

## Complex Numbers Worksheets

1. Compute  $(1 + 2i)(1 - 2i)$

2. Compute  $(1 + i)(1 - i)$

3. Verify that  $-1 + 2i$  and  $-1 - 2i$  are solutions to  $x^2 + 2x + 5 = 0$

4. Compute  $i(2 - i)(1 + 2i)$

5. Compute  $((5 - i) - 2(1 - 3i))^2$

6. Compute  $(3 - i)(4 + 7i)$

7. Compute  $-i(2 - i)(5 + 6i)$

## Complex Numbers Worksheets

1. Compute  $(1 + 2i)(1 - 2i)$

$$\begin{aligned}(1 + 2i)(1 - 2i) &= 1 + 2i - 2i - 4i^2 \\ &= 1 + 0 - 4(-1) \\ &= 1 + 4 = 5\end{aligned}$$

2. Compute  $(1 + i)(1 - i)$

$$\begin{aligned}(1 + i)(1 - i) &= 1 + i - i - i^2 \\ &= 1 - i^2 \\ &= 1 + 1 \\ &= 2 + 0i = 2\end{aligned}$$

3. Verify that  $-1 + 2i$  and  $-1 - 2i$  are solutions to  $x^2 + 2x + 5 = 0$

$-1 + 2i$ :

$$\begin{aligned}(-1 + 2i)^2 + 2(-1 + 2i) + 5 &= 1 - 4i + 4i^2 - 2 + 4i + 5 \\ &= 4i^2 - 4i + 4i + 1 - 2 + 5 \\ &= -4 + 0 + 4 = 0\end{aligned}$$

$-1 - 2i$ :

$$\begin{aligned}(-1 - 2i)^2 + 2(-1 - 2i) + 5 &= 1 + 4i + 4i^2 - 2 - 4i + 5 \\ &= 4i^2 + 4i - 4i + 1 - 2 + 5 \\ &= -4 + 0 + 4 = 0\end{aligned}$$

So, both complex numbers  $-1 - 2i$  and  $-1 + 2i$  are solutions to the quadratic equation  $x^2 + 2x + 5 = 0$

4. Compute  $i(2 - i)(1 + 2i)$

$$\begin{aligned}i(2 - i)(1 + 2i) &= i(2 + 4i - i - 2i^2) \\ &= i(2 + 3i - 2(-1)) \\ &= i(2 + 3i + 2) \\ &= i(4 + 3i) \\ &= 4i + 3i^2 \\ &= -3 + 4i\end{aligned}$$

5. Compute  $((5 - i) - 2(1 - 3i))^2$

$$\begin{aligned}(3 + 5i)^2 &= 9 + 30i + 25i^2 \\ &= 9 + 30i + (-25) \\ &= -16 + 30i\end{aligned}$$

6. Compute  $(3 - i)(4 + 7i)$

$$\begin{aligned}12 - 4i + 21i - 7i^2 &= 12 + 17i - (-7) \\ &= 19 + 17i\end{aligned}$$

7. Compute  $-i(2 - i)(5 + 6i)$

$$\begin{aligned}-i(2 - i)(5 + 6i) &= -i(10 - 5i + 12i - 6i^2) \\ &= -i(10 + 7i + 6) \\ &= -i(16 + 7i) \\ &= -16i - 7i^2 = -16i + 7 \\ &= 7 - 16i\end{aligned}$$

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