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Simplify and express each of the following in the form of $a + bi$.

1. $(7 - 10i) + (-4 - 14i)$

Solution:

$$\begin{aligned}(7 - 10i) + (-4 - 14i) &= 7 - 4 - 10i - 14i \\ &= 3 - 24i\end{aligned}$$

2. $(2 - 3i) + (-3 - 13i)$

Solution:

$$\begin{aligned}(2 - 3i) + (-3 - 13i) &= 2 - 3 - 3i - 13i \\ &= -1 - 16i\end{aligned}$$

3. $(8 - 8i) + (-9 - i)$

Solution:

$$\begin{aligned}(8 - 8i) + (-9 - i) &= 8 - 9 - 8i - i \\ &= -1 - 9i\end{aligned}$$

4. $(-5 - 10i) + (7 - 5i)$

Solution:

$$\begin{aligned}(-5 - 10i) + (7 - 5i) &= -5 + 7 - 10i - 5i \\ &= 2 - 15i\end{aligned}$$

5. $(6 - 11i) + (13 - 15i)$

Solution:

$$\begin{aligned}(6 - 11i) + (13 - 15i) &= 6 + 13 - 11i - 15i \\ &= 19 - 26i\end{aligned}$$

6. $(1 + 10i) - (-2 - 14i)$

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Solution:

$$\begin{aligned}(1+10i)-(-2-14i) &= 1+10i+2+14i \\ &= 1+2+10i+14i \\ &= 3+24i\end{aligned}$$

7. $(2-14i)-(13+15i)$

Solution:

$$\begin{aligned}(2-14i)-(13+15i) &= 2-14i-13-15i \\ &= 2-13-14i-15i \\ &= -11-29i\end{aligned}$$

8. $(-3+15i)-(-14-13i)$

Solution:

$$\begin{aligned}(-3+15i)-(-14-13i) &= -3+15i+14+13i \\ &= -3+14+15i+13i \\ &= 11+28i\end{aligned}$$

9. $(5-10i)-(-3-13i)$

Solution:

$$\begin{aligned}(5-10i)-(-3-13i) &= 5-10i+3+13i \\ &= 5+3-10i+13i \\ &= 8+3i\end{aligned}$$

10. $(9-10i)-(-10-3i)$

Solution:

$$\begin{aligned}(9-10i)-(-10-3i) &= 9-10i+10+3i \\ &= 9+10-10i+3i \\ &= 19-7i\end{aligned}$$

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11. $(8+7i)(-7+5i)$

Solution:

$$\begin{aligned}(8+7i)(-7+5i) &= -56+40i-49i+35i^2\\ &= -56+40i-49i+35(-1)\\ &= -56-35+40i-49i\\ &= -91-9i\end{aligned}$$

12. $(6+4i)(-7+4i)$

Solution:

$$\begin{aligned}(6+4i)(-7+4i) &= -42+24i-28i+16i^2\\ &= -42+24i-28i+16(-1)\\ &= -42-16+24i-28i\\ &= -58-4i\end{aligned}$$

13. $(-6-6i)(1+3i)$

Solution:

$$\begin{aligned}(-6-6i)(1+3i) &= -6-18i-6i-18i^2\\ &= -6-18i-6i-18(-1)\\ &= -6+18-18i-6i\\ &= 12-24i\end{aligned}$$

14. $(-9+9i)(3+7i)$

Solution:

$$\begin{aligned}(-9+9i)(3+7i) &= -27-63i+27i+63i^2\\ &= -27-63i+27i+63(-1)\\ &= -27-63-63i+27i\\ &= -90-36i\end{aligned}$$

15. $(-3-2i)(9+2i)$

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Solution:

$$\begin{aligned}(-3-2i)(9+2i) &= -27-6i-18i-4i^2\\ &= -27-6i-18i-4(-1)\\ &= -27+4-6i-18i\\ &= -23-24i\end{aligned}$$

16. $(1+9i)(-8+4i)$

Solution:

$$\begin{aligned}(1+9i)(-8+4i) &= -8+4i-72i+36i^2\\ &= -8+4i-72i+36(-1)\\ &= -8-36+4i-72i\\ &= -44-68i\end{aligned}$$

17. $(5-i)(-3-6i)$

Solution:

$$\begin{aligned}(5-i)(-3-6i) &= -15-30i+3i+6i^2\\ &= -15-30i+3i+6(-1)\\ &= -15-6-30i+3i\\ &= -21-27i\end{aligned}$$

18. $(7-5i)(2+6i)$

Solution:

$$\begin{aligned}(7-5i)(2+6i) &= 14+42i-10i-30i^2\\ &= 14+42i-10i-30(-1)\\ &= 14+30+42i-10i\\ &= 44+32i\end{aligned}$$

19. $(-5+6i)(4+8i)$

Solution:

$$\begin{aligned}(-5+6i)(4+8i) &= -20-40i+24i+48i^2\\ &= -20-40i+24i+48(-1)\\ &= -20-48-40i+24i\\ &= -68-16i\end{aligned}$$

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20. $(-8-9i)(-8+2i)$

Solution:

$$\begin{aligned}(-8-9i)(-8+2i) &= 64-16i+72i-18i^2\\ &= 64-16i+72i-18(-1)\\ &= 64+18-16i+72i\\ &= 82+56i\end{aligned}$$

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21. $\frac{5+i}{4-8i}$

Solution:

$$\begin{aligned}\frac{5+i}{4-8i} &= \frac{5+i}{4-8i}\cdot\frac{4+8i}{4+8i}\\ &= \frac{20+40i+4i+8i^2}{4^2-(8i)^2}\\ &= \frac{20+40i+4i+8i^2}{4^2-64i^2}\\ &= \frac{20+40i+4i+8(-1)}{4^2-64(-1)}\\ &= \frac{12+44i}{80}\\ &= \frac{3}{20}+\frac{11}{20}i\end{aligned}$$

22. $\frac{5-3i}{1-4i}$

Solution:

$$\begin{aligned}\frac{5-3i}{1-4i} &= \frac{5-3i}{1-4i}\cdot\frac{1+4i}{1+4i}\\ &= \frac{5+20i-3i-12i^2}{1^2-(4i)^2}\\ &= \frac{5+20i-3i-12i^2}{1^2-16i^2}\\ &= \frac{5+20i-3i-12(-1)}{1^2-16(-1)}\\ &= \frac{17+17i}{17}\\ &= 1+i\end{aligned}$$

23. $\frac{4-3i}{7-6i}$

Solution:

$$\begin{aligned}\frac{4-3i}{7-6i} &= \frac{4-3i}{7-6i}\cdot\frac{7+6i}{7+6i}\\ &= \frac{28+24i-21i-18i^2}{7^2-(6i)^2}\\ &= \frac{28+24i-21i-18i^2}{7^2-36i^2}\\ &= \frac{28+24i-21i-18(-1)}{7^2-36(-1)}\\ &= \frac{46+3i}{85}\\ &= \frac{46}{85}+\frac{3}{85}i\end{aligned}$$

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24. $\frac{6-3i}{5-6i}$

Solution:

$$\begin{aligned}\frac{6-3i}{5-6i} &= \frac{6-3i}{5-6i}\cdot\frac{5+6i}{5+6i}\\ &= \frac{30+36i-15i-18i^2}{5^2-(6i)^2}\\ &= \frac{30+36i-15i-18i^2}{5^2-36i^2}\\ &= \frac{30+36i-15i-18(-1)}{5^2-36(-1)}\\ &= \frac{48+21i}{61}\\ &= \frac{48}{61}+\frac{21}{61}i\end{aligned}$$

25. $\frac{9-5i}{3-5i}$

Solution:

$$\begin{aligned}\frac{9-5i}{3-5i} &= \frac{9-5i}{3-5i}\cdot\frac{3+5i}{3+5i}\\ &= \frac{27+45i-15i-25i^2}{3^2-(5i)^2}\\ &= \frac{27+45i-15i-25i^2}{3^2-25i^2}\\ &= \frac{27+45i-15i-25(-1)}{3^2-25(-1)}\\ &= \frac{52+30i}{34}\\ &= \frac{26}{17}+\frac{15}{17}i\end{aligned}$$

26. $\frac{3-6i}{5+i}$

Solution:

$$\begin{aligned}\frac{3-6i}{5+i} &= \frac{3-6i}{5+i}\cdot\frac{5-i}{5-i}\\ &= \frac{15-3i-30i+6i^2}{5^2-(i)^2}\\ &= \frac{15-3i-30i+6i^2}{5^2-i^2}\\ &= \frac{15-3i-30i+6(-1)}{5^2-(-1)}\\ &= \frac{9-33i}{26}\\ &= \frac{9}{26}-\frac{33}{26}i\end{aligned}$$

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27. $\frac{7-2i}{2-4i}$

Solution:

$$\begin{aligned}\frac{7-2i}{2-4i} &= \frac{7-2i}{2-4i}\cdot\frac{2+4i}{2+4i}\\ &= \frac{14+28i-4i-8i^2}{2^2-(4i)^2}\\ &= \frac{14+28i-4i-8i^2}{2^2-16i^2}\\ &= \frac{14+28i-4i-8(-1)}{2^2-16(-1)}\\ &= \frac{22+24i}{20}\\ &= \frac{11}{10}+\frac{6}{5}i\end{aligned}$$

28. $\frac{6-6i}{4-3i}$

Solution:

$$\begin{aligned}\frac{6-6i}{4-3i} &= \frac{6-6i}{4-3i}\cdot\frac{4+3i}{4+3i}\\ &= \frac{24+18i-24i-18i^2}{4^2-(3i)^2}\\ &= \frac{24+18i-24i-18i^2}{4^2-9i^2}\\ &= \frac{24+18i-24i-18(-1)}{4^2-9(-1)}\\ &= \frac{42-6i}{25}\\ &= \frac{42}{25}-\frac{6}{25}i\end{aligned}$$

29. $\frac{3-8i}{7+7i}$

Solution:

$$\begin{aligned}\frac{3-8i}{7+7i} &= \frac{3-8i}{7+7i}\cdot\frac{7-7i}{7-7i}\\ &= \frac{21-21i-56i+56i^2}{7^2-(7i)^2}\\ &= \frac{21-21i-56i+56i^2}{7^2-49i^2}\\ &= \frac{21-21i-56i+56(-1)}{7^2-49(-1)}\\ &= \frac{-35-77i}{98}\\ &= -\frac{5}{14}-\frac{11}{14}i\end{aligned}$$

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30. $\frac{4-i}{7-2i}$

Solution:

$$\begin{aligned}
\frac{4-i}{7-2i} &= \frac{4-i}{7-2i} \cdot \frac{7+2i}{7+2i} \\
&= \frac{28+8i-7i-2i^2}{7^2-(2i)^2} \\
&= \frac{28+8i-7i-2i^2}{7^2-4i^2} \\
&= \frac{28+8i-7i-2(-1)}{7^2-4(-1)} \\
&= \frac{30+i}{53} \\
&= \frac{30}{53}+\frac{1}{53}i
\end{aligned}$$