QUESTION 1

Let:

$$
\begin{aligned}
A &= 3B + 7 \\
2B &= A - 8 \\
2D - 10 &= C \\
7C &= -3D - 2
\end{aligned}
$$

What is $A + B + CD$?

QUESTION 2

My friend Sam is taking me to Morocco. We need to book the cheapest travel package because he likes money. A round trip flight with 3 layovers costs $150.00. A round trip flight with 2 layovers costs $175.00. Lastly, a round trip flight with 1 layover costs $199.00. A T-shirt costs $15.00, a rental car costs $30.25 per day, and a hotel room costs $45.00 per night. Let:

A = The cost of 1 round trip flight with 3 layovers, 2 hotel rooms for 3 nights, and a rental car for 4 days.

B = The cost of 1 round trip flight with 1 layover, 2 T-Shirts, a rental car for 2 days, and 2 hotel rooms for 1 night.

C = The cost of 1 round trip flight with 2 layovers, 1 T-Shirt, 1 rental car for 3 days and 2 hotel rooms for 2 nights.

D = The cost of 1 hotel room for 7 nights, and 12 T-shirts. (My flight and rental car is paid for when I buy my friends T-Shirts.)

Among the costs of packages A, B, C, and D, what is the positive difference between the costliest package and the cheapest package?

QUESTION 3

Let A, B, C, and D be solutions to the following systems of equations:

$$
\begin{aligned}
A) \quad & 4x + y = 5 \\
& -4x + 4y = 0 \\
B) \quad & 2x + 3y = 14 \\
& -2x + 3y = -2 \\
C) \quad & 2x + 5y = 7 \\
& 2x - y = 13 \\
D) \quad & 4x + 3y = -45 \\
& -5x + 3y = 36
\end{aligned}
$$

Find the sum of the distance between Points A and B, and between Points C and D in simplest form.

QUESTION 4

Let:

$$
\begin{aligned}
A &= \text{The area of a circle with diameter 6.} \\
B &= \text{The volume of a sphere with radius } \frac{3}{4\pi} \\
C &= \text{The surface area of a cone with radius 3, and height 4.} \\
D &= \text{The volume of a cylinder with radius 1 and height 3.}
\end{aligned}
$$

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

QUESTION 5

Ana can't decide if her name is spelled with one N or two N's. She seeks the help of The Great Jeremy Corbyn. Jeremy Corbyn, upset by his recent PM loss, makes Anna solve these four problems. Help Ana!

$$A \quad = \quad \text{The number of cookies I can bake in 45 minutes if I can bake 12 cookies in 1 hour.}$$
$$B \quad = \quad \text{The time in hours it takes 5 men to make 5 boats if it takes 3 men 3 hours to build 3 boats.}$$
$$C \quad = \quad \text{The number of different ways the letters of ILOVEKILTS can be arranged}$$
$$D \quad = \quad \text{The percent of soy concentration in a mixture that is composed of 20 fl. oz. of 20\% soy milk and}$$
$$ \text{30 fl. oz. of a 60\% soy milk solution.}$$

What $A + B + C - D$?

QUESTION 6

A = Mr. Swagger and his best bud Mr. Walters are complimenting each other. Mr. Swagger can spit out 11 compliments every 8 seconds. Mr. Walters can spit out 4 compliments every 3 seconds. They both start complimenting each other at the same time, and can compliment each other while they other is speaking (they feel very strongly about their compliments). Let A = the positive difference between the number of their complete compliments at 30 seconds.

B = Oh no! Mr.Walters accidentally poured the contents of his evil insult bag into his magical pleasantries and compliments bag (one bag). How will he show Mr.Swagger how much he loves and supports him now? If the magical pleasantries and compliments bag now has 17 insults, 3 pleasantries, and 12 compliments, let B be the probability that Mr. Walters does not pull out an insult.

Find $\dfrac{B}{A}$

QUESTION 7

Mr. Walters has a problem. He is a Bluejay that feeds on other birds' young, despite Mr. Swagger and Ms. Quanye's protests. He hit the jackpot today! He flew by the nests of four different species of birds. He is contemplating which eggs will taste best, but since he can't decide, he will randomly choose from what's available. There are 20 Cardinal nests, 4 Albatross nests, 15 Blue Winged Warbler nests and 7 Dove nests.

$$
\begin{aligned}
A &= \text{The probability that he chooses an Albatross nest.}\\
B &= \text{The probability that he chooses a Blue Winged Warbler nest.}\\
C &= \text{The probability that he chooses a Cardinal nest.}\\
D &= \text{The probability that he chooses a Dove nest and a Winged Warbler}\\
  &\quad\ \text{nest given he selects two nests (order does not matter).}
\end{aligned}
$$

Find $\dfrac{C}{A} + \dfrac{45D}{B}$

QUESTION 8

Macauley is in love with Ariana Grande. Macaulay is at Point C, Ariana is at Point D, and Taylor Swift is at Point E. Note. Macauley can only move north or west (i.e up or right); he may not move down or left.

A = The number of different ways Macauley can get to Arianna?

B = The number of different ways Macauley can get to Arianna while avoiding crossing paths with Taylor.
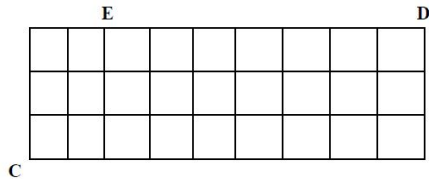
Find $A - B$.

QUESTION 9

$A \quad = \quad$ The solution to A in the equation: $\frac{1}{2} = \frac{1}{3} + \frac{1}{A}$

$B \quad = \quad$ The solution to B in the equation: $B = 27(7 + 5) + (3^2 + 18)(4 \cdot 2)$

$C \quad = \quad$ The solution to C in the equation: $\sqrt{C^2 + 2C + 1} + \frac{3}{2}(\frac{1}{C} + 5) = \frac{3 + 15C}{2C} + 2C$

$D \quad = \quad$ The value of $\frac{1}{x} + \frac{1}{y} \cdot \frac{1}{x} + \frac{1}{y}$, given $xy = 10$ and $x + y = 7$

Find $AC + B - 10D$

QUESTION 10

A =   Russell likes playing fetch. He has 2 different sticks with pointed tips. Stick A does 1 revolution in 0.05 seconds and stick B does 1 revolution in $\frac{1}{3}$ seconds. They both face north when they begin rotating. Let A be the time, in second(s), it will take for both sticks to face north again after they begin rotating.

B =   The product of the Least Common Multiple and Greatest Common Factor of the following numbers: 900 and 45.

C =   The sum of the numbers in the 6th row of Pascal's triangle given that the 0th row has 1 term.

D =   The number of numbers between 1 and 500 that are divisible by 4 and 2.

Find $A + B + C + D$

QUESTION 11

Kiran loves playing dice, she's the reigning queen of dice. You need to impress Kiran, but because you're bad at dice, so you gain her favor by solving dice related math problems for her!

A = The probability of rolling a 1, 2, 4, 5, or 6 on either die when two standard dice are rolled.

B = When two standard dice are rolled, let B be the probability that the numbers rolled on each dice sum to 5.

C = The probability of rolling at least one 4 when rolling two non-standard dice, one with a 75% chance of rolling a 4, and another with a 40% chance of rolling a 4.

D = The potatoes are rebelling after years of being the butt of human jokes. General Potato can defeat 1 human in 1 hour with the help of its soldier potatoes! The soldier potatoes can defeat a human in 3 hours on their own. Let D be General Potato's rate of defeating humans per hour.

Find $D + 36(A + B) + 40C$.

QUESTION 12

Let:

$$A = \text{The 9th term of the following sequence } \{0, 1, 2, 4, 7, 12, \ldots\}$$
$$B = \text{The 13th term of the following sequence } \{1, 4, 9, 16, 25, 36, \ldots\}$$
$$C = \text{The value of } x \text{ in the following sequence } \{1, x, 27, y, 729, \ldots\}$$
$$D = \text{The next term of the following sequence } \{1, 1, 2, 6, 24, 120, \ldots\}$$

Find $D - (A + B + C)$.

QUESTION 13

Given the following set of numbers $\{27, 59, 1, 4, 1, 44, 1, 2, 4, 32, 45\}$

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

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

QUESTION 14

Let:

$$
\begin{aligned}
A &= 50\% \text{ of } 70 \\
B &= 70\% \text{ of } 140 \\
C &= 270\% \text{ of } 100 \\
D &= 90\% \text{ of } 180
\end{aligned}
$$

Find $A + B - C + D$