

Simplify each. Give Complex answers in Standard Form.

1. $(8 + 3i)(8 - 3i)$

2. $3i(-5i)(i^5)(2i^4)(6i^3)$

3. $(5 + 7i)^2$

4. $(5 - 2\sqrt{-16})(6 + 3\sqrt{-49})$

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1. $(8+3i)(8-3i)$

$$\begin{aligned} a &= 8 & b &= 3 \\ &= a^2 + b^2 &= 8^2 + 3^2 \\ &= 64 + 9 \\ &= \boxed{73} \end{aligned}$$

2. $3i(-5i)(i^5)(2i^4)(6i^3)$

$$\begin{aligned} &= -180i^{14} \\ &= -180(-1) \\ &= \boxed{180} \end{aligned}$$

$$\begin{aligned} i^{14} &= (i^2)^7 \\ &= (-1)^7 \\ &= -1 \end{aligned}$$

3. $(5+7i)^2$

| | | |
|-----|--------|----------------------------|
| | 5 + 7i | |
| 5 | 25 | +35i |
| +7i | +35i | +49i ² = -49 |

$$\boxed{-24 + 70i}$$

4. $(5-2\sqrt{-16})(6+3\sqrt{-49})$

$$\begin{aligned} &= (5-2 \cdot 4i)(6+3 \cdot 7i) \\ &= (5-8i)(6+21i) \end{aligned}$$

| | | |
|------|--------|------------------------------|
| | 5 - 8i | |
| 6 | 30 | -48i |
| +21i | +105i | -168i ² = +168 |

$$= \boxed{198 + 57i}$$