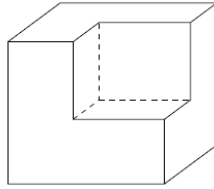


ROUND I

1. The volume of a large cube is 64 cubic inches. A new shape is formed by removing a small cube from one corner of the large cube. What is the surface area of new shape?



Answer: 96 in^2

2. Find all solutions of the equation $|x-2| = |2x^2 - 3x - 2|$.

Answer: $-1, 0, 2$

3. Suppose that a and b are nonzero real numbers, and that the equation $x^2 + ax + b = 0$ has solutions a and b . What is the pair (a, b) ?

Answer: $(1, -2)$

4. Suppose $f(x)$ is a function and $f(-1), f(0), f(1)$ are distinct real numbers. If $f(x^3) = (f(x))^3$ for all x , find $f(0) + f(1) + f(-1)$.

Answer: 0

5. If $\log_a x = 2$ and $\log_a y = 3$, what is the value of $\log_x \frac{\sqrt[3]{ax}}{\sqrt[5]{y}}$?

Answer: $1/5$

6. For how many positive integers n is $n^2 + 2n - 3$ prime?

Answer: One

7. How many distinct permutations are there of 3 letters selected from the letters in SYZYGY?

Answer: 34

8. Suppose x is a complex number such that $x^2 + x + 1 = 0$. What is the value of x^3 ?

Answer: 1

ROUND II

1. A Rubik's cube consists of 27 solid cubes, each of which has a side length of 1 inch. A new solid is formed by removing one cube from the center of each face of the Rubik's cube. What is the surface area of new solid?



Answer: 78 in^2

2. If p and q are the roots of $x^2 - 2008x + 2 = 0$, what is the value of $\frac{1}{p} + \frac{1}{q}$?

Answer: 1004

3. How many sets are there if each set contains three distinct numbers selected from the set $\{0, 1, 2, 3, 4, 5\}$ so that their sum is an even number greater than 4?

Answer: 9

4. For what value of k does the equation $(x-1)(x-5) = x(x-k)$ have no solution for x ?

Answer: $k = 6$

5. If $N = \sqrt{25^{32}16^{19}}$ in decimal representation, what is the sum of the digits of N ?

Answer: 10

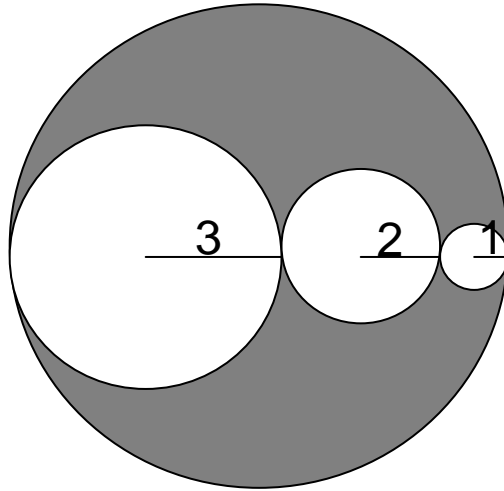
6. For what range of real numbers a is $\log_2(ax-1)$ positive for $1 \leq x \leq 2$?

Answer: $a > 2$

7. If $\sin\left(\frac{\theta}{2}\right) + \cos\left(\frac{\theta}{2}\right) = 0.8$, what is the value of $\sin \theta$?

Answer: -0.36

8. Circles of radii 3, 2, and 1 are externally tangent and are circumscribed by a fourth circle. Find the area of the shaded region.



Answer: 22π