Name: Key Date: Band:

Algebra 2

Unit 3: Solving Quadratic Equations & Imaginary Numbers PBA Practice

Solve the equation using square roots.

1. $(z-6)^2 = 25$

$\sqrt{(z-6)^2} = \pm\sqrt{25}$

$z-6 = \pm 5$

$+6 \quad +6$

$z = 6 \pm 5$

$z = 11$ $z = 1$

2. $\frac{2(x+3)^2}{2} = \frac{18}{2}$

$(x+3)^2 = 9$

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

$x+3 = \pm 3$

$-3 \quad -3$

$x = -3 \pm 3$

$x = 0$ $x = -6$

3. $7(x-4)^2 - 18 = 10$

$+18 \quad +18$

$\frac{7(x-4)^2}{7} = \frac{28}{7}$

$(x-4)^2 = 4$

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

$x-4 = \pm 2$

$+4 \quad +4$

$x = 4 \pm 2$

$x = 6$ $x = 2$

Solve the equation by factoring.

4. $0 = z^2 - 10z + 25$

$0 = (z-5)(z-5)$

$z-5 = 0$

$z = 5$

5. $n^2 - 6n = 0$

$n(n-6) = 0$

$n = 0$ $n-6 = 0$

$n = 6$

6. $-y + 28 + y^2 = 2y + 2y^2$

$0 = y^2 + 3y - 28$

$0 = (y+7)(y-4)$

$y+7 = 0$ $y-4 = 0$

$y = -7$ $y = 4$

Solve the equation by completing the square.

7. $s^2 + 2s - 6 = 0$ $\left(\frac{2}{2}\right)^2 = 1$

$s^2 + 2s = 6$

$+1 \quad +1$

$s^2 + 2s + 1 = 7$

$(s+1)^2 = 7$

$s+1 = \pm\sqrt{7}$

$s = -1 \pm \sqrt{7}$

8. $x^2 + 4x - 2 = 0$ $\left(\frac{4}{2}\right)^2 = 2$

$x^2 + 4x = 2$

$+2 \quad +2$

$x^2 + 4x + 2 = 4$

$(x+2)^2 = 4$

$x+2 = \pm 2$

$x = -2 \pm 2$

$x = 0$ $x = -4$

9. $6r^2 + 6r + 12 = 0$ $\left(\frac{1}{2}\right)^2 = \frac{1}{4}$

$r^2 + r + 2 = 0$

$r^2 + r = -2$

$+\frac{1}{4} \quad +\frac{1}{4}$

$r^2 + r + \frac{1}{4} = -1\frac{3}{4}$

$\left(r + \frac{1}{2}\right)^2 = -1\frac{3}{4}$

$r + \frac{1}{2} = \pm\sqrt{\frac{7}{4}}$

$r = -\frac{1}{2} \pm \frac{\sqrt{7}}{2}$

Solve the equation using the Quadratic Formula.

10. $3x^2 + 6x + 3 = 0$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ $a=3$ $b=6$ $c=3$

$x = \frac{-6 \pm \sqrt{(6)^2-4(3)(3)}}{2(3)}$

$x = \frac{-6 \pm \sqrt{0}}{6}$

$x = \frac{-6}{6} = -1$

$x = -1$

11. $-3x = 2x^2 - 4$

$2x^2 + 3x - 4 = 0$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ $a=2$ $b=3$ $c=-4$

$x = \frac{-3 \pm \sqrt{(3)^2-4(2)(-4)}}{2(2)}$

$x = \frac{-3 \pm \sqrt{41}}{4}$

12. $-5x^2 - 6 = -4x$

$-5x^2 + 4x - 6 = 0$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ $a=-5$ $b=4$ $c=-6$

$x = \frac{-4 \pm \sqrt{(4)^2-4(-5)(-6)}}{2(-5)}$

$x = \frac{-4 \pm \sqrt{-104}}{-10}$

$x = \frac{-4 \pm 2i\sqrt{26}}{-10}$

$x = \frac{-2 \pm i\sqrt{26}}{-5}$

$b^2-4ac<0$
2 imaginary solutions

$b^2-4ac=0$
1 real solution

$b^2-4ac>0$
2 real solutions

Find the discriminant of the quadratic equation and describe the number and type of solutions of the equation.

13. $x^2 + 12x + 36 = 0$

$a=1 \quad b=12 \quad c=36$

$(12)^2-4(1)(36) = \boxed{0}$

1 real solution

14. $-x^2 + 2x + 12 = 0$

$a=1 \quad b=2 \quad c=12$

$(2)^2-4(1)(12) = \boxed{-44} < 0$

2 imaginary solutions

15. $-2x^2 + 6 = x$ $\quad a=-2$

$-2x^2-x+6=0 \quad b=-1$

$c=+6$

$(-1)^2-4(-2)(+6) = \boxed{49} > 0$

2 real solutions

$i^1=i$ R1
$i^2=-1$ R2
$i^3=i$ R3
$i^4=1$ R0

Simplify.

16. i^{13}

$\frac{13}{4} = 3R1$

$i^{13} = i^1 = \boxed{i}$

17. i^{24}

$\frac{24}{4} = 6R0$

$i^{24} = i^4 = \boxed{1}$

18. i^{35}

$\frac{35}{4} = 8R3$

$i^{35} = i^3 = \boxed{-i}$

19. i^{46}

$\frac{46}{4} = 11R2$

$i^{46} = i^2 = \boxed{-1}$

20. $(9 + 5i) + (11 + 2i)$

$\boxed{20+10i}$

21. $(16 - 9i) - (2 - 9i)$

$16-9i-2+9i$

$\boxed{14}$

22. $(-1 + 2i)(11 - i)$

$-11+i+22i-2i^2$

$-11+23i-2(-1)$

$-11+23i+2$

$\boxed{-9+23i}$

23. $\sqrt{-36}$

$\boxed{6i}$

24. $\sqrt{-24}$

$\sqrt{-1}\sqrt{4}\sqrt{6}$

$\boxed{2i\sqrt{6}}$

25. $-4\sqrt{-32}$

$-4\sqrt{-1}\sqrt{16}\sqrt{2}$

$-4 \cdot i \cdot 4\sqrt{2}$

$\boxed{-16i\sqrt{2}}$

26. $\frac{7i}{8+i} \cdot \frac{(8-i)}{(8-i)}$

$\frac{56i-7i^2}{64-i^2} = \frac{56i+7}{64+1}$

$\boxed{\frac{56i+7}{65}}$

27. $\frac{7+4i}{2-3i} \cdot \frac{(2+3i)}{(2+3i)}$

$\frac{14+21i+8i+12i^2}{4-9i^2}$

$\frac{14+29i-12}{4+9}$

$\boxed{\frac{2+29i}{13}}$

28. $\frac{-1-6i}{5+9i} \cdot \frac{(5-9i)}{(5-9i)}$

$\frac{-5+9i-30i+54i^2}{25-81i^2}$

$\frac{-5-21i-54}{25+81}$

$\boxed{\frac{-59-21i}{106}}$