

Complete Data Science and Machine Learning Using Python

By
Jitesh Khurkhuriya

Basic Algebra

Derive Value of variable in an Equation

$$3X + 4 = 10$$

$$3X + 4 - 4 = 10 - 4$$

$$\frac{3X}{3} = \frac{6}{3}$$

$$X = 2$$

Verify and equation

$$3X + 4 = 10$$

$$3(2) + 4 = 10$$

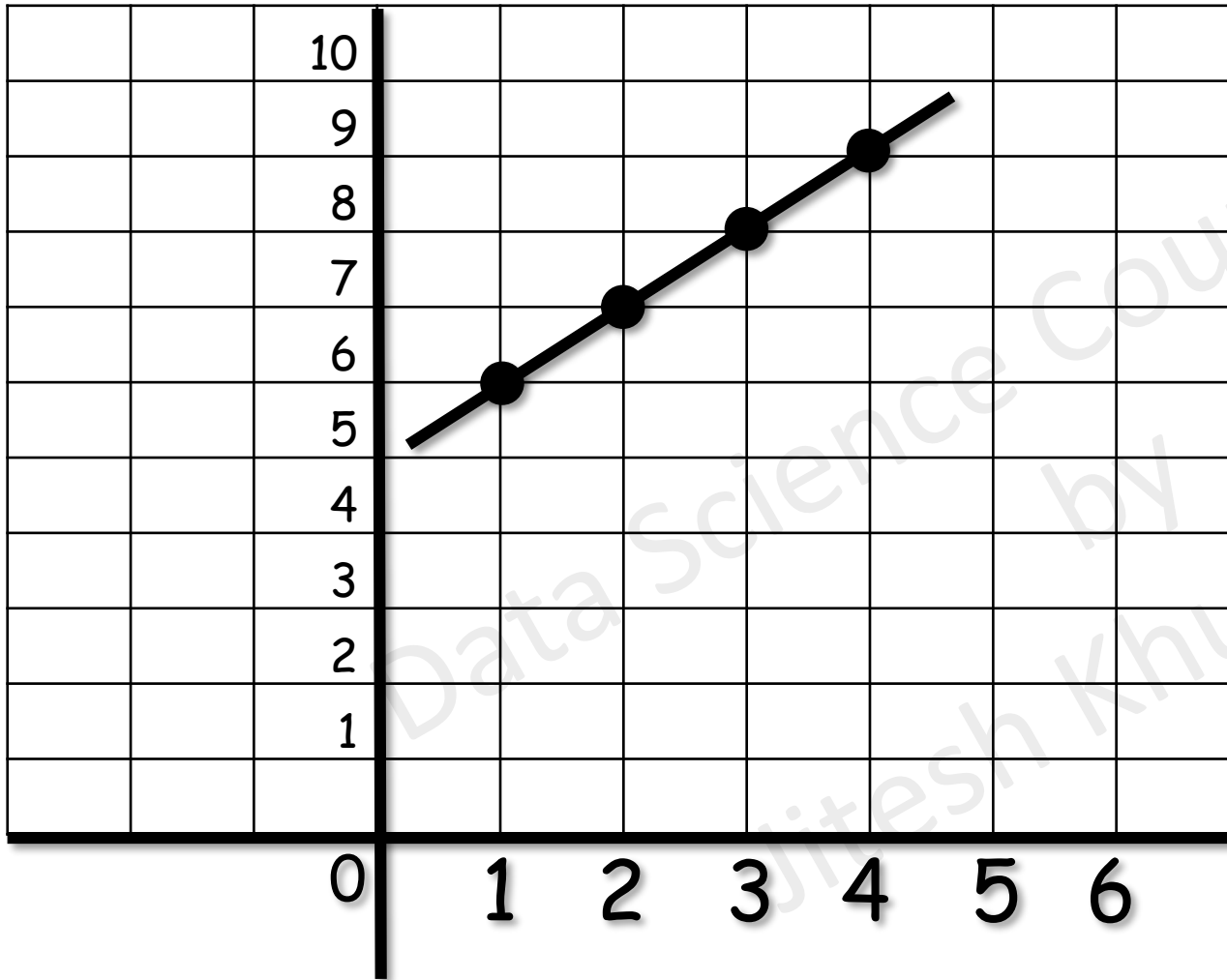
$$6 + 4 = 10$$

Distributive Property

$$3 (X + 2) = 12$$


$$3X + 6 = 12$$

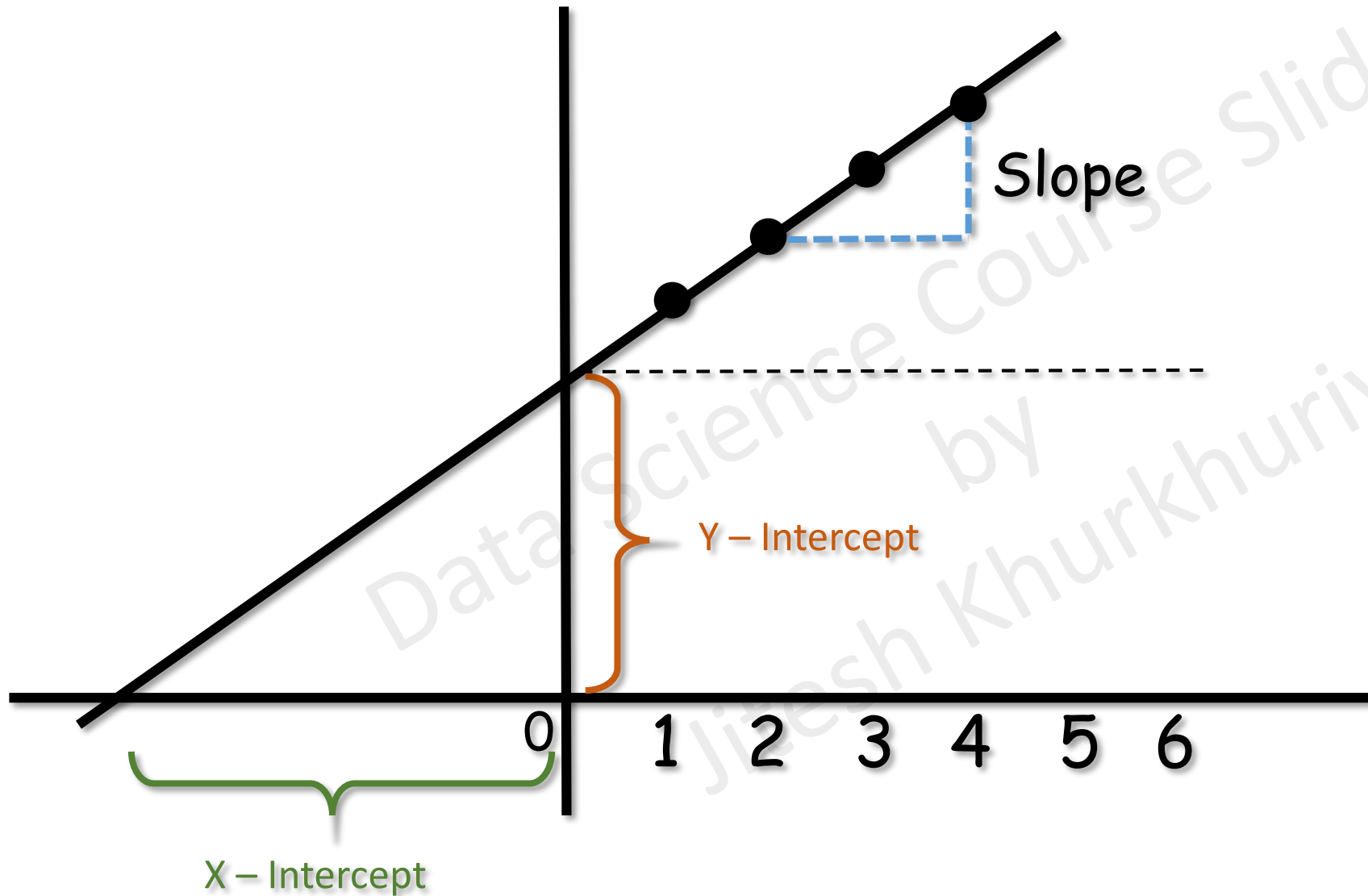
Linear Equation



$$y = x + 5$$

x	y
1	6
2	7
3	8
4	9

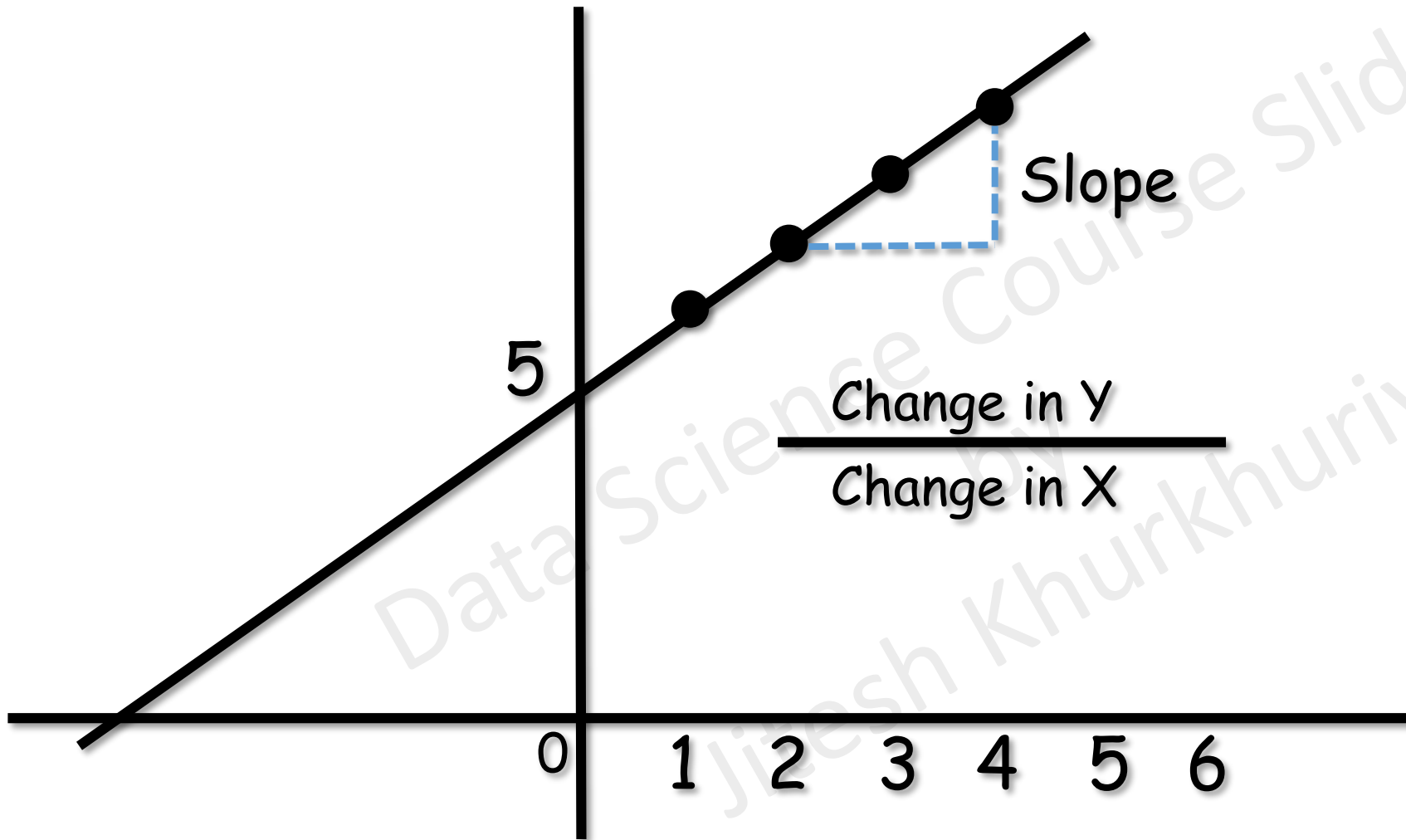
Linear Equation



$$y = x + 5$$

x	y
1	6
2	7
3	8
4	9

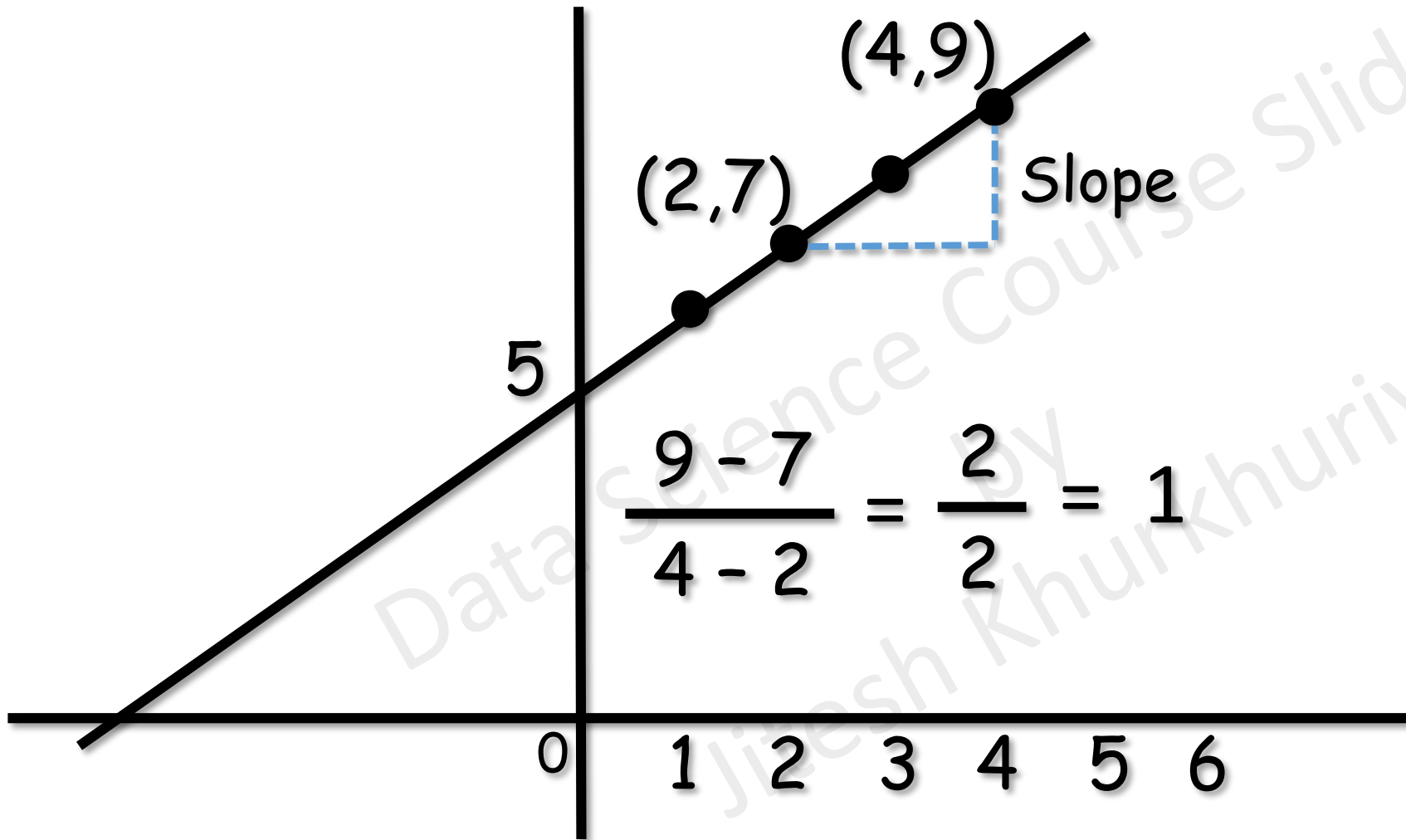
Linear Equation



$$y = x + 5$$

x	y
1	6
2	7
3	8
4	9

Linear Equation



$$y = x + 5$$

x	y
1	6
2	7
3	8
4	9

Algebraic Terms

Exponents

Logarithm

Polynomial

Factoring

Quadratic Equations

Exponents

- How many times we should multiply a number by itself?

Index or exponent or power



2

$$4^2 = 4 \times 4$$

Base



3

$$4^3 = 4 \times 4 \times 4$$

Exponents

$$4^{-3} = 1 \div (4 \times 4 \times 4)$$

$$4^0 = 1$$

Exponents Arithmetic

$$X^3 \times X^2 = X^{3+2} = X^5$$

$$X^3 \div X^2 = X^{3-2} = X^1$$

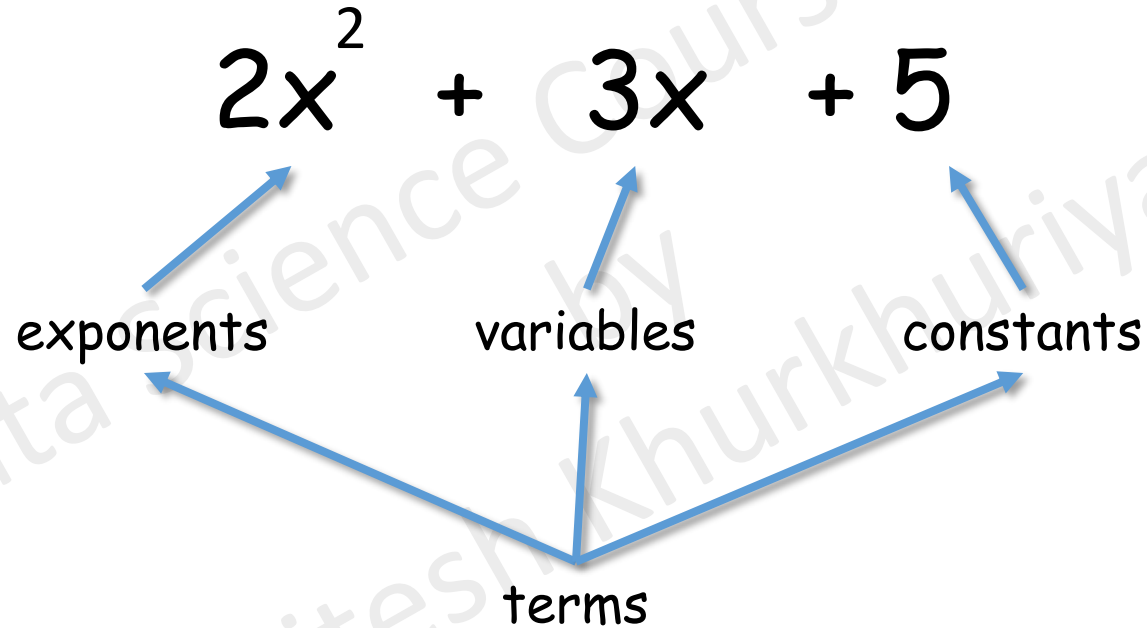
Logarithm

$$4^3 = 64$$

$$4^? = 64 \rightarrow \log_4(64) = 3$$

Polynomial

- Poly → Many
- Nomial → Terms



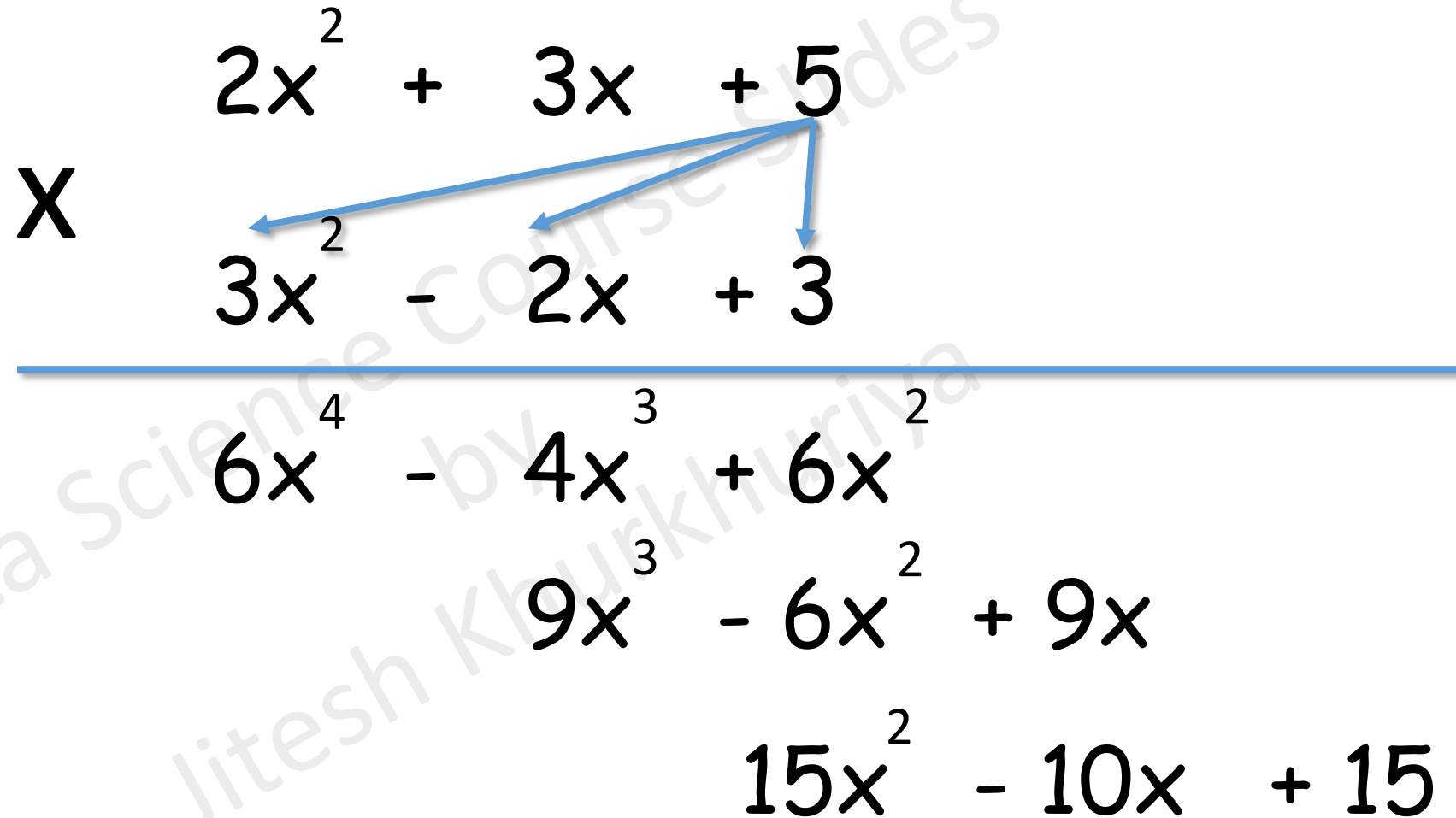
Polynomial Arithmetic

- Poly → Many
- Nomial → Terms

$$\begin{array}{r} 2x^2 + 3x + 5 \\ + \quad 3x^2 - 2x + 3 \\ \hline 5x^2 + 1x + 8 \end{array}$$

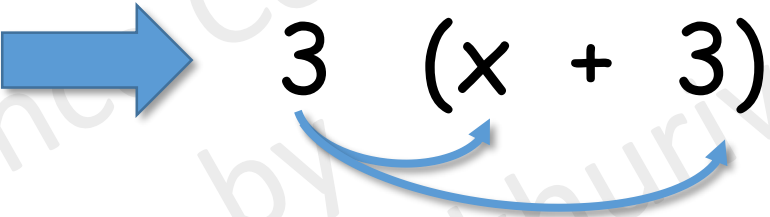
Polynomial Arithmetic

X

$$\begin{array}{r} 2x^2 + 3x + 5 \\ \times \quad 3x^2 - 2x + 3 \\ \hline 6x^4 - 4x^3 + 6x^2 \\ 9x^3 - 6x^2 + 9x \\ 15x^2 - 10x + 15 \end{array}$$


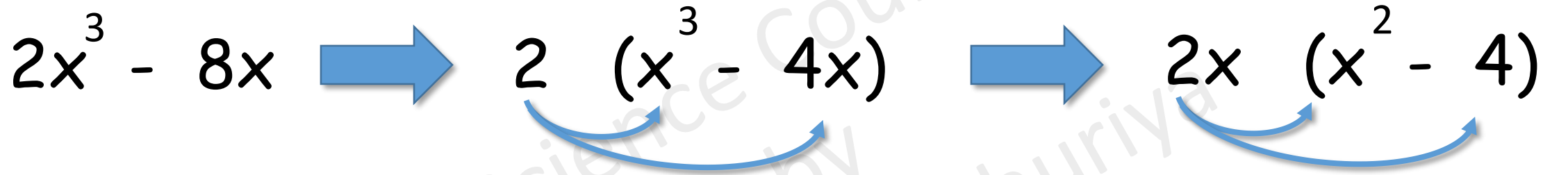
Factoring

- What can I multiply with what to get the required equation or number?

$$3x + 9 \rightarrow 3(x + 3)$$


Factoring

- What can I multiply with what to get the required equation or number?

$$2x^3 - 8x \rightarrow 2(x^3 - 4x) \rightarrow 2x(x^2 - 4)$$


Difference of Squares

Difference of Squares

$$(a^2 - b^2) = (a + b)(a - b)$$

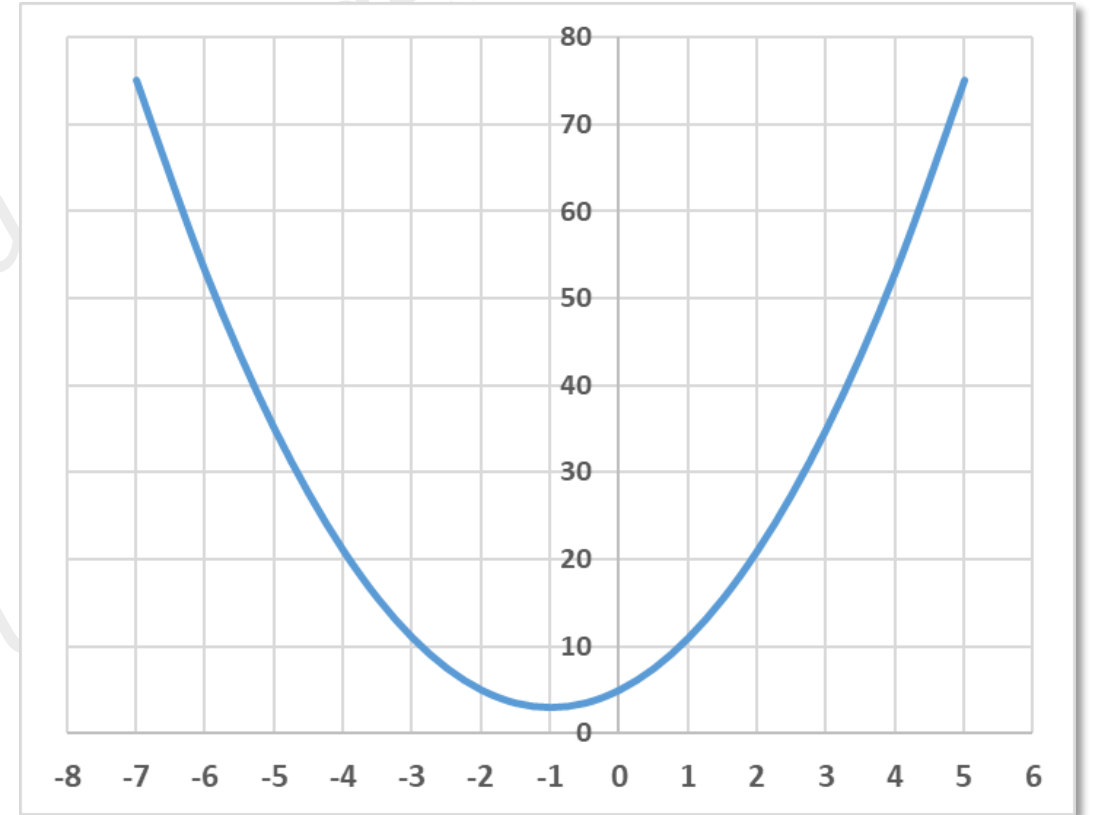
$$(x^2 - 4) = (x^2 - 2^2) = (x + 2)(x - 2)$$

Quadratic Equation

Special type of polynomial with “Quad” or Square.

$$ax^2 + bx + c$$

$$2x^2 + 4x + 5$$



Common Equations

$$(x + a)^2 = x^2 + 2xa + a^2$$

$$(x - a)^2 = x^2 - 2xa + a^2$$

$$(x + a) * (x - a) = x^2 - a^2$$

Functions

What is a Function?

Input  function  Output

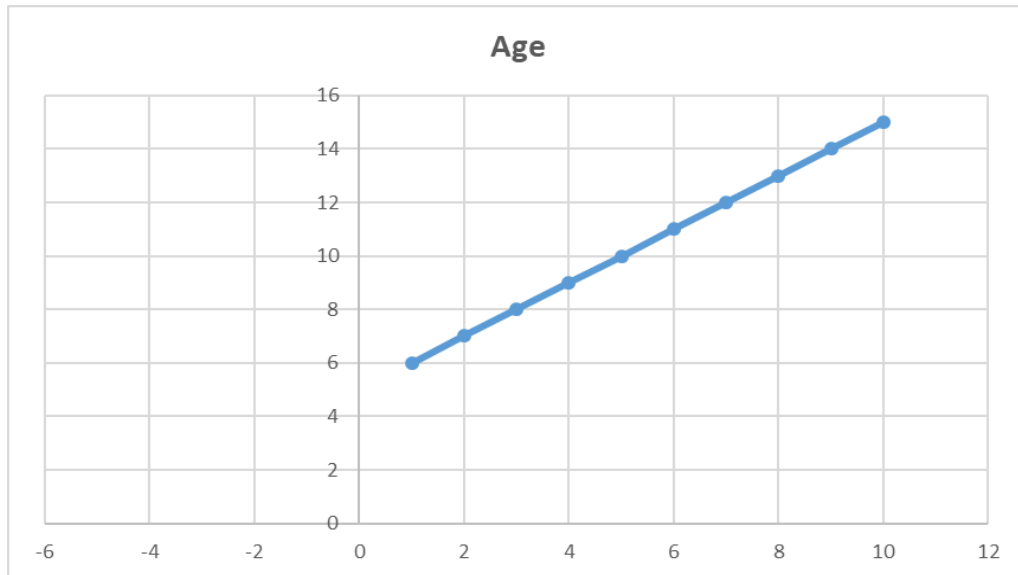
Process the input

x  Square  x^2

$$f(x) = x^2$$

Age as a function of grade?

$$f(x) = x + 5$$

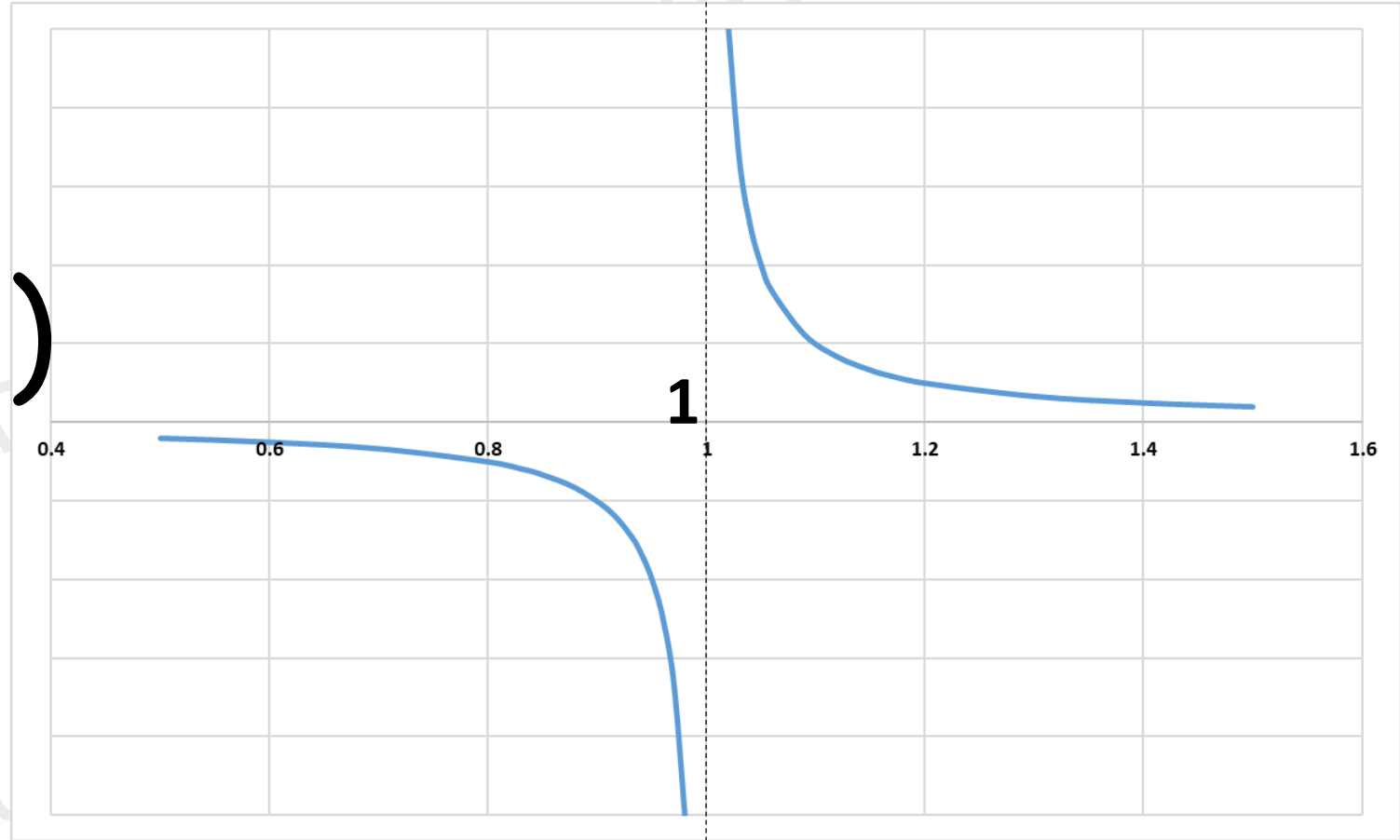


Grade	Age
1	1 + 5 = 6
2	2 + 5 = 7
3	3 + 5 = 8
4	4 + 5 = 9
5	5 + 5 = 10

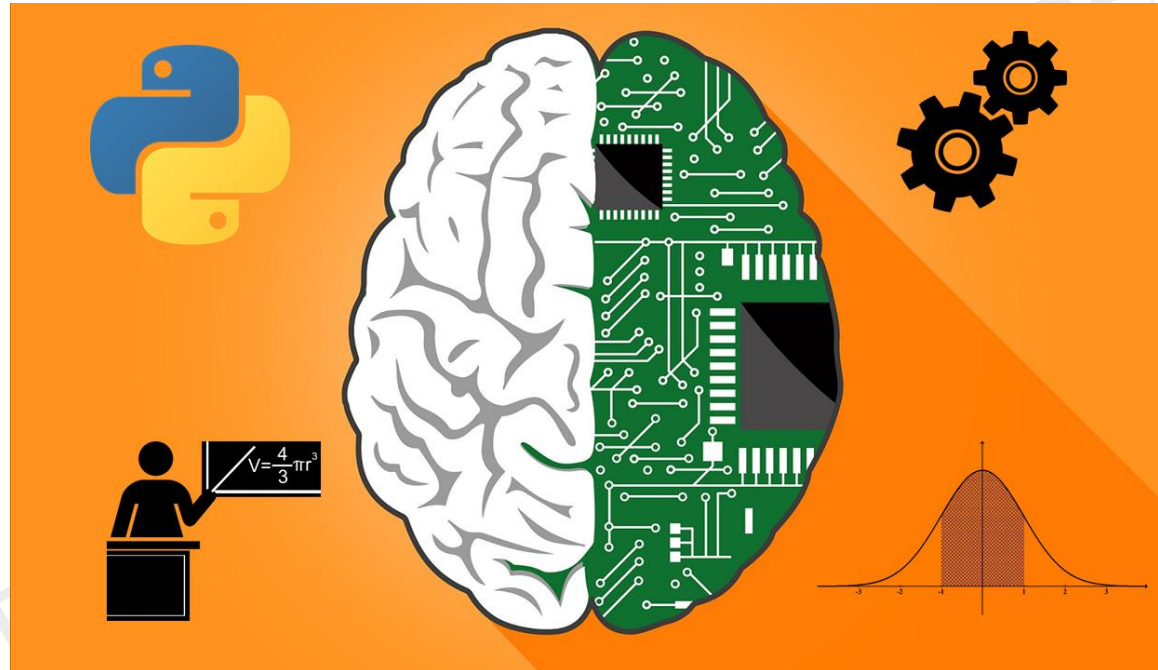
Allowed values → 1 to 10

Continuous Functions

$$f(x) = 1/(x - 1)$$



Complete Data Science and Machine Learning Using Python



Thank You!