APPLICATIONS TO DIVISION

Dividing by multiplying with the conjugate

The identity $z \cdot \bar{z} = |z|^2$ guarantees the denominator becomes real.

01

COMPLEX DENOMINATOR — BEFORE

$$\frac{3 + 2i}{1 - 4i}$$

↓ Multiply by the conjugate — numerator and denominator both by 1 + 4i

02

CONJUGATE IN

$$\frac{(3 + 2i)(1 + 4i)}{(1 - 4i)(1 + 4i)}$$

↓ Multiply out — denominator 1 − 16i² = 17, numerator 3 + 14i + 8i² = −5 + 14i

03

REAL DENOMINATOR

$$\frac{-5 + 14i}{17}$$

↓ Divide each part by 17 — a real denominator only scales the two components

04

STANDARD FORM — AFTER

$$-\frac{5}{17} + \frac{14}{17}\,i$$