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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 litres?**
   Solution: 20litres

   Quantity of milk = 40 litters
   Milk-water ratio = 2:3
   The initial milk-water ratio of 2:3 implies that the total mixture can be divided into 2 parts milk and 3 parts waters. Let's calculate the initial quantities of milk and water.
   Milk quantity = (2 / (2+3)) * Total quantity = (2 / 5) * 40 litters=16 litters
   Water quantity = (3 / (2+3)) * Total quantity= (3 / 5) * 40 litters=24 litters

   Now, we want to change the milk-water ratio to 4:11. This new ratio implies that the total mixture can be divided into 4 parts milk and 11 parts waters.
   Let's assume we need to add 'x' litters of water to achieve the desired ratio.
   New milk quantity = 4 * (Total quantity + x) / (4+11) = 4 * (40 + x) / 15
   New water quantity = 11 * (Total quantity + x) / (4+11) = 11 * (40 + x) / 15

   According to the problem, the new milk quantity = Initial milk quantity
   4 * (40 + x) / 15 = 16

   Solving this equation for 'x', we can find the amount of water to be added.
   4 * (40 + x) = 16 * 15
   160 + 4x = 240
   4x = 240 – 160
   4x = 80
   x = 80 / 4
   x = 20

   Therefore, 20 litters of water should be added to the milk-water mixture to change the milk-water ratio from 2:3 to 4:11.

2. **Linear equation 2x+3y=0 meets the x & y-axis at the point?**
   Solution: (0,0)

   To find the points where the equation 2x + 3y = 0 intersects the x-axis and y-axis, we
   can set one of the variables to 0,
   When the equation intersects the x-axis, y = 0.
   2x + 3(0) = 0
   2x = 0
   x = 0
   the point where the equation intersects the x-axis is (0, 0).
   When the equation intersects the y-axis, x = 0.
   2(0) + 3y = 0
   3y = 0
   y = 0
   the point where the equation intersects the y-axis is also (0, 0).
   Therefore, the equation 2x + 3y = 0 intersects both the x-axis and y-axis at the point (0, 0).

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

Solution: a = 10 and b = 9

the factors of 19: 1 and 19.

Since a and b are positive integers, we can set up the following equations:

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

a - b = 1 ---- (Equation 2)

Adding Equation 1 and Equation 2:

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

2a = 20

a = 10

Substituting the value of an into Equation 2:

10 - b = 1

b = 9

Therefore, the values of a and b : **a = 10 and b = 9**

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

Solution: 25/2

To find the value of a^3 + b^3 + c^3 + 3abc, we can use this formula:

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

Given:

a + b + c = 5

a^2 + b^2 + c^2 = 10

Let's substitute these values into the identity:

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

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

Now, we need to find the value of ab + ac + bc.

To find ab + ac + bc, we can square the equation a + b + c = 5

(a + b + c)^2 - (a^2 + b^2 + c^2) = (5)^2 – 10

a^2 + b^2 + c^2 + 2(ab + ac + bc) - a^2 - b^2 - c^2 = 25 – 10

2(ab + ac + bc) = 15

ab + ac + bc = 15/2

Substituting this value,

50 - 5(15/2) = a^3 + b^3 + c^3 - 3abc

(100 - 75)/2 = a^3 + b^3 + c^3 - 3abc

25/2 = a^3 + b^3 + c^3 - 3abc

a^3 + b^3 + c^3 + 3abc = 25/2.

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.

Solution:

Let's assume the first two-digit number is represented as "10a + b," where 'a' and 'b' are the two consecutive positive integers. When the digits of the first number are reversed, the second number is formed, which means the second two-digit number is "10b + a."

To solve this, (10a + b) + (10b + a) = k^2

11(a + b) = k^2

Since 11 is a prime number, the sum (a + b) must also be a multiple of 11. This means 'a' and 'b' are either both multiples of 11 or both not multiples of 11.

Case 1: 'a' and 'b' are multiples of 11:

The only consecutive positive integers that are multiples of 11 are 11 and 22.
Therefore, 'a' must be 11, and 'b' must be 22.
So the first two-digit number is 110 + 22 = 132, and the second two-digit number is 220 + 11 = 231.
The sum of these numbers is 132 + 231 = 363, which is a perfect square. The square root of 363 is approximately 19.07.

Case 2: 'a' and 'b' are not multiples of 11:

Let's consider the consecutive positive integers 1 and 2. In this case, 'a' is 1, and 'b' is 2. So, the first two-digit number is 10 + 2 = 12, and the second two-digit number is 20 + 1 = 21.
The sum of these numbers is 12 + 21 = 33, which is a perfect square. The square root of 33 is approximately 5.74.

Therefore, we have two possibilities:

1. The first two-digit numbers are 132 and 231, and the square root of their sum is approximately 19.07.
2. The first two-digit numbers are 12 and 21, and the square root of their sum is approximately 5.74.