# Aptitude Assignment 2

## 1. What quantity of water should be added to the milk water mixture so that the milk water ratio changes from 2:3 to 4:11. The quantity of milk in the mixture is 40 liters?

The initial ratio of milk to water is 2:3, which means the total number of parts is 2 + 3 = 5 parts.

Water quantity = (Quantity of milk / Total parts) * Water parts

Water quantity = (40 / 5) * 3

Water quantity = 8 * 3

Water quantity = 24 liters

Therefore, in the initial mixture, there are 40 liters of milk and 24 liters of water.

Now, let's determine the final quantities of milk and water in the mixture based on the desired milk-to-water ratio of 4:11.

The final ratio of milk to water is 4:11, which means the total number of parts is 4 + 11 = 15 parts.

Since we want to find the quantity of water that needs to be added, let's assume the quantity of water to be added is "x" liters.

Therefore, the final quantity of water in the mixture will be 24 + x liters.

We can now set up the equation based on the parts:

(Quantity of milk / Total parts) * Milk parts = (Quantity of water / Total parts) * Water parts

(40 / 15) * 4 = (24 / 15 + x) * 11

Simplifying the equation:

(8/3) * 4 = (24/15 + x) * 11

32/3 = (24/15 + x) * 11

32/3 = (24 + 15x) / 15 * 11

Multiplying both sides of the equation by 3:

32 = (8x + 24) * 11/5

Dividing both sides of the equation by 11/5:

(32 * 5) / 11 = 8x + 24

Simplifying further:

160/11 - 24 = 8x

160/11 - 264/11 = 8x

-104/11 = 8x

x = -104/88

x ≈ -1.18

Since the quantity of water cannot be negative, it means no water needs to be added to the mixture to achieve the desired milk-to-water ratio of 4:11.

Therefore, the answer is 0 liters.

## 2. Linear equation 2x+3y=0 meets the x & y-axis at the point?

To find the points where the equation $2x + 3y = 0$ intersects the x and y-axes, we can set either x or y to zero and solve for the other variable.

When $x = 0$:

$2(0) + 3y = 0$
$3y = 0$
$y = 0$

So, the point of intersection on the y-axis is (0, 0).

When $y = 0$:

$2x + 3(0) = 0$
$2x = 0$
$x = 0$

Therefore, the point of intersection on the x-axis is (0, 0).

Hence, the equation $2x + 3y = 0$ intersects both the x and y-axes at the origin (0, 0).

# 3. a & b are positive integers such that a^2-b^=19. Find a & b?

Given: $a^2 - b^2 = 19$

This equation is in the form of a difference of squares, which can be factored as:

$(a + b)(a - b) = 19$

Since 19 is a prime number, the only possible factorization is $1 * 19$ or $-1 * -19$.

Setting up the two equations:

Case 1: $a + b = 19$ and $a - b = 1$

Adding the two equations:

$(a + b) + (a - b) = 19 + 1$

$2a = 20$

$a = 10$

Substituting the value of a in either equation:

$10 + b = 19$

$b = 9$

So, in this case, $a = 10$ and $b = 9$.

Case 2: $a + b = -19$ and $a - b = -1$

Adding the two equations:

$(a + b) + (a - b) = -19 - 1$

$2a = -20$

$a = -10$

Substituting the value of a in either equation:

$-10 + b = -19$

$b = -9$

However, since the given problem specifies that a and b are positive integers, this case is not valid.

Therefore, the solution is $a = 10$ and $b = 9$, where $a^2 - b^2$ equals 19.

# 4. Find a^+b^3+c^3+3abc , where a+b+c=5 & , a^2+b^2+c^2=10?

To find the value of a^3 + b^3 + c^3 + 3abc, we can use the identity for the sum of cubes:

a^3 + b^3 + c^3 = (a + b + c)(a^2 + b^2 + c^2 - ab - ac - bc)

Given:
a + b + c = 5
a^2 + b^2 + c^2 = 10

We can substitute these values into the identity:

a^3 + b^3 + c^3 = (a + b + c)(a^2 + b^2 + c^2 - ab - ac - bc)
= (5)(10 - ab - ac - bc)
= 50 - 5(ab + ac + bc)

To find the value of 3abc, we can use the identity for the product of symmetric sums:

abc = (a + b + c)(ab + ac + bc) / 3

Substituting the given values:

abc = (5)(ab + ac + bc) / 3

Now we can substitute these values into the expression a^3 + b^3 + c^3 + 3abc:

a^3 + b^3 + c^3 + 3abc = 50 - 5(ab + ac + bc) + 3[(5)(ab + ac + bc) / 3]
= 50 - 5(ab + ac + bc) + 5(ab + ac + bc)
= 50

Therefore, the value of a^3 + b^3 + c^3 + 3abc is 50.

**5. Sum of two, two-digit numbers is a perfect square. The digits of the first two-digit number are two consecutive positive integers; also, when the digits of the first number are reversed, the second number is formed. Find these numbers & the square root of their sum.**

The number formed by reversing the digits would be $10(a+1) + a = 10a + 10 + a = 20a + 10$.

Given that the sum of these two numbers is a perfect square, we can write the equation as follows:

$(10a + (a+1)) + (20a + 10) = x^2$, where x represents the square root of the sum.

Simplifying the equation:

$30a + 11 + 20a + 10 = x^2$

$50a + 21 = x^2$

To find the values of a that satisfy this equation, we can test different values of a.

Starting with $a = 1$:

$50(1) + 21 = 71$, which is not a perfect square.

Trying $a = 2$:

$50(2) + 21 = 121$, which is equal to $11^2$.

So, $a = 2$ satisfies the equation.

Plugging in $a = 2$ into the expressions for the two-digit numbers:

First number: $10a + (a+1) = 10(2) + (2+1) = 20 + 3 = 23$

Second number (reversed digits): $20a + 10 = 20(2) + 10 = 40 + 10 = 50$

Therefore, the two-digit numbers are 23 and 50. The sum of these numbers is $23 + 50 = 73$.

The square root of 73 is approximately 8.544.

So, the two numbers are 23 and 50, and the square root of their sum is approximately 8.544.