QUESTION 1

There are one hundred seniors at a high school. Seventy-three seniors take a science class. Sixty-four seniors take an English class. Sixty-two seniors take a math class. Forty-nine seniors take both a science and English class. Thirty-six seniors take both an English and math class. Forty-nine seniors take both a science and math class. Thirty seniors take a science, math and English course. Let:

$$
\begin{aligned}
A &= \text{the number of seniors taking only a math class} \\
B &= \text{the number of seniors taking only an English class} \\
C &= \text{the number of seniors taking only a science class} \\
D &= \text{the number of seniors that do not take an English, science, or math class}
\end{aligned}
$$

What is $A + B + C + D$?

QUESTION 2

A teacher records the test scores of her ten students as follows: 57, 68, 73, 88, 89, 88, 76, 100, 92, 99. Let:

A = the mean of the ten scores
B = the median of the ten scores
C = the range of the ten scores
D = the new mean of the test scores if the teacher decides to add 5 extra credit points to each test

What is $A + B + C + D$?

QUESTION 3

The currency on planet X contains Ticks, Tocks, Tins and Tacks. One Tick is worth the same amount as thirteen Tocks. Seven Tocks are worth the same amount as fifty-six Tins. Forty Tins are worth the same amount as seven Tacks. Let:

$$\begin{aligned} A &= \text{the amount of Tocks that are worth the same amount as seven Tacks} \\ B &= \text{the amount of Ticks that are worth the same amount as seven Tacks} \\ C &= \text{the amount of Ticks that are worth the same amount as three Tins} \end{aligned}$$

What is $56(A + B + C)$ to the nearest whole number?

QUESTION 4

Let:

$$\begin{aligned} A &= \text{the greatest common factor of 36 and } 111,114 \\ B &= \text{the least common multiple of 7, 9 and 12} \\ C &= \text{the number of positive integral factors of 48} \\ D &= \text{the largest prime factor of 252} \end{aligned}$$

Find $A + B + C + D$.

QUESTION 5

Let:

A = 3.2% of 1800

B = the price of two sweaters, if each costs \$23.20 before sales tax (Note: sales tax is 7.5%)

C = the sum of the interior angles of a decagon

D = the diameter of a circle with area 36π

Find $A + B + C + D$ to the nearest whole number.

QUESTION 6

Simplify:

$$\frac{\frac{11}{7}-\frac{18}{17}+36-\frac{17}{5}+2}{19-\frac{2}{17}+3}-\frac{\frac{15}{17}+\frac{13}{5}}{\frac{19}{17}-\frac{3}{2}}-\frac{97}{14105}$$

QUESTION 7

A cube with a side length of 5 units is made out of white clay. Five of the faces are painted green. The cube is then cut into unit cubes. Let:

$$\begin{aligned} A &= \text{the probability of choosing a unit cube with no green faces} \\ B &= \text{the probability of choosing a unit cube with only one green face} \\ C &= \text{the probability of choosing a unit cube with only two green faces} \\ D &= \text{the probability of choosing a unit cube with three green faces} \end{aligned}$$

Find $5A + 5B + 25C + 125D$.

QUESTION 8

Let:

A = the hypotenuse of a right triangle with leg lengths 11 and 60
B = the number of distinct ways to have 7 people stand in a line
C = the 10th prime number
D = the distance between the points $(2001, 2018)$ and $(2012, 2078)$ on the Cartesian plane

Find $AB - CD$.

QUESTION 9

Anirudh needs help analyzing the following infinite geometric sequence: $1, 2, 4, 8, \ldots$ Let:

$$\begin{aligned} A &= \text{the 7th term in the sequence} \\ B &= \text{the common ratio of the sequence} \\ C &= \text{the seventh term divided by the fourth term} \\ D &= \text{the sum of the first 8 numbers in the sequence} \end{aligned}$$

Find $A + B + C + D$.

QUESTION 10

Let:

$$\begin{aligned} A &= f(2) - f(-2) \text{ if } f(x) = 4x^5 - 13x^3 + 11x \\ B &= \text{the sum of the first 26 positive integers} \\ C &= \text{the second positive integer with seven factors} \\ D &= \text{the evaluation of the following finite geometric series: } 1 - 2 + 4 - 8 + 16 - \ldots + 1024 \end{aligned}$$

Find $A + B + C + D$.

QUESTION 11

Bonnie can paint a house in 5 hours. Clyde can paint a house in 7 hours. If Bonnie began painting an empty house at noon and Clyde joined her at 1 PM, at what time (include AM or PM) will the house be completely finished?

QUESTION 12

Let:

A = the perimeter of a regular heptagon with a side length of two

B = the number of centimeters in a decameter

C = the height of a triangle that has an area of 25 square units and base of 5 units

D = the product of the first five prime numbers

Find $A + B + C + D$.

QUESTION 13

Given that $z(x) = 4x^3 + 14x^2 - 3x + 8$, let:

$$\begin{aligned} A &= \text{the sum of the roots of } z(x) \\ B &= \text{the product of the roots of } z(x) \\ C &= y(23), \text{ if } y(x) \text{ is the inverse of } z(x) \end{aligned}$$

Find $A + B + C$.

QUESTION 14

Let:

$$\begin{aligned} A &= \text{the slope of the line containing the points } (1,3) \text{ and } (-5,9) \\ B &= \text{the number of prime numbers less than } 100 \\ C &= \text{the sum of the first } 70 \text{ positive odd integers} \\ D &= \text{the distinct number of ways to rearrange the letters in the word WAKANDA} \end{aligned}$$

Find $A + B - C + D$.