AI1110 ASSIGNMENT-1

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***Abstract*—This document contains the solution for Assignment 1 (ICSE 10 2018, Question 8a)**

I. Question 8a

Q8. Rs.7500 were divided equally among a certain number of children. Had there been 20 less children, each would have received Rs.100 more. Find the original number of children.

II. Solution

Given,
The total amount of money is Rs. 7500 Let the number of children be n.
Let the money received by each child be x.

$$\frac{7500}{n} = x \tag{1}$$

$$xn = 7500 \tag{2}$$

Given if there are 20 less children, each would have received Rs.100 more.

$$\frac{7500}{n-20} = x + 100 \tag{3}$$

$$7500 = x(n-20) + 100n - 2000 \tag{4}$$

$$7500 = xn - 20x + 100n - 2000 \tag{5}$$

By substituting equation-1 in equation-2, we get

$$20x = 100n - 2000 \tag{6}$$

Dividing both sides by 20 gives

$$x = 5n - 100 \tag{7}$$

By substituting equation-3 in equation-1, we get

$$(5n-100)n = 7500 \tag{8}$$

$$5n^2 - 100n - 7500 = 0 \tag{9}$$

Dividing both sides by 5 gives

$$n^2 - 20n - 1500 = 0 \tag{10}$$

we know that,

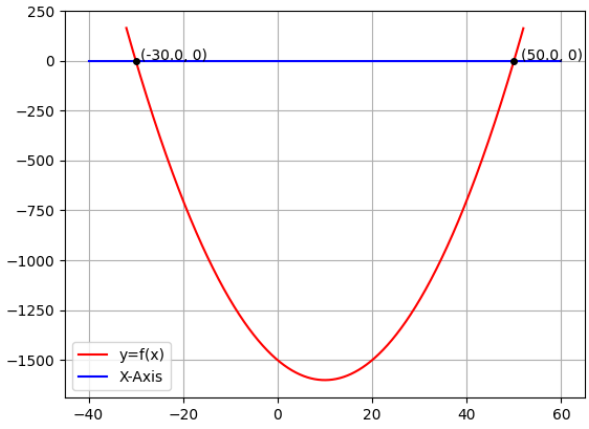

Fig. 0. Plot of $n^2 - 20n - 1500$

For a quadratic equation of form $ax^2 + bx + c = 0$, the roots are of the form

$$\frac{-b + \sqrt{b^2 - 4ac}}{2a}, \frac{-b - \sqrt{b^2 - 4ac}}{2a} \tag{11}$$

$$\frac{20 + \sqrt{(-20)^2 + 4(1500)}}{2(1)}, \frac{20 - \sqrt{(-20)^2 + 4(1500)}}{2(1)} \tag{12}$$

$$\frac{20 + \sqrt{6400}}{2(1)}, \frac{20 - \sqrt{6400}}{2(1)} \tag{13}$$

$$\frac{20+80}{2}, \frac{20-80}{2} \tag{14}$$

$$n = 50, -30 \tag{15}$$

Since n can only be positive, the number of children is 50.