Name: _____
School: _____
Score: _____

1. _____ On a fair six-sided die, what is the probability of rolling six times and obtaining every number from 1 through 6 exactly once?
2. _____ Find the discriminant of: $y = -x^2 + 8x - 15$
3. _____ Find the sum of the first 5 negative cubes.
4. _____ Compute $23472 \cdot 22$.
5. _____ Find the volume, in cubic inches, of a square pyramid with base length 1 foot and a height of 5 inches.
6. _____ $A = \begin{bmatrix} 4 & 1 \\ -8 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 4 \\ 2 & 9 \end{bmatrix}$. Find the determinant of $A + B$
7. _____ 7.2% of $x = 1.8$. Find the exact value of $4.5x$.
8. _____ Compute $\cos\left(\frac{4\pi}{3}\right)$. Write your answer as a fraction or exact decimal.
9. _____ What is the maximum number of pieces obtainable by cutting a cylindrical cake of 5 inches, 5 times?
10. _____ Jeromy genuinely enjoys vacuuming for a living. Unfortunately for him, so does Varun. If Jeromy can neatly vacuum 40 square feet per minute, and Varun can neatly vacuum 30 square feet per minute, how long would it take to vacuum 850 square feet of dirty carpet, if the two of them are working together? Give an exact answer as an improper fraction in minutes.
11. _____ Compute the eccentricity of the conic: $9x^2 + 54x + 4y^2 + 16y = -61$.
12. _____ What are the last 2 digits of the expression 7^{7^7}?
13. _____ Evaluate the sum of the y-intercepts of the tangent lines to the extrema of the function $y = 49x^{29} - 1728x^3 - 3x + 1$.
14. _____ Cookies come in packs of 17 and packs of 29. What is the largest number of cookies unattainable by buying whole numbers of packs?
15. _____ Evaluate $\dfrac{\sin(5^\circ)\sin(10^\circ)\sin(15^\circ)\ldots\sin(80^\circ)\sin(85^\circ)}{\cos(5^\circ)\cos(10^\circ)\cos(15^\circ)\ldots\cos(80^\circ)\cos(85^\circ)}$.
16. _____ Calculate the area under the curve $y = \dfrac{\sqrt{36 - 9x^2}}{2}$.
17. _____ How many primitive Pythagorean triples exist with hypotenuse less than 30?
18. _____ Find the sum of the numerator and denominator of the reduced fraction form of 0.714285.
19. _____ Evaluate the following infinite series: $\frac{1}{3} + \frac{4}{9} + \frac{9}{27} + \frac{16}{81} + \ldots$
20. _____ Find the number of zeros in 7!.