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QUADRATIC EQUATIONS

INTRODUCTION

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 04
CHAPTER NAME : QUADRATIC EQUATIONS

Website: www.odmegroup.org
Email: info@odmps.org
Toll Free: **1800 120 2316**
Sishu Vihar, Infocity Road, Patia, Bhubaneswar- 751024

LEARNING OUTCOME

1.Students will be able to define Quadratic Equations.

2. Students will be able to express Quadratic Equations in standard form.

3. Students will be able to represent situations in the form of Quadratic Equations.

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Introduction to Quadratic Equations
https://youtu.be/UZTvYYoOrmI {3.11}

Quadratic Equation

When we equate a quadratic polynomial to a constant, we get a quadratic equation.

Any equation of the form $p(x)= ax^2+bx+c$, where $p(x)$ is a polynomial of degree 2 and c is a constant, is a quadratic equation.

The standard form of a Quadratic Equation

The standard form of a quadratic equation is $ax^2+bx+c=0$, where a,b and c are real numbers and $a\neq0$.

'a' is the coefficient of x^2. It is called the quadratic coefficient. 'b' is the coefficient of x. It is called the linear coefficient. 'c' is the constant term.

: Represent the following situations mathematically:
(i) John and Jayanti together have 45 marbles. Both of them lost 5 marbles each, and the product of the number of marbles they now have is 124. We would like to find out how many marbles they had to start with..

: Let the number of marbles John had be x.

Then the number of marbles Jayanti had = 45 – x .

The number of marbles left with John, when he lost 5 marbles = x – 5

The number of marbles left with Jayanti, when she lost 5 marbles = 45 – x – 5

= 40 –x

Therefore, their product = (x – 5) (40 – x)

= 40x –x^2– 200 + 5x

= – x^2+ 45x – 200

So, – x^2 + 45x – 200 = 124 (Given that product = 124)

i.e., – x^2 + 45x – 324 = 0

i.e., x^2 – 45x + 324 = 0

Therefore, the number of marbles John had, satisfies the quadratic equation x^2 – 45x + 324 = 0 which is the required representation of the problem mathematically.

: Represent the following situation mathematically:

The product of two consecutive positive integers is 306. We need to find the integers.

: Represent the following situation mathematically:
The product of two consecutive positive integers is 306. We need to find the integers.

:Let the two consecutive positive integer be $x$and x + 1
Then according to the question,
Products of the two integers=306
$\Rightarrow x\ (x+1) = 306$
$\Rightarrow x^2 + x - 306 = 0$
This is the required equation.

: A cottage industry produces a certain number of toys in a day. The cost of production of each toy (in rupees) was found to be 55 minus the number of toys produced in a day. On a particular day, the total cost of production was ` 750. We would like to find out the number of toys produced on that day..

A cottage industry produces a certain number of toys in a day. The cost of production of each toy (in rupees) was found to be 55 minus the number of toys produced in a day. On a particular day, the total cost of production was ` 750. We would like to find out the number of toys produced on that day.

Let the number of toys produced on that day be x.

Therefore, the cost of production (in rupees) of each toy that day = 55 –x

So, the total cost of production (in rupees) that day = x (55 – x)

Therefore, $x(55 - x) = 750$

$\Rightarrow 55x - x^2 = 750$

$\Rightarrow - x^2 + 55x - 750 = 0$

$\Rightarrow x^2 - 55x + 750 = 0$

Therefore, the number of toys produced that day satisfies the quadratic equation $x^2 - 55x + 750 = 0$

which is the required representation of the problem mathematically.

Check whether the following are quadratic equations:

(ii) $x(x + 1) + 8 = (x + 2)(x - 2)$

(iii) $(x - 2)(x + 1) = (x - 1)(x + 3)$

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(ii) $x(x + 1) + 8 = (x + 2)(x - 2)$

Since $x(x + 1) + 8 = x^2 + x + 8$ and

$(x + 2)(x - 2) = x^2 - 4$ Therefore,

$x^2 + x + 8 = x^2 - 4$ i.e.,

$x + 12 = 0$

It is not of the form a x^2 + b x + c = 0. Therefore, the given equation is not a quadratic equation.

Check whether the following are quadratic equations:

$(x - 2)(x + 1) = (x - 1)(x + 3)$

$$(x-2)(x+1) = (x-1)(x+3)$$

$$\Rightarrow \quad x^2 + x - 2x - 2 = x^2 + 3x - x - 3$$

$$\Rightarrow \quad x^2 + x - 2x - 2 - x^2 - 3x + x + 3 = 0$$

$$\Rightarrow \quad -3x + 1 = 0$$

$$\Rightarrow \quad 3x - 1 = 0$$

$$\text{or} \quad 0.x^2 + 3x + (-1) = 0$$

It is not of the form a x^2 + b x + c = 0. Therefore, the given equation is not a quadratic equation

HOME ASSIGNMENT Ex. 4.1 Q. No 1 to Q2

AHA

1 . Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. We would like to find Rohan's present age

2. A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/h less, then it would have taken 3 hours more to cover the same distance. We need to find the speed of the train

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