

Exercise 52

For the following exercises, evaluate the expressions, writing the result as a simplified complex number.

$$i^{-3} + 5i^7$$

Solution

Simplify the given expression.

$$\begin{aligned}i^{-3} + 5i^7 &= \frac{1}{i^3} + \frac{5i^8}{i} \\&= \frac{1}{i^2 \cdot i} + \frac{5(i^4)^2}{i} \\&= \frac{1}{(-1) \cdot i} + \frac{5(1)^2}{i} \\&= -\frac{1}{i} + \frac{5}{i} \\&= \frac{-1 + 5}{i} \\&= \frac{4}{i} \\&= \frac{4}{i} \times \frac{i}{i} \\&= \frac{4i}{i^2} \\&= \frac{4i}{-1} \\&= -4i\end{aligned}$$