

TEST | for Unit 1

Simplify the expression.

1. $\sqrt{525}$

2. $\sqrt{567}$

3. $\sqrt{192}$

4. $\sqrt{\frac{49}{81}}$

5. $\sqrt{\frac{128}{25}}$

6. $\sqrt{\frac{53}{9}}$

Write the complex number in standard form.

7. $\sqrt{-99}$

8. $\sqrt{-196}$

9. $\sqrt{-80}$

10. $2 + \sqrt{-27}$

11. $6 - \sqrt{-162}$

12. $-3 + \sqrt{-44}$

Write the expression as a complex number in standard form.

13. $6i + (-2 - 7i)$

14. $(1 - 4i) - (1 + 3i)$

15. $(2 + 5i) + (5 - 2i)$

16. $(-7 - 12i) + (4 + 5i)$

17. $(1 - i) - (6 + i)$

18. $(9 - 8i) - (4 - 13i)$

19. $(-2 + 3i) + (2 - 3i)$

20. $(4 - i) - (-6 + 7i)$

21. $6i + (-7 + i) - 2$

22. $7 - (-10 + i) + 4i$

23. $(1 + 3i)(-2 + i)$

24. $(-2 - 5i)(2 - 2i)$

25. $(3 - 2i)7i$

26. $(7 + i)5i$

27. $(-2 + 2i)^2$

28. $(1 - i)(2 - 6i)$

29. $-(2 + 3i)(1 - 4i)$

30. $(3 + 5i)^2$

31. $4i(3 - i)(-2 + 8i)$

32. $-3i(2 - i)(4 - 5i)$

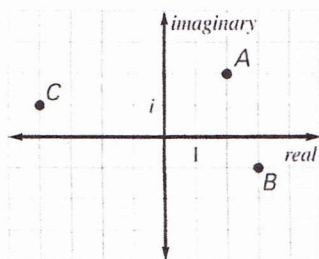
33. $\frac{3i}{4 - i}$

34. $\frac{6 + 2i}{4 + 8i}$

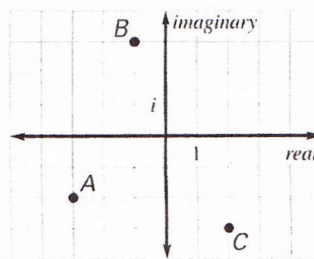
SKIP → 35. $\frac{1 + 2i}{2 - 4i} \times \frac{2 + 4i}{1 - 2i}$

Identify the complex numbers plotted in the complex plane.

37.



38.



TEST REVIEW solutions

Simplify the expression.

1. $\sqrt{525} = \sqrt{25 \cdot 21} = \boxed{5\sqrt{21}}$

2. $\sqrt{567} = \sqrt{81 \cdot 7} = \boxed{9\sqrt{7}}$

3. $\sqrt{192} = \sqrt{64 \cdot 3} = \boxed{8\sqrt{3}}$

4. $\sqrt{\frac{49}{81}} = \boxed{\frac{7}{9}}$

5. $\sqrt{\frac{128}{25}} = \frac{\sqrt{64 \cdot 2}}{5} = \boxed{\frac{8\sqrt{2}}{5}}$

6. $\sqrt{\frac{53}{9}} = \boxed{\frac{\sqrt{53}}{3}}$

Write the complex number in standard form.

7. $\sqrt{-99} = \sqrt{99} \cdot \sqrt{-1} = \sqrt{9 \cdot 11} \cdot \sqrt{-1} = \boxed{3i\sqrt{11}}$

8. $\sqrt{-196} = \sqrt{196} \cdot \sqrt{-1} = \boxed{14i}$

9. $\sqrt{-80} = \sqrt{80} \cdot \sqrt{-1} = \sqrt{16 \cdot 5} \cdot \sqrt{-1} = \boxed{4i\sqrt{5}}$

10. $2 + \sqrt{-27} = 2 + \sqrt{9 \cdot 3} \cdot \sqrt{-1} = \boxed{2 + 3i\sqrt{3}}$

11. $6 - \sqrt{-162} = 6 - \sqrt{81 \cdot 2} \cdot \sqrt{-1} = \boxed{6 - 9i\sqrt{2}}$

12. $-3 + \sqrt{44} = -3 + \sqrt{4 \cdot 11} \cdot \sqrt{-1} = \boxed{-3 + 2i\sqrt{11}}$

Write the expression as a complex number in standard form.

13. $6i + (-2 - 7i) = \boxed{-2 - i}$

14. $(1 - 4i) - (1 + 3i) = \boxed{-7i}$

15. $(2 + 5i) + (5 - 2i) = \boxed{7 + 3i}$

16. $(-7 - 12i) + (4 + 5i) = \boxed{-3 - 7i}$

$$17. (1-i) - (6+i) = \boxed{-5-2i} \quad (\text{distribute negative})$$

$$18. (9-8i) - (4-13i) = \boxed{5+5i} \quad (\text{distribute negative})$$

$$19. (-2+3i) + (2-3i) = \boxed{0}$$

$$20. (4-i) - (-6+7i) = \boxed{10-8i} \quad (\text{distribute negative})$$

$$21. 6i + (-7+i) - 2 = \boxed{-9+7i}$$

$$22. 7 - (-10+i) + 4i = \boxed{17+3i} \quad (\text{distribute negative})$$

$$\text{F.O.I.L. } 23. (1+3i)(-2+i) = -2+i-6i+3i^2 = \boxed{-5-5i}$$

$$\text{F.O.I.L. } 24. (-2-5i)(2-2i) = -4+4i-10i+10i^2 = \boxed{-14-6i}$$

$$25. (3-2i)7i = 21i - 14i^2 = \boxed{14+21i}$$

$$26. (7+i)5i = 35i + 5i^2 = \boxed{-5+35i}$$

$$27. (-2+2i)^2 = (-2+2i)(-2+2i) = 4-4i-4i+4i^2 = \boxed{-8i}$$

$$28. (1-i)(2-6i) = 2-6i-2i+6i^2 = \boxed{-4-8i}$$

$$29. -(2+3i)(1-4i) = -(2-8i+3i-12i^2) =$$

$$= -(14-5i) \quad (\text{distribute negative})$$

$$= \boxed{-14+5i}$$

$$30. (3+5i)^2 = (3+5i)(3+5i) = 9+15i+15i+25i^2 = \boxed{-16+30i}$$

$$\text{F.O.I.L. } 31. 4i(3-i)(-2+8i) = 4i(-6+24i+2i-8i^2)$$

$$= 4i(2+26i)$$

$$= 8i+104i^2$$

$$= \boxed{-104+8i}$$

$$\begin{aligned}
 32. \quad -3i(2-i)(4-5i) &= -3i(8-10i-4i+5i^2) \\
 &= -3i(3-14i) \\
 &= -9i+42i^2 \\
 &= \boxed{-42-9i}
 \end{aligned}$$

$$33. \quad \frac{3i}{(4-i)} \cdot \frac{(4+i)}{(4+i)} = \frac{12i+3i^2}{16-i^2} = \frac{-3+12i}{17} = \boxed{\frac{-3}{17} + \frac{12i}{17}}$$

$$\begin{aligned}
 34. \quad \frac{(6+2i)}{(4+8i)} \cdot \frac{(4-8i)}{(4-8i)} &= \frac{24-48i+8i-16i^2}{16-64i^2} \\
 &= \frac{40-40i}{80} \\
 &= \boxed{\frac{1}{2} - \frac{i}{2}}
 \end{aligned}$$

$$35. \quad \text{(SKIP)} \quad \frac{(2+4i)}{(4-i)} = \frac{(2+4i)(4+i)}{(4-i)(4+i)} = \frac{8+4i+16i+4i^2}{16-i^2} = \frac{8+20i-4}{17} = \frac{4+20i}{17}$$

$$37. \quad \text{A. } 2+2i$$

$$\text{B. } 3-i$$

$$\text{C. } -4+i$$

$$38. \quad \text{A. } -3-2i$$

$$\text{B. } -1+3i$$

$$\text{C. } 2-3i$$

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Simplifying Complex Numbers - Matching Worksheet

Write the letter of the answer that matches the problem.

e 1. $\sqrt{-196} = \sqrt{196} \cdot \sqrt{-1} = \boxed{14i}$ ~~a.~~ i

f 2. i^6 $6/4 = 1.5$
hint: 0.5 corresponds to $i^2 = \boxed{-1}$ ~~b.~~ $\sqrt{8i} = 2i\sqrt{2}$

a 3. i^5 $5/4 = 1.25$
hint: 0.25 corresponds to $i^4 = \boxed{1}$ ~~c.~~ $\sqrt{24} + 2i = 2\sqrt{6} + 2i$

~~TYPO~~ g 4. i^3 should be i^4 $i^4 = \boxed{1}$ ~~d.~~ $3 + 5i$

b 5. $\sqrt{-8} = \sqrt{4 \cdot 2} \cdot \sqrt{-1} = \boxed{2i\sqrt{2}}$ ~~e.~~ $14i$

h 6. $\sqrt{-49} = \sqrt{49} \cdot \sqrt{-1} = \boxed{7i}$ ~~f.~~ -1

c 7. $\sqrt{24} + \sqrt{-4} = \sqrt{4 \cdot 6} + \sqrt{4} \cdot \sqrt{-1}$
 $= \boxed{2\sqrt{6} + 2i}$ ~~g.~~ 1

i 8. $\sqrt{64} + \sqrt{-16} = 8 + \sqrt{16} \cdot \sqrt{-1}$
 $= \boxed{8 + 4i}$ ~~h.~~ $7i$

d 9. $\sqrt{9} + \sqrt{-25} = 3 + \sqrt{25} \cdot \sqrt{-1}$
 $= \boxed{3 + 5i}$ ~~i.~~ $8 + 4i$

j 10. $\sqrt{-36} + \sqrt{9} = \sqrt{36} \cdot \sqrt{-1} + 3$
 $= \boxed{3 + 6i}$ ~~j.~~ $6i + 9$ should be $3 + 6i$

↑
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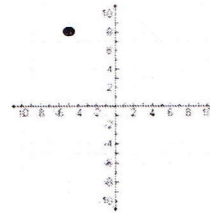
Graphing Complex Numbers - Matching Worksheet

Match the complex numbers to their graphs. Write the letter of the graph that matches the complex number.

d 1.

$$6 + 9i$$

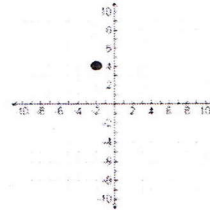
~~a.~~



c 2.

$$3 + 7i$$

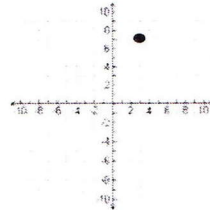
~~b.~~



a 3.

$$-5 + 8i$$

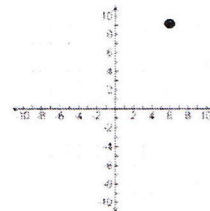
~~c.~~



b 4.

$$-2 + 4i$$

~~d.~~



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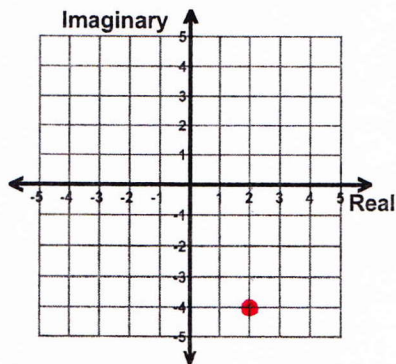
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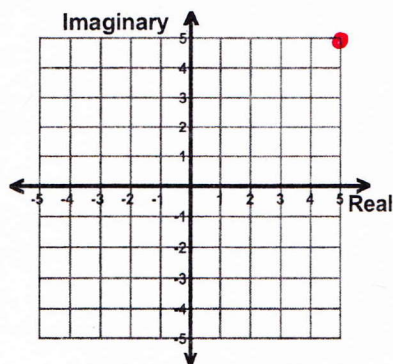
Graphing and Writing Complex Numbers

For 1-3: Graph the given complex number. For 4-6: Find the complex number graphed.

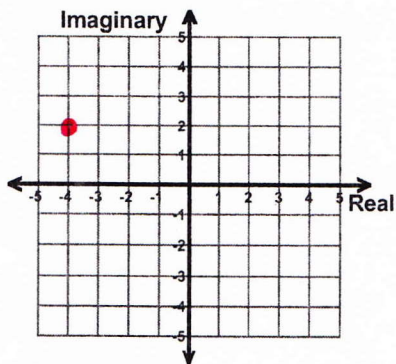
1) $2 - 4i$



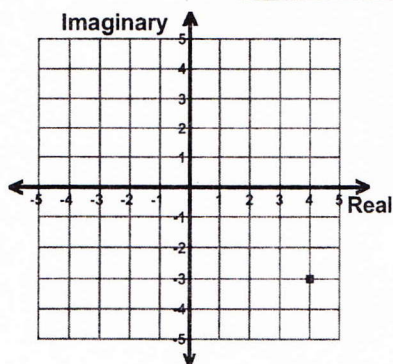
2) $5 + 5i$



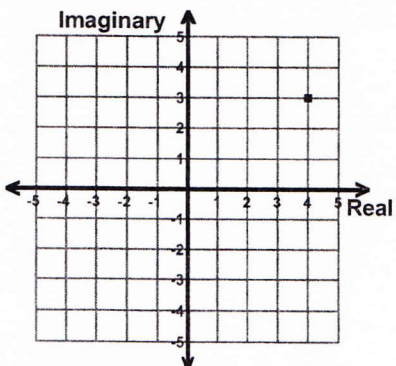
3) $-4 + 2i$



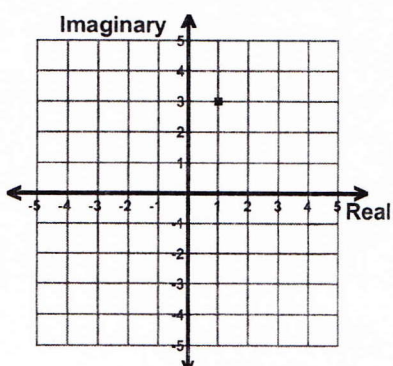
4) ANSWER: $4 - 3i$



5) ANSWER: $4 + 3i$



6) ANSWER: $1 + 3i$



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Operations with Complex Numbers

Simplify.

$$1) \quad -4i \cdot -2i = 8i^2 \\ = \boxed{-8}$$

$$6) \quad -i(6 + 7i) = -6i - 7i^2 \\ = \boxed{7 - 6i}$$

$$2) \quad (-4 - 2i)^2 = (-4 - 2i)(-4 - 2i) \\ = 16 + 8i + 8i + 4i^2 \\ = \boxed{12 + 16i}$$

$$7) \quad 7i(-1 + 5i) = -7i + 35i^2 \\ = \boxed{-35 - 7i}$$

$$3) \quad -2i - 6i = \boxed{-8i}$$

$$8) \quad 3 - i - 1 - i = \boxed{2 - 2i}$$

$$4) \quad 2 + i + 6 = \boxed{8 + i}$$

$$9) \quad i \cdot i \cdot i = -i^3 \\ = -(-i) \\ = \boxed{i}$$

$$5) \quad 5 + i - 7 = \boxed{-2 + i}$$

$$10) \quad -5i(5 + 3i)(-8 - i) = -5i(-40 - 5i - 24i - 3i^2) \\ = -5i(-37 - 29i) \\ = 185i + 145i^2 \\ = \boxed{-145 + 185i}$$



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Rationalizing Imaginary Denominators

Simplify.

$$1) \frac{(-10-3i)}{(6+2i)} \cdot \frac{(6-2i)}{(6-2i)} = \frac{-60+20i-18i+6i^2}{36-4i^2} \quad 6)$$

$$= \frac{-60+2i}{40}$$

$$= \boxed{-\frac{33}{20} + \frac{1}{20}i}$$

$$\frac{(1+5i)}{4i} \cdot \frac{i}{i} = \frac{i+5i^2}{4i^2}$$

$$= \frac{-5+i}{-4}$$

$$= \boxed{\frac{5}{4} - \frac{i}{4}}$$

$$2) \frac{(-9-6i)}{2i} \cdot \frac{i}{i} = \frac{-9i-6i^2}{2i^2}$$

$$= \frac{6-9i}{-2}$$

$$= \boxed{-3 + \frac{9}{2}i}$$

$$7) \frac{(-5-6i)}{(3+4i)} \cdot \frac{(-3-4i)}{(-3-4i)} = \frac{15+20i+18i+24i^2}{9-16i^2}$$

$$= \frac{-9+38i}{25}$$

$$= \boxed{-\frac{9}{25} + \frac{38}{25}i}$$

$$3) \frac{(-4-3i)}{7i} \cdot \frac{i}{i} = \frac{-4i-3i^2}{7i^2}$$

$$= \frac{3-4i}{-7}$$

$$= \boxed{-\frac{3}{7} + \frac{4}{7}i}$$

$$8) \frac{(10+4i)}{(8-i)} \cdot \frac{(8+i)}{(8+i)} = \frac{80+10i+32i+4i^2}{64-i^2}$$

$$= \frac{76+42i}{65}$$

$$= \boxed{\frac{76}{65} + \frac{42}{65}i}$$

$$4) \frac{-5}{-i} \cdot \frac{i}{i} = \frac{-5i}{-i^2}$$

$$= \frac{-5i}{1}$$

$$= \boxed{-5i}$$

$$9) \frac{9}{i} \cdot \frac{i}{i} = \frac{9i}{i^2}$$

$$= \frac{9i}{-1}$$

$$= \boxed{-9i}$$

$$5) \frac{(9-2i)}{i} \cdot \frac{i}{i} = \frac{9i-2i^2}{i^2}$$

$$= \frac{2+9i}{-1}$$

$$= \boxed{-2-9i}$$

$$10) \frac{8}{-i} \cdot \frac{i}{i} = \frac{8i}{-i^2}$$

$$= \frac{8i}{-1}$$

$$= \boxed{8i}$$

