Review: Quadratics Review and Graphing

1. Expand the following expressions

a) (x - 3)(x + 5)

$= x^2 + 5x - 3x - 15$

$= x^2 + 2x - 15$

b) $(x - 8)^2$

$= (x-8)(x-8)$

$= x^2 - 8x - 8x + 64$

$= x^2 - 16x + 64$

c) 2(x + 4)(x - 6)

$= 2(x^2 - 6x + 4x - 24)$

$= 2(x^2 - 2x - 24)$

$= 2x^2 - 4x - 48$

2. Evaluate each equation for y when x = -2

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

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

$y = 4 - 6 - 5$

$y = -7$

b) $y = -2x^2 + 5x - 1$

$= -2(-2)^2 + 5(-2) - 1$

$= -2(4) - 10 - 1$

$= -8 - 10 - 1$

$= -19$

c) y = 3(x - 3)(x - 1)

$= 3(-2-3)(-2-1)$

$= 3(-5)(-3)$

$= 45$

3. Fully factor each expression.

a) $5x^2 - 35x$

$= 5x(x - 7)$

b) $x^2 - 11x + 30$

$= (x - 5)(x - 6)$

c) $100 - x^2$

$= (10 - x)(10 + x)$

d) $3x^2 + 9x - 12$

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

$= 3(x + 4)(x - 1)$

e) $9x^2 - 9$

$= 9(x^2 - 1)$

$= 9(x - 1)(x + 1)$

f) $x^2 + 2x - 24$

$= (x - 4)(x + 6)$

4. Complete the table of values and graph the function. Label and write the equation of the axis of symmetry and the ~~optimal~~ value.

a) $y = 2x^2 - 4x - 1$

x	y
-1	5
0	-1
1	-3
2	-1
3	5

$y = 2(-1)^2 - 4(-1) - 1$
$= 2 + 4 - 1$
$= 5$

$y = 2(0)^2 - 4(0) - 1$
$= 0 - 0 - 1$
$= -1$

$18 - 12 - 1$

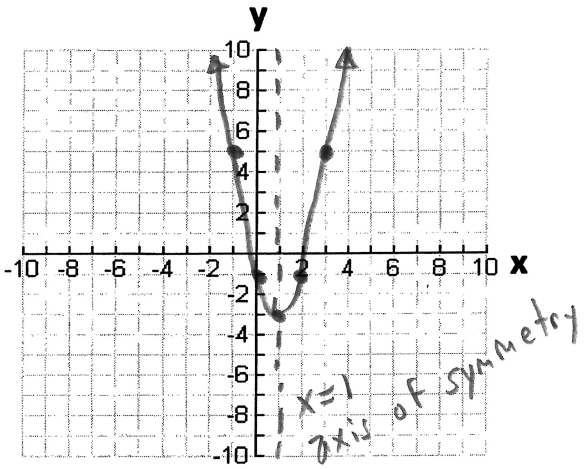
b) $y = -x^2 - 4x - 1$

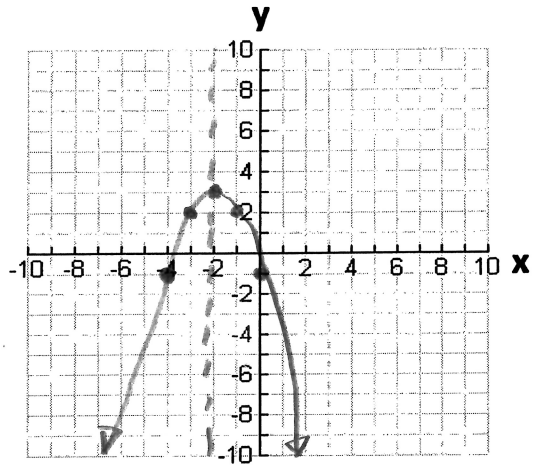
x	y
-4	-1
-3	2
-2	3
-1	2
0	-1

$y = -(-4)^2 - 4(-4) - 1$
$= -16 + 16 - 1$
$= -1$

$y = -(-3)^2 - 4(-3) - 1$
$= -9 + 12 - 1$
$= 2$

$-1 + 4 - 1$





x=-2 axis of symmetry

5. For each quadratic equation below, determine the x-ints, the y-int, and the vertex.

a) $y = x^2 + 4x - 5$

$y = (x-1)(x+5)$

x-ints: 1 & -5

y-int: -5

vertex

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

$x = -\frac{4}{2}$

$x = -2$

$y = (-2-1)(-2+5)$
$= (-3)(3)$
$y = -9$

vertex is $(-2, -9)$

b) $y = -x^2 - 6x - 5$

$y = -(x^2 + 6x + 5)$
$= -(x+1)(x+5)$

x-ints: -1 & -5

y-int: -5

vertex

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

$x = \frac{-6}{2}$

$x = -3$

$y = -(-3+1)(-3+5)$
$= -(-2)(2)$
$y = 4$

vertex is $(-3, 4)$

6. **The height of a flare that is launched from a cruise ship is given by the equation: $h = -5t^2 + 30t + 35$ where h is the height of the flare 'above the water' in metres and t is the time in seconds after launch.**

a) **Determine the h-intercept, the t-intercepts, and vertex. Use this information to sketch a graph of the height vs time.**

$h = -5t^2 + 30t + 35$

$= -5(t^2 - 6t - 7)$

$= -5(t+1)(t-7)$

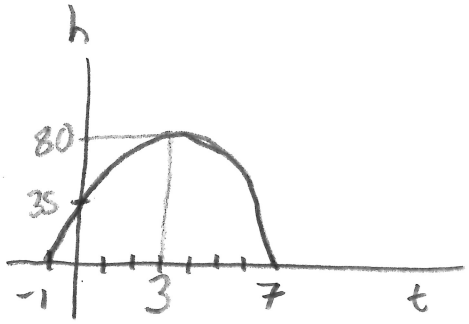
t-ints: -1 & 7, h-int $= 35$

vertex

$t = \frac{(-1)+(7)}{2}$ $\quad h = -5(3+1)(3-7)$

$t = 3$ $\quad h = -5(4)(-4)$

$h = 80$



b) **When was the flare at its highest point and how high above the water did it reach?**

The flare reached the highest point of 80m after 3 seconds.

c) **What is the height of the cruise ship? Hint: What is the height of the flare at the time it is launched (when t = 0)?**

The cruise ship height is 35m.

d) **How long did it take until the flare came down and landed in the water?**

The flare was airborne for 7 seconds