Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
ALGEBRA I REVIEW: Perfect Square Trinomials	A trinomial of the form ax^2+bx+c where $\left(\frac{b}{2}\right)^2 = a \cdot c$. **Factor the following trinomials:** • $x^2+8x+16 = (x+4)(x+4) = (x+4)^2$ • $m^2-18m+81 = (m-9)^2$ • $a^2+2a+1 = (a+1)(a+1) = (a+1)^2$ • $p^2-10p+25 = (p-5)^2$

STANDARD FORM
$f(x) = ax^2+bx+c$
⬇
VERTEX FORM
$f(x) = a(x-h)^2+k$

If the standard form equation is a perfect square (like ex. 1), simply factor to convert to vertex form. If not, you can use a process called **completing the square** to write the equation in vertex form.

①	**GROUP** (ax^2+bx)
②	If $a \neq 1$, **FACTOR** it outside so it becomes $a(x^2+bx)$
③	**COMPLETE THE SQUARE** by taking half of b and square it. This is the new "c". Add this to "x^2+bx". This is the perfect square trinomial.
④	**SUBTRACT** $a \cdot c$ from the end of the equation.
⑤	**FACTOR** the trinomial and **SIMPLIFY** the end of the equation.

Directions: Write each function in vertex form. Give the vertex.

1. $f(x) = x^2+4x+4$

$f(x) = (x^2+4x) + 4$

$\frac{4}{2} = 2 \quad (2)^2 = 4$

$f(x) = (x^2+4x+4) + 4 - 4$

$f(x) = (x+2)^2 + 0$

$f(x) = (x+2)^2$ $\quad$ $V = (-2,0)$

2. $f(x) = x^2-8x+18$

$f(x) = (x^2-8x) + 18$

$\frac{-8}{2} = -4 \quad (-4)^2 = 16$

$f(x) = (x^2-8x+16) + 18 - 16$

$f(x) = (x-4)^2 + 2$ $\quad$ $V: (4,2)$

3. $f(x) = -x^2+6x-5$

$f(x) = (-x^2+6x) - 5$

$f(x) = -(x^2-6x) - 5$

$\frac{-6}{2} = -3 \quad (-3)^2 = 9$

$f(x) = -(x^2-6x+9) - 5 + 9$

$f(x) = -(x-3)^2 + 4$ $\quad$ $V: (3,4)$

4. $f(x) = 2x^2-12x+13$

$f(x) = (2x^2-12x) + 13$

$f(x) = 2(x^2-6x) + 13$

$\frac{-6}{2} = -3 \quad (-3)^2 = 9$

$f(x) = 2(x^2-6x+9) + 13 - 18$

$f(x) = 2(x-3)^2 - 5$ $\quad$ $V: (3,-5)$

5. $f(x) = x^2 - 3x - 2$

$f(x) = (x^2 - 3x) - 2$

$\left(\frac{-3}{2}\right)^2 = \frac{9}{4}$

$f(x) = (x^2 - 3x + \frac{9}{4}) - 2 - \frac{9}{4}$

$f(x) = (x - \frac{3}{2})^2 - \frac{17}{4}$ V: $(\frac{3}{2}, -\frac{17}{4})$

6. $f(x) = -x^2 - 9x - 22$

$f(x) = (-x^2 - 9x) - 22$

$f(x) = -(x^2 + 9x) - 22$

$\left(\frac{9}{2}\right)^2 = \frac{81}{4}$

$f(x) = -(x^2 + 9x + \frac{81}{4}) - 22 + \frac{81}{4}$

$f(x) = -(x + \frac{9}{2}) - \frac{7}{4}$ V: $(-\frac{9}{2}, -\frac{7}{4})$

7. $f(x) = x^2 + 5x$

$f(x) = (x^2 + 5x) + 0$

$\left(\frac{5}{2}\right)^2 = \frac{25}{4}$

$f(x) = (x^2 + 5x + \frac{25}{4}) - \frac{25}{4}$

$f(x) = (x + \frac{5}{2})^2 - \frac{25}{4}$ V: $(-\frac{5}{2}, -\frac{25}{4})$

8. $f(x) = 4x^2 - 8x$

$f(x) = 4(x^2 - 2x) + 0$

$\frac{-2}{2} = -1 \quad (-1)^2 = 1$

$f(x) = 4(x^2 - 2x + 1) - 4$

$f(x) = 4(x-1)^2 - 4$ V: $(1, -4)$

9. $f(x) = -2x^2 + 20x - 46$

$f(x) = -2(x^2 - 10x) - 46$

$\frac{-10}{2} = -5 \quad (-5)^2 = 25$

$f(x) = -2(x^2 - 10x + 25) - 46 + 50$

$f(x) = -2(x-5)^2 + 4$ V: $(5, 4)$

10. $f(x) = -\frac{1}{2}x^2 - 4x - 5$

$f(x) = -\frac{1}{2}(x^2 + 8x) - 5$

$\frac{8}{2} = 4 \quad (4)^2 = 16$

$f(x) = -\frac{1}{2}(x^2 + 8x + 16) - 5 + 8$

$f(x) = -\frac{1}{2}(x+4)^2 + 3$ V: $(-4, 3)$

Directions: Convert to vertex form. Identify the vertex, axis of symmetry, then graph.

11. $f(x) = x^2 - 12x + 39$

$f(x) = (x^2 - 12x) + 39$

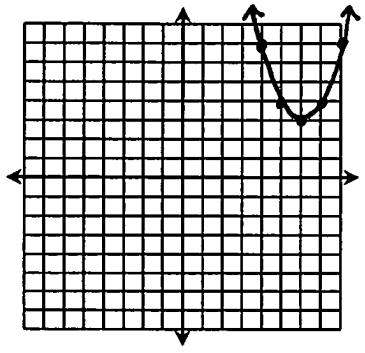
$\frac{-12}{2} = -6 \quad (-6)^2 = 36$

$f(x) = (x^2 - 12x + 36) + 39 - 36$

$f(x) = (x-6)^2 + 3$ V: $(6, 3)$

A: $x = 6$

x	$f(x)$
3	12
4	7
5	4
6	3
7	4
8	7
9	12



12. $f(x) = -3x^2 - 12x - 8$

$f(x) = -3(x^2 + 4x) - 8$

$\frac{4}{2} = 2 \quad (2)^2 = 4$

$f(x) = -3(x^2 + 4x + 4) - 8 + 12$

$f(x) = -3(x+2)^2 + 4$ V: $(-2, 4)$

A: $x = -2$

x	$f(x)$
-5	-23
-4	-8
-3	1
-2	4
-1	1
0	-8
1	-23