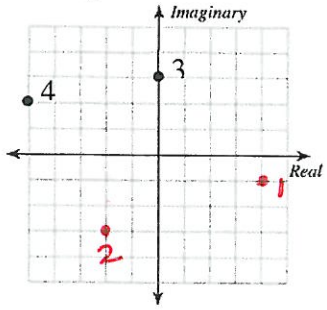
Algebra II **4.6-4.8 Review** **Name:** Key
Per: _____ **Date:** _____

For 1-2, graph each number in the complex plane below. Label each point with the question number.

1. $4-i$

2. $-2-3i$



For 3-4, identify each complex number that is graphed at right.

3. $3i$

4. $-5+2i$

For 5-6, find the absolute value of each complex number.

5. $|4+6i|$ $a=4$ $b=6$
$= \sqrt{(4)^2+(6)^2} = \sqrt{16+36} = \sqrt{52} = \sqrt{4}\sqrt{13} = 2\sqrt{13}$

6. $|3-2i|$ $a=3$ $b=-2$
$= \sqrt{(3)^2+(-2)^2} = \sqrt{9+4} = \sqrt{13}$

For 7-8, find each sum or difference.

7. $(7-5i)-(2-8i)$ $= 7-5i-2+8i$
$= 5+3i$

8. $(-3-i)+(4+6i)$ $= -3-i+4+6i$
$= 1+5i$

For 9-10, find each product.

9. $3i(5+6i)$ $= 15i+18i^2$
$= 15i+18(-1)$
$= 15i-18$
$= -18+15i$

10. $(4-5i)(1-i)$ $= 4-4i-5i+5i^2$
$= 4-9i+5(-1) = 4-9i-5 = -1-9i$

For 11-12, simplify each expression.

11. $\frac{7+2i}{3i} \cdot \frac{i}{i} = \frac{7i+2i^2}{3i^2} = \frac{7i+2(-1)}{3(-1)}$
$= \frac{7i-2}{-3} = \frac{-2+7i}{-3} = \frac{2}{3}-\frac{7}{3}i$

12. $\frac{5}{(3+4i)} \cdot \frac{(3-4i)}{(3-4i)} = \frac{15-20i}{9-12i+12i-16i^2}$
$= \frac{15-20i}{9-16(-1)} = \frac{15-20i}{9+16} = \frac{15-20i}{25} =$
$\frac{3-4i}{5} = \frac{3}{5}-\frac{4}{5}i$

For 13-15, factor each expression completely.

13. $x^2+36 = (x+6i)(x-6i)$

14. $x^2+81 = (x+9i)(x-9i)$

15. $9x^2+4 = (3x+2i)(3x-2i)$

For 16-18, solve each equation by *finding square roots*.

16. $x^2+64=0$
$x^2=-64$
$\sqrt{x^2} = \pm\sqrt{-64}$
$x = \pm\sqrt{-1}\sqrt{64}$
$x = \pm 8i$
$x = \{-8i, 8i\}$

17. $4x^2-48=0$
$4x^2=48$
$x^2=12$
$\sqrt{x^2} = \pm\sqrt{12}$
$x = \pm\sqrt{4}\sqrt{3}$
$x = \pm 2\sqrt{3}$
$x = \{-2\sqrt{3}, 2\sqrt{3}\}$

18. $3x^2+21=0$
$3x^2=-21$
$x^2=-7$
$\sqrt{x^2} = \pm\sqrt{-7}$
$x = \pm\sqrt{-1}\sqrt{7}$
$x = \pm i\sqrt{7}$
$x = \{-i\sqrt{7}, i\sqrt{7}\}$

For 19-21, find the value of c that makes each expression a perfect square trinomial, then factor it.

19. $x^2+16x+c$ $c = \left(\frac{b}{2}\right)^2 = \left(\frac{16}{2}\right)^2 = (8)^2 = 64$
$(x+8)(x+8) = (x+8)^2$

20. $x^2-20x+c$ $c = \left(\frac{b}{2}\right)^2 = \left(\frac{-20}{2}\right)^2 = (-10)^2$
$c = 100$
$(x-10)(x-10)$
$= (x-10)^2$

21. x^2+2x+c $c = \left(\frac{b}{2}\right)^2 = \left(\frac{2}{2}\right)^2$
$c = (1)^2 = 1$
$(x+1)(x+1)$
$= (x+1)^2$

For 22-25, solve each equation by *completing the square*.

22. $x^2 - 2x - 3 = 0$

$x^2 - 2x = 3$

$x^2 - 2x + 1 = 3 + 1$

$(x-1)(x-1) = 4$

$(x-1)^2 = 4$

$\sqrt{(x-1)^2} = \pm\sqrt{4}$

$x - 1 = \pm 2$

$\left(\frac{b}{2}\right)^2 = \left(\frac{-2}{2}\right)^2 = (-1)^2 = 1$

$x - 1 = 2 \quad x - 1 = -2$

$x = 3 \quad x = -1$

$x = \{-1, 3\}$

23. $x^2 + 12x + 23 = 0$

$x^2 + 12x = -23$

$\left(\frac{b}{2}\right)^2 = \left(\frac{12}{2}\right)^2 = (6)^2 = 36$

$x^2 + 12x + 36 = -23 + 36$

$(x+6)(x+6) = 13$

$(x+6)^2 = 13$

$\sqrt{(x+6)^2} = \pm\sqrt{13}$

$x + 6 = \pm\sqrt{13}$

$x + 6 = \sqrt{13} \quad x + 6 = -\sqrt{13}$

$x = -6 + \sqrt{13} \quad x = -6 - \sqrt{13}$

$x = \{-6 - \sqrt{13}, -6 + \sqrt{13}\}$

24. $\frac{2x^2}{2} - \frac{8x}{2} = \frac{-26}{2}$ GCF = 2

$x^2 - 4x = -13$

$\left(\frac{b}{2}\right)^2 = \left(\frac{-4}{2}\right)^2 = (-2)^2 = 4$

$x^2 - 4x + 4 = -13 + 4$

$(x-2)(x-2) = -9$

$(x-2)^2 = -9$

$\sqrt{(x-2)^2} = \pm\sqrt{-9}$

$x - 2 = \pm\sqrt{-1}\sqrt{9}$

$x - 2 = \pm 3i$

$x - 2 = 3i \quad x - 2 = -3i$

$x = 2 + 3i \quad x = 2 - 3i$

$x = \{2 - 3i, 2 + 3i\}$

25. $\frac{4x^2}{2} + \frac{24x}{2} = \frac{-18}{2}$ GCF = 2

$2x^2 + 12x = -9$

$2(x^2 + 6x\ ) = -9$

$2(x^2 + 6x + 9) = -9 + 2(9)$

$2(x+3)(x+3) = -9 + 18$

$2(x+3)^2 = 9$

$(x+3)^2 = \frac{9}{2}$

$\sqrt{(x+3)^2} = \pm\sqrt{\frac{9}{2}}$

$\left(\frac{b}{2}\right)^2 = \left(\frac{6}{2}\right)^2 = (3)^2 = 9$

$x + 3 = \pm\frac{\sqrt{9}}{\sqrt{2}}$

$x + 3 = \pm\frac{3}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$x + 3 = \pm\frac{3\sqrt{2}}{2}$

$x + 3 = \frac{3\sqrt{2}}{2} \quad x + 3 = \frac{-3\sqrt{2}}{2}$

$x = -3 + \frac{3\sqrt{2}}{2} \quad x = -3 - \frac{3\sqrt{2}}{2}$

$x = \left\{-3 - \frac{3\sqrt{2}}{2}, -3 + \frac{3\sqrt{2}}{2}\right\}$

For 26-29: a) find the discriminant

b) use the value of the discriminant to describe the number and type of solutions

c) solve the equation by using the *quadratic formula*

26. $2x^2 - x = 15$

$2x^2 - x - 15 = 0$

$a = 2 \quad b = -1 \quad c = -15$

$b^2 - 4ac = (-1)^2 - 4(2)(-15) = 1 + 120 = 121$

2 real solns

$x = \frac{-(-1) \pm \sqrt{121}}{2(2)} = \frac{1 \pm 11}{4} = \begin{cases} \frac{1+11}{4} = \frac{12}{4} = 3 \\ \frac{1-11}{4} = \frac{-10}{4} = \frac{-5}{2} \end{cases}$

$x = \left\{-\frac{5}{2}, 3\right\}$

27. $4x^2 + 4x = 9$

$4x^2 + 4x - 9 = 0$

$a = 4 \quad b = 4 \quad c = -9$

$b^2 - 4ac = (4)^2 - 4(4)(-9) = 16 + 144 = 160$

2 real solutions

$x = \frac{-4 \pm \sqrt{160}}{2(4)} = \frac{-4 \pm \sqrt{16}\sqrt{10}}{8} = \frac{-4 \pm 4\sqrt{10}}{8}$

$= \frac{-1 \pm \sqrt{10}}{2} \qquad x = \left\{\frac{-1 - \sqrt{10}}{2}, \frac{-1 + \sqrt{10}}{2}\right\}$

28. $8x^2 + 6x = -5$

$8x^2 + 6x + 5 = 0$

$a = 8 \quad b = 6 \quad c = 5$

$b^2 - 4ac = (6)^2 - 4(8)(5) = 36 - 160 = -124$

2 complex solns

$x = \frac{-6 \pm \sqrt{-124}}{2(8)} = \frac{-6 \pm \sqrt{-1}\sqrt{4}\sqrt{31}}{16} = \frac{-6 \pm 2i\sqrt{31}}{16}$

$= \frac{-3 \pm i\sqrt{31}}{8} \qquad x = \left\{-\frac{3}{8} - \frac{\sqrt{31}}{8}i, -\frac{3}{8} + \frac{\sqrt{31}}{8}i\right\}$

29. $x^2 - 2x + 5 = 0$

$a = 1 \quad b = -2 \quad c = 5$

$b^2 - 4ac = (-2)^2 - 4(1)(5) = 4 - 20 = -16$

2 complex solutions.

$x = \frac{-(-2) \pm \sqrt{-16}}{2(1)} = \frac{2 \pm \sqrt{-1}\sqrt{16}}{2} =$

$\frac{2 \pm 4i}{2} = 1 \pm 2i$

$x = \{1 - 2i, 1 + 2i\}$