➤ Express each number in terms of i and then simplify:

12. $\sqrt{-36}$ $6i$	13. $\sqrt{-100}$ $10i$	14. $-\sqrt{-81}$ $-9i$	15. $2\sqrt{-49}$ $14i$
16. $\frac{1}{8}\sqrt{-64}$ $\frac{1}{8} \cdot i \cdot 8$ $\boxed{i}$	17. $\frac{-2}{3}\sqrt{-9}$ $-\frac{2}{3} \cdot i \cdot 3$ $\boxed{-2i}$	18. $\frac{3}{4}\sqrt{-144}$ $\frac{3}{4} \cdot i \cdot 12$ $\boxed{9i}$	19. $\frac{1}{3}\sqrt{-25}$ $\frac{1}{3} \cdot i \cdot 5$ $\boxed{\frac{5}{3}i}$
20. $\sqrt{-\frac{1}{4}}$ $\boxed{\frac{1}{2}i}$	21. $\sqrt{-\frac{16}{25}}$ $\boxed{\frac{4}{5}i}$	22. $4\sqrt{-\frac{49}{64}}$ $4 \cdot i \cdot \frac{7}{8}$ $\boxed{\frac{7}{2}i}$	23. $\frac{3}{5}\sqrt{-\frac{100}{9}}$ $\frac{3}{5} \cdot i \cdot \frac{10}{3}$ $\boxed{2i}$
24. $\sqrt{-3}$ $i\sqrt{3}$	25. $\sqrt{-29}$ $i\sqrt{29}$	26. $3\sqrt{-11}$ $3i\sqrt{11}$	27. $-\sqrt{-10}$ $\boxed{-i\sqrt{10}}$
28. $\sqrt{-20}$ $\boxed{2i\sqrt{5}}$	29. $-\sqrt{-28}$ $\boxed{-2i\sqrt{7}}$	30. $2\sqrt{-75}$ $\boxed{10i\sqrt{3}}$	31. $5\sqrt{-8}$ $\boxed{10i\sqrt{2}}$
32. $3\sqrt{-98}$ $3 \cdot i \cdot \sqrt{98}$ $3 \cdot i \cdot 7\sqrt{2}$ $\boxed{21i\sqrt{2}}$	33. $-2\sqrt{-75}$ $\boxed{-10i\sqrt{3}}$	34. $\pm\sqrt{-45}$ $\boxed{\pm 3i\sqrt{5}}$	35. $\frac{3\sqrt{7}}{\sqrt{-28}}$ $\frac{3\sqrt{7}}{2i\sqrt{7}}$ $\boxed{\frac{3}{2}i}$

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Math 2
Unit 3 – Rational Exponents and Solving Quadratics
Lesson 4 → Completing the Square

Name_____
Date_____Pd_____

Ways to Graph a Parabola: $y = a(x - h)^2 + k$ and $y = a(x - int.)(x - int.)$

- What if a quadratic equation is in standard form? $y = ax^2 + bx + c$
- Recall from Math I: The vertex can be found using $\left(\frac{-b}{2a}, y\right)$ and the axis of symmetry is $x = \frac{-b}{2a}$.

✓ Complete the information for each parabola. Graph on the calculator to verify your vertex.

$y = -2x^2 - 12x - 16$	$y = 3x^2 + 10x - 2$	$y = 2x^2 + 15x + 29$
1. Vertex:	1. Vertex:	1. Vertex:
2. Maximum or Minimum	2. Maximum or Minimum	2. Maximum or Minimum
3. Axis of Symmetry:	3. Axis of Symmetry:	3. Axis of Symmetry:
4. y – intercept:	4. y – intercept:	4. y – intercept:
5. x – intercepts:	5. x – intercepts:	5. x – intercepts:
6. Domain:	6. Domain:	6. Domain:
7. Range:	7. Range:	7. Range:

- How can we solve a quadratic equation that has irrational or complex solutions?

❖ **COMPLETING THE SQUARE** will allow us to find all solutions (rational, irrational & imaginary).

1) **REWRITE** as $x^2 + bx + c = 0$ as $x^2 + bx = -c$
2) $x^2 + bx + \underline{\quad\quad} = -c + \underline{\quad\quad}$
3) **COMPLETE THE SQUARE** by taking half of b; square it and ADD IT TO BOTH SIDES of the equation in the blanks.
4) **FACTOR** the perfect square trinomial.
5) Take the **SQUARE ROOT** of both sides. Don't forget to include a $\pm$ to create 2 solutions.
6) **SOLVE** both equations. **SIMPLIFY** all irrational and complex solutions.

1. $x^2 - 6x + 8 = 0$

$$(x - 2)(x - 4) = 0$$

$$x - 2 = 0 \qquad x - 4 = 0$$
$$+2 \quad +2 \qquad +4 \quad +4$$
$$x = 2 \qquad x = 4$$

$$\boxed{x = 2, 4}$$

2. $x^2 + 16x - 16 = 0$
$$+16 \quad +16$$

$$x^2 + 16x + 64 = 16 + 64$$

$$\sqrt{(x + 8)^2} = \sqrt{80}$$

$$x + 8 = \pm\sqrt{80}$$
$$x + 8 = \pm 4\sqrt{5}$$
$$-8 \qquad\qquad -8$$

$$x = \pm 4\sqrt{5} - 8$$

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1) $x^2 + 4x + 16 = 0$

$ -16 \quad -16$

$x^2 + 4x + \underline{4} = -16 + \underline{4}$

$\sqrt{(x+2)^2} = \sqrt{-12}$

$x + 2 = 2\sqrt{2}$
$\frac{2\sqrt{6}}{3}$

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

$-2 -2$

$\boxed{x = -2 \pm 2i\sqrt{3}}$

3. $x^2 + 12x + 43 = 0$	4. $3x^2 - 6x - 45 = 0$

3.

$x^2 + 12x + 43 = 0$

$\quad -43 \quad -43$

$x^2 + 12x + \boxed{36} = -43 + \underline{36}$

$\sqrt{(x + 6)^2} = \sqrt{-7}$

$x + 6 = \pm\sqrt{-7}$

$x + 6 = \pm i\sqrt{7}$

$\quad -6 \qquad -6 \qquad \pm i\sqrt{7} - 6$

$\boxed{x = -6 \pm i\sqrt{7}}$

1) **BEGIN** with $ax^2 + bx + c = 0$ and **MULTIPLY** "a" to "c"
2) **REWRITE** $x^2 + bx = -c \cdot a$
3) $x^2 + bx + \underline{} = -c \cdot a + \underline{}$
4) **COMPLETE THE SQUARE** by taking half of b; square it and ADD IT TO BOTH SIDES of the equation in the blanks.
5) **FACTOR** the perfect square trinomial.
6) Take the **SQUARE ROOT** of both sides. Don't forget to include a $\pm$ to create 2 solutions.
7) **SOLVE** both equations. **SIMPLIFY** all irrational and complex solutions.
8) **DIVIDE** by "a" and **REDUCE** all final solutions.

5. $3x^2 + 10x - 8 = 0$	6. $4x^2 - 8x + 3 = 0$
7. $4x^2 - .16x + 71 = 0$	8. $3x^2 + 6x - 4 = 0$

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