 140, find all possible integral pairs of (n, k) .

23. (7) Simplify $\sqrt{18 + 8\sqrt{2}} + \sqrt{18 - 8\sqrt{2}}$ in to a form with at most one radical.

24. (7) A trapezoid $ABCD$ is inscribed in a circle with \overline{AB} and \overline{CD} the bases. Given that \overline{CD} is 6 inches longer than \overline{AB} , the shortest line segment connecting the two bases is 4 inches, and \overline{AD} is 9 inches shorter than \overline{CD} , find the area of the trapezoid $ABCD$.

Team: _____

WinMaC 2016

Set 9

25. (8) Evaluate: $(1 + \frac{2}{3})(1 + (\frac{2}{3})^2)(1 + (\frac{2}{3})^4)(1 + (\frac{2}{3})^8)(1 + (\frac{2}{3})^{16}) \cdots$

26. (8) On a spherical planet with radius of 2 miles, there exists a ring S perpendicular to the line drawn from the North and South pole where if you are at a point P on S , such that it is possible to end up back at P if you go north π miles from P , then go east π miles from there and finally south π miles. From ring S , you go South π miles to ring R . Find the radius of R .

27. (8) If $4^x + 4^{-x} = 7$, then what is $|8^x + 8^{-x}|$? (the bars denote absolute value)

Team: _____

Set 10

28. (9) A sanic mouse's weight, w , is determined by the equation $w = x^4 + x^3 - 4x^2 - 2x + 2016$ where x is the mouse's favorite real number. Determine the minimum integer possible weight of a sanic mouse.

29. (9) If point A is at $(3, 2)$, point B is at $(6, 1)$, and point C is at $(x, 0)$ where x minimizes the value of $AC + BC$, find the value of x .

30. (9) How many factors does $n + 1$ have if n is the greatest integer such that the equation $13x + 11y = n$, where x and y are nonnegative integers, has no solution?
