QUESTION 1

Let:

A = the distance between the points $(-4, 8)$ and $(8, 3)$

B = the area of a quadrilateral with vertices at points $(-3, 5)$, $(4, 2)$, $(-7, -6)$, and $(2, -3)$ (not necessarily in that order)

C = the shortest distance between point $(5, 4)$ and the line y = 3

D = the ordinate of the y-intercept of the line perpendicular to the line y = $2x + 9$ and passes through the point $(4, 6)$

Find the distance between points $(A, \frac{B}{4})$ and (C, D).

QUESTION 2

Let:

$A =$ the sum of the roots of $47x^2 + 94x - 12$

$B =$ the product of the roots of $28x^2 - 56x + 34$

$C =$ the sum of the reciprocal of the roots of $16x^2 + 34x - 19$

$D =$ the sum of the squares of the roots of $8x^2 + 20x - 12$

Find $A + 14B + 19C + 4D$.

QUESTION 3

Given the functions, $f(x) = 5x^3$, $n(x) = 8x + 8$, and $g(x) = \dfrac{\sqrt{x}}{5}$, let:

$$A = n(15)$$

$$B = g(2025)$$

$$C = g(f(5))$$

$$D = n(g(1156))$$

Find $A + B + C + 10D$.

QUESTION 4

Sagar, Tanmay, and Meghna are rising TikTok stars! They want to buy a house in which they can live along with other TikTok stars and film even more TikToks. After weeks of searching, they found the perfect house! However, they want the entire exterior (or outside) of the house to be purple. Sagar comes up with a great solution: They can paint the house purple! The house is a cube, with dimensions 40 ft by 40 ft by 40 ft.

Let:

A = the amount of purple paint in ft^3 that they will need to paint the outside of the house (assuming they paint everywhere on the exterior but the bottom).

B = how much all the paint required to paint the exterior costs if the paint is 4 dollars per ft^3

C = the amount of whole 3 ft by 3 ft by 3 ft cubes that can fit inside the house

D = the amount of whole 4 ft by 8 ft by 3 ft rectangular prisms that can fit inside the house

Find $(B/4 - A) * (C - D)$.

QUESTION 5

Let:

$A =$ The solution to the equation $4(6x + 12) = 19 + 11(9 - x)$

$B =$ the number of real roots of the equation $-23x^2 + 36x + 15$

$C =$ the rationalized form of $\dfrac{4}{2 - \sqrt{3}}$

$D =$ the largest possible integer solution to the inequality $|8x - 3| + 25 \geq 17x$

Find $ABD + C$.

QUESTION 6

Start with 0 and add 1 for every true statement and subtract 2 for every false statement.

1. $x + 0 = x$ is an example of the Zero Property of Addition.
2. $a + b = b + a$ is an example of the Commutative Property of Addition.
3. $n = n$ is an example of the Associative Property of Addition.
4. the Symmetric Property of Equality states that if $a = b$, then $b = a$.
5. $(x + y) + z = x + (y + z)$ is an example of the Distributive Property of Equality.

What is the resulting value?

QUESTION 7

Given the arithmetic sequence:

$$12, 16, 20, 24, 28, 32...$$

Let:

A = the common difference of the arithmetic sequence

B = the 20th term in the sequence

Given the geometric sequence:

$$3, 9, 27, 81, 243...$$

Let:

C = the common ratio of the geometric sequence

D = the 8th term in the sequence

Express $\dfrac{(B+D)}{AC}$ as a simplified fraction.

QUESTION 8

Let:

$A = 47 * 0.16$

$B = 20$ percent of 37

$C = 149/500$

$D = \sqrt{14}$ to the nearest tenth

Find $(A + B + C + D) * 1000$.

QUESTION 9

Alan goes to a nearby pizza shop. Alan wants to get 3 different toppings on his pizza. The toppings available are: olives, bell peppers, pineapples, mushrooms, and jalapeños. Let A be the amount of distinct combinations of toppings Alan can order on his pizza. (The order of the toppings matters - olives, bell peppers, and mushrooms is a different combination from bell peppers, olives, and mushrooms.)

As he orders his pizza, he tells the waiter to make 7 cuts into the pizza. He tells the waiter that he will give him a tip if he can produce the maximum amount of slices possible using only 7 cuts. Let B be the amount of slices the waiter needs to make in order to earn a tip.

After finishing his pizza, Alan goes to a nearby cake shop for dessert. He sees a beautiful 3-layer strawberry cake and immediately feels an urge to calculate the volume of the cake, which is made of three cylindrical layers. The height of each layer is 3 inches, and the diameters of the tops of the 3 layers from top to bottom are 2 inches, 4 inches, and 6 inches respectively. Let C be the total volume in inches^3 of the cake.

Find $\dfrac{C}{\pi} - B - A$.

QUESTION 10

Let:

A = the sum of all even whole numbers from $0 - 100$

B = the 8th three digit prime number

C = the 12th number in the Fibonacci sequence $[1, 1, 2, 3, 5...]$

D = the geometric mean of 5, 4, and 50

Find $A - B - D + \sqrt{C}$.

QUESTION 11

Find the missing term (x) in each of the following patterned sequences.

$$A = 6, 18, 30, x, 54$$

$$B = 29, 61, 125, x, 509$$

$$C = 17, 88, x, 1508$$

$$D = 54, 24, x, 1.5$$

Find $A + B + C + D$.

QUESTION 12

Teddy goes to a fruit store. He has 10 quarters, 5 nickels, 7 dimes, 3 pennies, and 5 dollar bills. Bananas cost 60 cents each. Apples cost 50 cents each. Mangoes cost 75 cents each.

A = the maximum amount of apples Teddy can buy

B = the maximum amount of bananas Teddy can buy

C = the maximum amount of mangoes Teddy can buy if he also buys 3 bananas

D = the maximum amount of mangoes Teddy can buy if he also buys 4 apples and 2 bananas

Find $A + B + C + D$.

QUESTION 13

Let $x@y = \dfrac{7x}{y} + 5$

$$A = 4@7$$

$$B = 6@3$$

$$C = 12@3$$

$$D = 13@(15@5)$$

Find $A + B + C + D$.

QUESTION 14

Let:

A = the distance between the points $(-4, 5)$ and $(8, -3)$

B = the mean of the set $[2, 5, 6, 9, 2, 4, 8]$

C = the sum of the prime factors of 2022

D = the number of distinct ways you can rearrange the word CRANBERRY

Find $D - A^2 - 7B - C$.