



Quadratic Equations Ex 14.2 Q2(vii)

$$2x^2 + \sqrt{15}ix - i = 0$$

Comparing the given equation with the general form

$$ax^2 + bx + c = 0, \text{ we get } a = 2, b = \sqrt{15}i, c = -i$$

Substituting a and b in,

$$\alpha = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \quad \text{and} \quad \beta = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$
$$\alpha = \frac{-\sqrt{15}i + \sqrt{-15 + 8i}}{4} \quad \text{and} \quad \beta = \frac{-\sqrt{15}i - \sqrt{-15 + 8i}}{4}$$

$$\text{Let } \sqrt{-15 + 8i} = a + bi$$

$$\Rightarrow -15 + 8i = (a + bi)^2$$

$$\Rightarrow -15 + 8i = a^2 - b^2 + 2abi$$

$$\Rightarrow a^2 - b^2 = -15 \text{ and } 2abi = 8i$$

$$\text{Now } (a^2 + b^2)^2 = (a^2 - b^2)^2 + 4a^2b^2$$

$$\Rightarrow (a^2 + b^2)^2 = (-15)^2 + 64 = 289$$

$$\Rightarrow a^2 + b^2 = 17$$

Solving $a^2 - b^2 = -15$ and $a^2 + b^2 = 17$, we get

$$a^2 = 1 \text{ and } b^2 = 16$$

$$\Rightarrow a = \pm 1 \text{ and } b = \pm 4$$

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$$\Rightarrow a = 1, b = 4 \text{ or } a = -1, b = -4$$

$$\therefore \sqrt{-15+8i} = 1+4i, -1-4i$$

$$\text{When } \sqrt{-15+8i} = 1+4i$$

$$\alpha = \frac{-\sqrt{15}i + 1 + 4i}{4} = \frac{1 + (4 - \sqrt{15})i}{4}$$

$$\text{and } \beta = \frac{-\sqrt{15}i - (1 + 4i)}{4} = \frac{-1 - (4 + \sqrt{15})i}{4}$$

$$\text{When } \sqrt{-15+8i} = -1-4i$$

$$\alpha = \frac{-\sqrt{15}i - 1 - 4i}{4} = \frac{-1 - (4 + \sqrt{15})i}{4}$$

$$\text{and } \beta = \frac{-\sqrt{15}i - (-1 - 4i)}{4} = \frac{1 + (4 - \sqrt{15})i}{4}$$

Quadratic Equations Ex 14.2 Q2(viii)

$$x^2 - x + (1+i) = 0$$

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$$x^2 - ix - (1-i)x + i(1-i) = 0$$

$$(x-i)(x-(1-i)) = 0$$

$$x = i, 1-i$$

***** END *****