



Complex Numbers Ex 13.2 Q2(i)

$$\text{We have } (x + iy)(2 - 3i) = 4 + i$$

$$\Rightarrow x(2 - 3i) + iy(2 - 3i) = 4 + i$$

$$\Rightarrow 2x - 3xi + 2yi + 3y = 4 + i$$

$$\Rightarrow 2x + 3y + i(-3x + 2y) = 4 + i$$

Equating the real and imaginary parts we get

$$2x + 3y = 4 \dots\dots\dots(i)$$

$$-3x + 2y = 1 \dots\dots\dots(ii)$$

Multiplying (i) by 3 and (ii) by 2 and adding

$$6x - 6x - 9y + 4y = 12 + 2$$

$$\Rightarrow 13y = 14$$

$$\Rightarrow y = \frac{14}{13}$$

Substituting the value of  $y$  in (i), we get

$$2x + 3 \times \frac{14}{13} = 4$$

$$\Rightarrow 2x + \frac{42}{13} = 4$$

$$\Rightarrow 2x = 4 - \frac{42}{13}$$

$$\Rightarrow 2x = \frac{52 - 42}{13}$$

$$\Rightarrow 2x = \frac{10}{13}$$

$$\Rightarrow x = \frac{5}{13}$$

Hence

$$x = \frac{5}{13} \text{ and } y = \frac{14}{13}$$

Complex Numbers Ex 13.2 Q2(ii)

$$(3x - 2iy)(2 + i)^2 = 10(1 + i)$$

$$\Rightarrow (3x - 2iy)(2^2 + i^2 + 2 \times 2 \times i) = 10 + 10i$$

$$\Rightarrow (3x - 2iy)(4 - 1 + 4i) = 10 + 10i$$

$$\Rightarrow 3x(3 + 4i) - 2iy(3 + 4i) = 10 + 10i$$

$$\Rightarrow 9x + 12xi - 6yi + 8y = 10 + 10i$$

$$\Rightarrow 9x + 8y + i(12x - 6y) = 10 + 10i$$

Equating the real and imaginary parts we get

$$9x + 8y = 10 \dots\dots\dots (i)$$

$$12x - 6y = 10 \dots\dots\dots (ii)$$

Multiplying (i) by 6 and (ii) by 8 and adding

$$54x + 96y + 48y - 48y = 60 + 80$$

$$\Rightarrow 150x = 140$$

$$\Rightarrow x = \frac{140}{150}$$

$$\Rightarrow x = \frac{14}{15}$$

Substituting value of x in (i) we get

$$9 \times \frac{14}{15} + 8y = 10$$

$$\Rightarrow \frac{42}{5} + 8y = 10$$

$$\Rightarrow 8y = 10 - \frac{42}{5}$$

$$\Rightarrow 8y = \frac{50 - 42}{5}$$

$$\Rightarrow 8y = \frac{8}{5}$$

$$\Rightarrow y = \frac{1}{5}$$

$$\begin{aligned}
& \frac{(1+i)x - 2i}{3+i} + \frac{(2-3i)y + i}{3-i} = i \\
& \Rightarrow \frac{(3-i)((1+i)x - 2i) + (3+i)((2-3i)y + i)}{(3+i)(3-i)} = i \\
& \Rightarrow \frac{(3-i)(1+i)x - 2i(3-i) + (3+i)(2-3i)y + i(3+i)}{3^2 + 1^2} = i \\
& \Rightarrow \frac{(3+3i-i+1)x - 6i-2 + (6-9i+2i+3)y + 3i-1}{9+1} = i \\
& \Rightarrow \frac{(4+2i)x - 6i-2 + (9-7i)y + 3i-1}{10} = i \\
& \Rightarrow 4x + 2ix - 6i - 2 + 9y - 7iy + 3i - 1 = 10i \\
& \Rightarrow 4x + 9y - 3 + i(2x - 7y - 3) = 10i
\end{aligned}$$

Equating real and imaginary parts we get

$$4x + 9y - 3 = 0 \dots\dots\dots (i)$$

$$\text{and } 2x - 7y - 3 = 10$$

$$\text{i.e. } 2x - 7y = 13 \dots\dots\dots (ii)$$

Multiplying (i) by 7, (ii) by 9 and adding we get

$$28x + 18x + 63y - 63y = 117 + 21$$

$$\Rightarrow 46x = 117 + 21$$

$$\Rightarrow 46x = 138$$

$$\Rightarrow x = \frac{138}{46}$$

$$= 3$$

Substituting the value of  $x = 3$  in (i), we get

$$4 \times 3 + 9y = 3$$

$$\Rightarrow 9y = -9$$

$$\Rightarrow y = \frac{-9}{9}$$

$$\Rightarrow y = -1$$

Hence

$$x = 3, y = -1$$

Complex Numbers Ex 13.2 Q2(iv)

$$(1+i)(x+iy) = 2-5i$$

$$\Rightarrow 1(x+iy) + i(x+iy) = 2-5i$$

$$\Rightarrow x+iy+ix-y = 2-5i$$

$$\Rightarrow x-y+i(x+y) = 2-5i$$

Equating real and imaginary parts we get

$$x-y = 2 \dots\dots\dots (i)$$

$$x+y = -5 \dots\dots\dots (ii)$$

Adding (i) and (ii) we get

$$2x = 2-5$$

$$\Rightarrow 2x = -3$$

$$\Rightarrow x = \frac{-3}{2}$$

Substituting the value of  $x$  in (i), we get

$$\frac{-3}{2} - y = 2$$

$$\Rightarrow \frac{-3}{2} - 2 = y$$

$$\Rightarrow y = \frac{-3-4}{2}$$

$$\Rightarrow y = \frac{-7}{2}$$

Hence

$$x = \frac{-3}{2}, y = \frac{-7}{2}$$

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