QUESTION 1

Given the functions, $f(x) = \dfrac{x}{4}$, $g(x) = 8x^3$, and $h(x) = \sqrt{\dfrac{1}{x}}$, let:

$$\begin{aligned} A &= f(144) \\ B &= f \circ g(4) \\ C &= g\left(\frac{\sqrt[3]{2}}{2}\right) \\ D &= h\left(\frac{1}{256}\right) \end{aligned}$$

Find $\dfrac{ABC}{D^2}$.

QUESTION 2

Starting with 2, add 1 for every true statement, and subtract 2 for every false statement.

I. $a = a$ is an example of the Symmetric Property of Equality.

II. If $g = e$ and $e = f$, then $g = f$ is an example of the Transitive Property of Equality.

III. $(a + b) + c = a + (b + c)$ is an example of the Associative Property.

IV. $a(b + c + d) = ab + ac + ad$ is an example of the Distributive Property of Equality.

What is the final value?

QUESTION 3

Russell is walking his human, Vishnav, up a hill. Starting from the base of the hill, it takes him 30 mins to walk Vishnav up the hill at a pace of 3 miles per hour. At the top of the hill, he turns around, and walks Vishnav down the same path, at a speed of 6 miles per hour.

Let A be Russell's average speed for the total trip, in miles per hour.

Aman is buying Man U shirts and Dallas Cowboys posters. The Man U shirts cost \$20.00 and Dallas Cowboys posters cost \$15.75. He bought 14 items in total, and spent \$263.00.

Let B equal the number of posters bought and let C equal the number of shirts bought.

Find $A + (C - B)$.

QUESTION 4

Find the number of distinct ways to rearrange the following words.

$$\begin{aligned} A &= \text{LOCHNESS} \\ B &= \text{HIGHLANDS} \\ C &= \text{SCOTLANDS} \\ D &= \text{BAGPIPES} \end{aligned}$$

Find $\frac{B}{D} + \frac{A}{C}$.

QUESTION 5

In Mr. Black's class there are twenty kids. Each kid in his class has at least one pet: a bunny, a dragon, or a panda. Thirteen kids have a dragon, ten kids have a panda, and three kids have all three of the types of pets. Two kids only have a panda and a dragon, eight kids only have a dragon and a bunny, and four kids only have a bunny and a panda. Answer the following question based on Mr. Black's class.

A = How many kids in Mr. Black's class have only a dragon?

B = How many kids have only a panda?

C = How many kids have a bunny?

D = If any kid who has a panda is a vegetarian, what is the probability of choosing a vegetarian in Mr. Black's class?

Find $\dfrac{(A-B)C}{D}$.

QUESTION 6

Find the average of the ordinates of the solutions to each of the following systems of equations.

A) $5x - y = 6$
$3x + y = 10$

B) $12x + 17y = 51$
$6x + 5y = 1$

C) $5x + 3y = 18$
$2x + y = -7$

D) $2x + 8y = 3$
$3x + 5y = -\frac{19}{2}$

QUESTION 7

Let:

$$\begin{aligned} A &= \text{the volume of a sphere with radius } 3 \\ B &= \text{the area of a circle with diameter } 1 \\ C &= \text{the radius of a sphere such that the surface area and volume of the sphere are equal} \\ D &= \text{the radius of a sphere with a surface area of } 64\pi \end{aligned}$$

Find $\dfrac{A}{B} + C + D$.

QUESTION 8

Let:

A = the sum of the x and y values of the vertex of the following parabola $f(x) = x^2 + 6x + 9$
B = the value of the abscissa of the y-intercept of the following line $y = 6x + 3$
C = the degree of the polynomial: $(x^2 + 3)^3$
D = the reciprocal of the sum of the roots of $3x^2 + 5x + 2$

Find $ABCD$.

QUESTION 9

Oh no, Hana has lost her stuff. She's in a rush, and needs to find her stuff before her next class. Olivia, being the nice person she is, decides to help Hana by giving her the coordinates of all her missing stuff. Her binder is located at $(0, 6)$, her pencil is at $(3, 6)$, her pen is at $(0, 0)$ and her textbook is at $(-6, -2)$. Help Hana by answering the following questions based on Olivia's clues.

A = the distance from Hana's pen to her binder

B = the distance from Hana's pencil to her binder

C = the distance from her textbook to her pencil

D = the area of the shape formed by connecting the points where Hana's binder, pencil and pen are located

Find $A + B + C + D$.

QUESTION 10

Given the following set of numbers $\{1, 2, 3, 4, 5, 7, 8, 2, 87, 44, 3, 2, 1\}$ let,

$$\begin{aligned} A &= \text{the median of the set} \\ B &= \text{the range of the set} \\ C &= \text{the mode of the set} \\ D &= \text{the mean of the set} \end{aligned}$$

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

QUESTION 11

Let:

$$\begin{aligned} A &= \left(-\frac{2}{3}\right)^2 \\ B &= \left(\frac{1}{4}\right)^{\frac{1}{2}} \\ C &= (\sqrt[3]{2})^6 \\ D &= 2^{-2} \end{aligned}$$

Find $\dfrac{9A}{B} + \dfrac{C}{D}$

QUESTION 12

Let

$$\begin{aligned} A &= \text{the greatest common factor of 116 and 202} \\ B &= \text{the least common multiple of 9 and 52} \\ C &= \text{the discriminant of } 3x^2 + x - 4 \\ D &= \text{the ordinate of the } x\text{-intercept of } y = -3x + 6 \end{aligned}$$

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

QUESTION 13

Solve for x for the value of each letter

$A)$ $\dfrac{x^3}{3} = \dfrac{81}{x^2}$

$B)$ $\dfrac{x}{2} = \dfrac{2}{5}$

$C)$ $x + 3 = 4x$

$D)$ $x^2 - 2x + 1 = 0$

Find $20B + A + 2C + D$.

QUESTION 14

Let:

$$\begin{aligned} A &= 60\% \text{ of } 25 \\ B &= 70\% \text{ of } 70 \\ C &= 30\% \text{ of } 40 \\ D &= 130\% \text{ of } 90 \end{aligned}$$

Find $CD - AB$.