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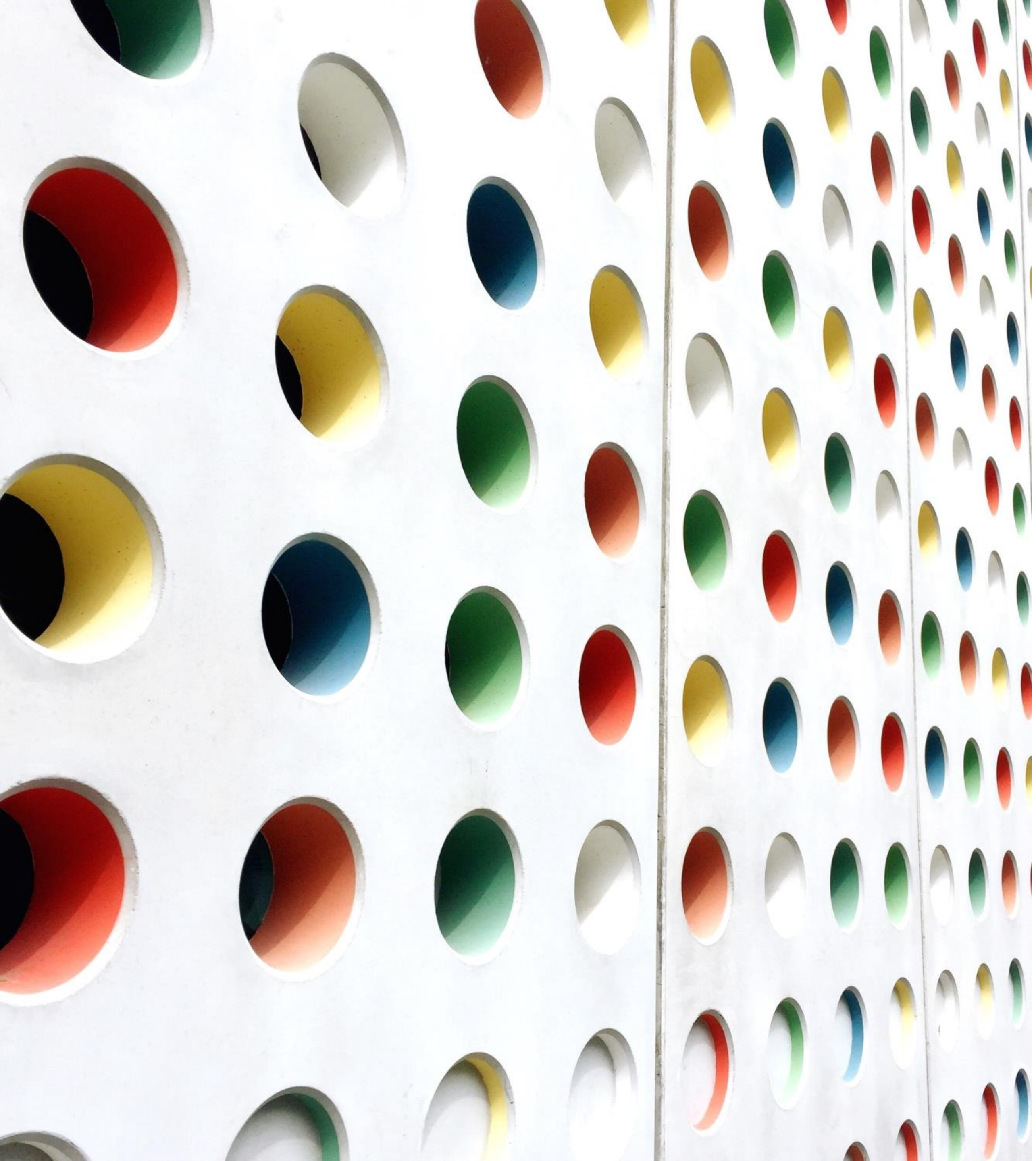

QUADRATIC EQUATIONS
Solution of a Quadratic Equations by discriminant method.
Chapter: 4, (Part: 1)

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Nature of Roots

Since b^2 – 4ac determines whether the quadratic equation ax^2 + bx + c = 0 has real roots or not, b^2 – 4ac is called the discriminant of this quadratic equation.

A quadratic equation $ax^2 + bx + c = 0$ has

- Two distinct real roots, if $b^2 - 4ac > 0$,
- Two equal real roots, if $b^2 - 4ac = 0$,
- No real roots, if $b^2 - 4ac < 0$.

Find the nature of the roots of the following quadratic equations. If the real roots exist, find them:

$$2x^2 - 3x + 5 = 0 \rightarrow ax^2 + bx + c = 0$$

$a = 2$, $b = -3$, $c = 5$

$D = b^2 - 4ac = (-3)^2 - 4(2)(5)$

$= 9 - 40$

$= -31$

$D < 0$

if $D < 0$ $\therefore$ No Real Root

$$3x^2 - 4\sqrt{3}\,x + 4 = 0$$

$a = 3$, $b = -4\sqrt{3}$, $c = 4$

∴ we have two Real Root equal

$D = b^2 - 4ac$

$D = (-4\sqrt{3})^2 - 4(3)(4)$

$= (-4)^2(\sqrt{3})^2 - 12 \times 4$

$= 16 \times 3 - 48$

$= 48 - 48$

$D = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-4\sqrt{3}) \pm 0}{2 \times 3}$$

$$x = \frac{4\sqrt{3}}{6} = \frac{2\sqrt{3}}{3}$$

$$x = \frac{2\sqrt{3}}{3}, \frac{2\sqrt{3}}{3}$$

$$2x^2 - 6x + 3 = 0$$

$a = 2$, $b = -6$, $c = 3$

$D = b^2 - 4ac = (-6)^2 - 4(2)(3)$

$D = 36 - 24$

$D = 12$

$D > 0$

∴ we have two distinct Real Roots

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-6) \pm \sqrt{12}}{2 \times 2}$$

$$= \frac{6 \pm 2\sqrt{3}}{2 \times 2}$$

$$= \frac{2(3 \pm \sqrt{3})}{2 \times 2} = \frac{3 \pm \sqrt{3}}{2}$$

$$x = \frac{3 + \sqrt{3}}{2}, \quad \frac{3 - \sqrt{3}}{2}$$

$\sqrt{2 \times 2 \times 3}$

2	12
2	6
3	3
	1


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