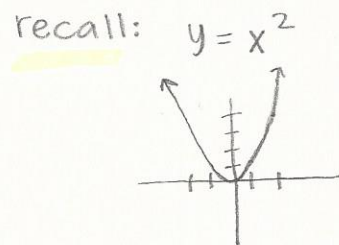


Precalculus: Prerequisites Chapter

Graphing Quadratics and Writing Equations of Lines

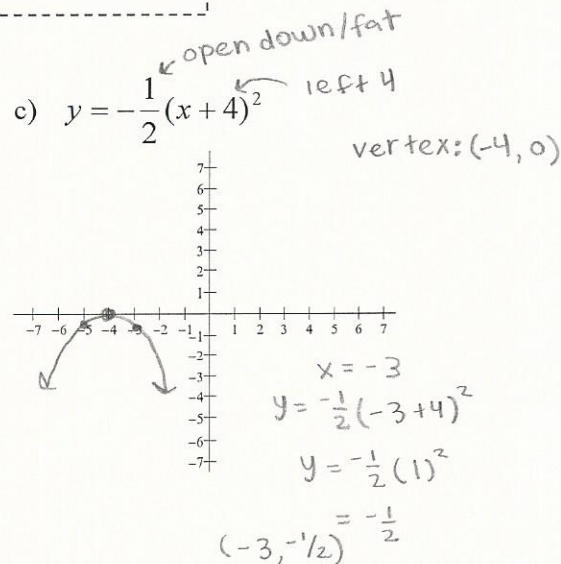
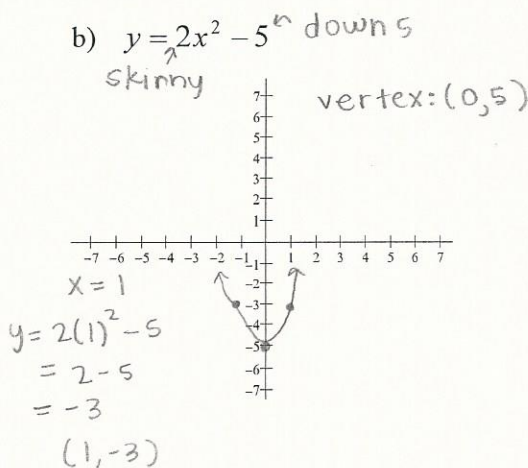
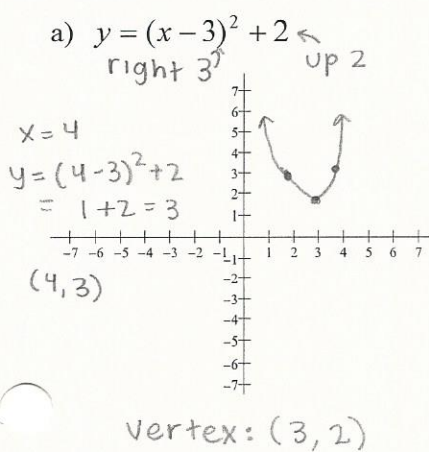
Graphing in quadratics in vertex form:



Vertex Form: $y = a(x-h)^2 + k$

- a : opens up/down, skinny/fat
- h : moves left to right
- k : moves up/down

Example 1: Graph each quadratic and identify the vertex.



Graphing quadratics in intercept form:

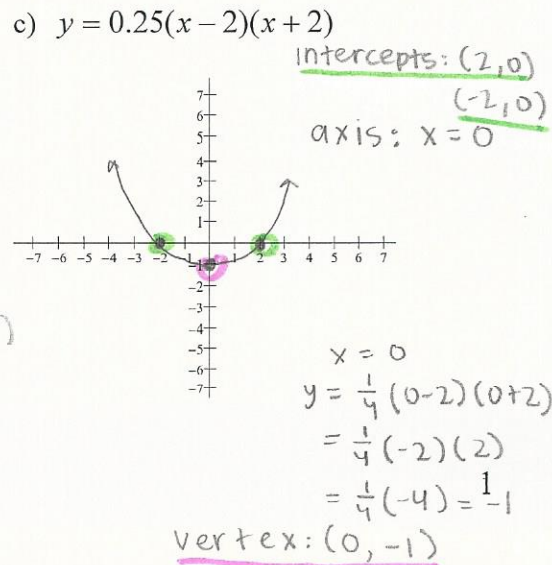
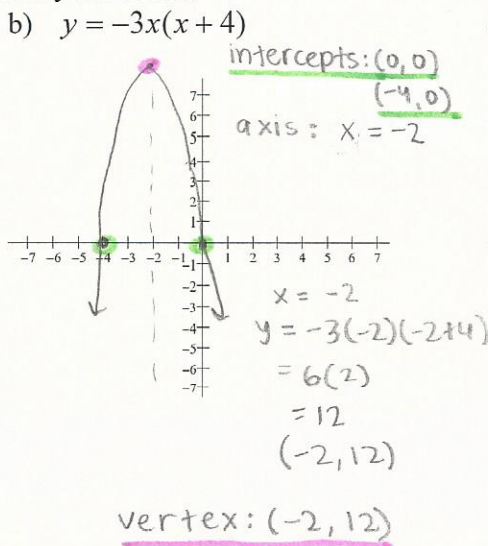
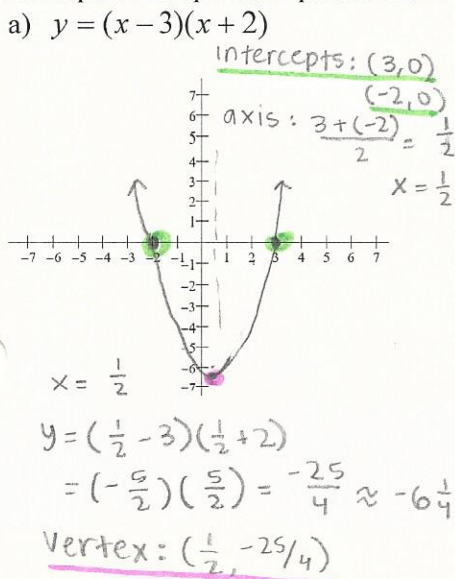
Intercept Form: $y = a(x-p)(x-q)$

p and q are opposite

To find the vertex:

- Find the line of symmetry. $x = h$
- Plug h in for both x 's and solve for y .

Example 2: Graph each quadratic and identify the vertex.



Graphing quadratics in standard form:

Standard Form: $y = ax^2 + bx + c$

Rewrite in vertex form by **completing the square**.

Example 3: Rewrite each quadratic in vertex form then graph.

a) $y = x^2 + 6x + 5$

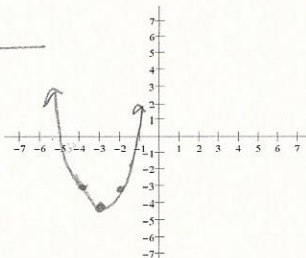
$$y = (x^2 + 6x + \underline{\quad}) + 5 - \underline{\quad}$$

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

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

$$y = (x + 3)^2 - 4$$

vertex: $(-3, -4)$



b) $y = x^2 + 8x + 10$

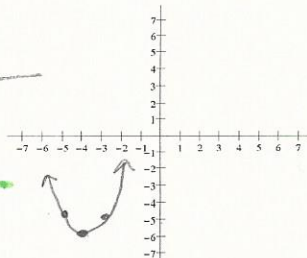
$$y = (x^2 + 8x + \underline{\quad}) + 10 - \underline{\quad}$$

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

$$y = (x^2 + 8x + 16) + 10 - 16$$

$$y = (x + 4)^2 - 6$$

vertex: $(-4, -6)$



c) $y = 3x^2 - 12x + 24$

$$y = (3x^2 - 12x + \underline{\quad}) + 24 - \underline{\quad}$$

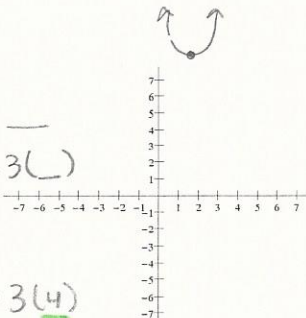
$$y = 3(x^2 - 4x + \underline{\quad}) + 24 - 3(\underline{\quad})$$

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

$$y = 3(x^2 - 4x + 4) + 24 - 3(4)$$

$$y = 3(x - 2)^2 + 12$$

vertex: $(2, 12)$



d) $y = -2x^2 + 12x - 13$

$$y = (-2x^2 + 12x + \underline{\quad}) - 13 - \underline{\quad}$$

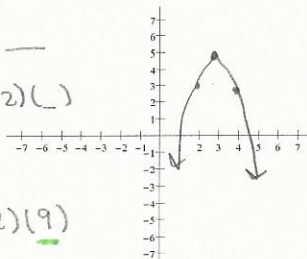
$$y = -2(x^2 - 6x + \underline{\quad}) - 13 - (-2)(\underline{\quad})$$

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

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

$$y = -2(x - 3)^2 + 5$$

vertex: $(3, 5)$



Writing Equations of Lines

Point-Slope Form: $y = m(x - x_1) + y_1$

Example 4: Use the given information to write the equation of each line.

a) point $(4, -3)$, slope = 2

b) point $(-3, -2)$, slope = $\frac{1}{2}$

c) point $(0, 3)$ and $(-2, 7)$

d) point $(5, -8)$ and $(5, 2)$

e) point $(3, -1)$,
parallel to the line $y = 4x + 7$

f) point $(0, 5)$
perpendicular to the line $y = 4x + 7$