

Exercise 36

For the following exercises, perform the indicated operation and express the result as a simplified complex number.

$$\frac{2 + 3i}{2 - 3i}$$

Solution

Start by making the denominator real. Then use the distributive property.

$$\begin{aligned}\frac{2 + 3i}{2 - 3i} \\ \frac{2 + 3i}{2 - 3i} \times \frac{2 + 3i}{2 + 3i} \\ \frac{(2 + 3i)(2 + 3i)}{(2 - 3i)(2 + 3i)} \\ \frac{4 + 6i + 6i + 9i^2}{4 + 6i - 6i - 9i^2} \\ \frac{4 + 12i + 9(-1)}{4 - 9(-1)} \\ \frac{4 + 12i - 9}{4 + 9} \\ \frac{-5 + 12i}{13} \\ \frac{1}{13}(-5 + 12i) \\ -\frac{5}{13} + \frac{12}{13}i\end{aligned}$$