

Name: _____

School: _____

1. _____ What is the volume of a sphere with a radius of 9?
2. _____ A right triangle with legs of length 20 and 21 is inscribed in a circle. What is the area of the circle?
3. _____ What is $294+176+720$?
4. _____ Evaluate 45^2
5. _____ How many permutations exist for the word MENTALEMATH?
6. _____ What is the sum of the first 10 perfect cubes?
7. _____ RJ is buying Pokémon cards. He can buy packs of either 8 cards or 15 cards. What is the greatest number of cards that he cannot obtain?
8. _____ Compute $69^2 - 31^2$
9. _____ How many numbers between 1 and 1000, inclusive, are divisible by 3 or 5 but not both?
10. _____ A triangle with integral side lengths has one side of length 4, and another side of length 7. What is the positive difference between the maximum and minimum lengths of the third side?
11. _____ If $\cos(2\theta) = 0$, what is $\sin(3\theta)$?
12. _____ Consider a 13-14-15 triangle. What is the length of the altitude to the side of length 14?
13. _____ How many diagonals does a cube have?
14. _____ Find the product of the greatest common divisor and the least common multiple of 18 and 24.
15. _____ What is the sum of the exterior angles of a myriagon (10000 sides) in degrees?
16. _____ If $f(x)$ is the inverse factorial function, what is $f(6! \cdot 7!)$?
17. _____ Which has a larger value: $A = \sqrt[3]{5}$ or $B = \sqrt[3]{2}$? (Answer with just the letter)
18. _____ Find the sum of the first 10 positive integers with an odd number of factors.
19. _____ What is the sum of the coefficients of $(5w + 6x - 8y - z)^{12}$.
20. _____ What is the sum of the positive integral factors of 2017?
21. _____ What is the probability of getting a sum of either 4 or 8 when rolling two 6-sided dice?
22. _____ If $x + y = 5$ and $x^3 + y^3 = 95$, find xy .
23. _____ Evaluate: $\log_5 343 \cdot \log_3 256 \cdot \log_{49} \sqrt[4]{5} \cdot \log_2 3$.
24. _____ Carson is playing Madden. If his quarterback can throw a football at a velocity of 25 m/s, what is the farthest possible distance the ball can travel? (Assume gravity = $10m/s^2$ and no air resistance)
25. _____ $\sqrt{6 - \sqrt{6 - \sqrt{6 - \dots}}} = x$. Find x .
26. _____ Aman can do a statistics problem in 9 hours, while Cherry can do a statistics problem in 6 hours. How long would it take, in minutes, for Aman and Cherry to complete five statistics problems while working together?
27. _____ The number of terminal zeroes in 2017!
28. _____ Find the units digit of 839022^{849295} .
29. _____ Find the mode of the set: 3, 8, 8, 8, 5, 8, 3, 5, 3, 3, 3, 5, 5, 5, 5, 8
30. _____ Find x such that $17 - 2x = 1 + 6x$.

31. ----- Find the sum of the infinite sequence: $\frac{1}{2}, \frac{1}{3}, \frac{1}{6}, \frac{1}{6}, \frac{1}{18}, \frac{1}{12}, \dots$
32. ----- Find the sum of the infinite series: $4 - \frac{4}{3} + \frac{4}{5} - \frac{4}{7} + \dots$
33. ----- What is the surface area of a cone with a radius of 5 and a height of 12?
34. ----- What is the sum of the reciprocals of the roots of the polynomial $21x^4 - 8295x^3 + 10x - 20$?
35. ----- A mailman is distributing 4 pieces of mail to 4 houses. Each house was supposed to receive one piece of mail. However, the addresses of the mail have been erased. If the mailman distributes the mail randomly so that each house gets one piece of mail, what is the probability that none of the houses get the right mail?
36. ----- Evaluate: $|9 - 40i|$
37. ----- What is the sum of the first 10 prime numbers?
38. ----- Find the determinant of AB, given that $A = \begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix}$.
39. ----- Find the discriminant of $x^3 - 11x^2 + 32x - 28$.
40. ----- Find $\langle 5, 4, 6 \rangle \cdot \langle 2, -7, 4 \rangle$.