

Find the coordinates of the vertex for the following quadratic functions by completing the square.

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

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

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

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

V: (2, -5)

2) $g(x) = -x^2 - 4x + 8$

$$y - 8 = -(x^2 + 4x + 4) + 4$$

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

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

V: (-2, 12)

3) $h(x) = -2x^2 + 12x - 1$

$$y + 1 = -2(x^2 - 6x + 9) + 18$$

$$y - 17 = -2(x - 3)^2$$

$$y = -2(x - 3)^2 + 17$$

V: (3, 17)

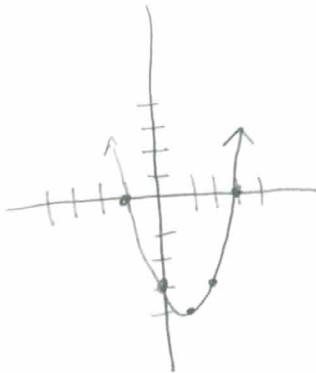
For each of the following quadratic functions below, find the vertex, intercepts, symmetric point and then graph.

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

$$x = \frac{2}{2 \cdot 1} = 1 \quad y = 1^2 - 2 \cdot 1 - 3 = -4$$

V: (1, -4)
 y.int (0, -3)
 sym.pt (2, -3)

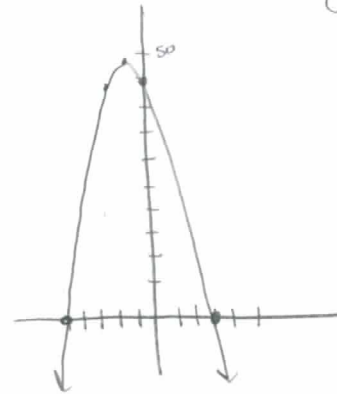
x.int
 $0 = x^2 - 2x - 3$
 $0 = (x - 3)(x + 1)$
 $x = 3, -1$
 (3, 0) (-1, 0)



5) $g(x) = -3x^2 - 6x + 45$

$$x = \frac{6}{2(-3)} = -1 \quad y = -3(-1)^2 - 6(-1) + 45 = 48$$

(-1, 48)
 y.int (0, 45)
 sym.pt (2, 45)
 x.int
 $0 = -3x^2 - 6x + 45$
 $0 = -3(x^2 + 2x - 15)$
 $0 = -3(x + 5)(x - 3)$
 (-5, 0) (3, 0)



6) Find the solutions: $y = 4x^2 - 7x + 5$

$$0 = 4x^2 - 7x + 5$$

$$x = \frac{7 \pm \sqrt{49 - 4 \cdot 4 \cdot 5}}{8}$$

$$\frac{7 \pm \sqrt{-31}}{8}$$

no real sol.

7) Solve the quadratic: $2x^2 + 9x = 5$

$$2x^2 + 9x - 5 = 0$$

$$x = \frac{-9 \pm \sqrt{81 - 4(2)(-5)}}{4}$$

$$\frac{-9 \pm \sqrt{81 + 40}}{4}$$

$$\frac{-9 \pm \sqrt{121}}{4} = \frac{-9 \pm 11}{4} =$$

-5, 1/2

Solve each quadratic using the method of your choice.

8) $2x^2 + 5 = 55$

$$2x^2 = 50$$

$$x^2 = 25$$

$$x = \pm 5$$

9) $x^2 - 3x - 10 = 0$

$$(x-5)(x+2) = 0$$

$$x = 5, -2$$

10) $(3x+2)^2 - 9 = 0$

$$(3x+2)^2 = 9$$

$$3x+2 = \pm 3$$

$$3x+2 = 3 \quad 3x+2 = -3$$

$$3x = 1 \quad 3x = -5$$

$$x = \frac{1}{3}, -\frac{5}{3}$$

11) $3x^2 + 12x = 0$

$$3x(x+4) = 0$$

$$x = 0, -4$$

12) $x^2 + 8x = 4$

$$x^2 + 8x + 16 = 20$$

$$(x+4)^2 = 20$$

$$x+4 = \pm\sqrt{20}$$

$$x = -4 \pm 2\sqrt{5}$$

13) $2x^2 - 4x = 2$

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

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

$$(x-1)^2 = 2$$

$$x-1 = \pm\sqrt{2}$$

$$x = 1 \pm \sqrt{2}$$

14) $2x^2 - 3x = 8$

$$2x^2 - 3x - 8 = 0$$

$$x = \frac{3 \pm \sqrt{9 - 4(2)(-8)}}{4}$$

$$= \frac{3 \pm \sqrt{9 + 64}}{4} = \frac{3 \pm \sqrt{73}}{4}$$

15) Find the discriminant and use it to describe the solutions:

a) $5x^2 + 7x - 3 = 0$

$$(-7)^2 - 4(5)(-3)$$

$$49 + 60$$

$$109$$

2 real solutions

b) $x^2 + x + 1 = 0$

$$1^2 - 4(1)(1) = -3$$

no real solutions

16) Let $f(x) = -4x^2 + 4x + 15$

a) Find $f(-3)$

$$-4(-3)^2 + 4(-3) + 15$$

$$-36 - 12 + 15$$

$$-33$$

b) Find x when $f(x) = 20$

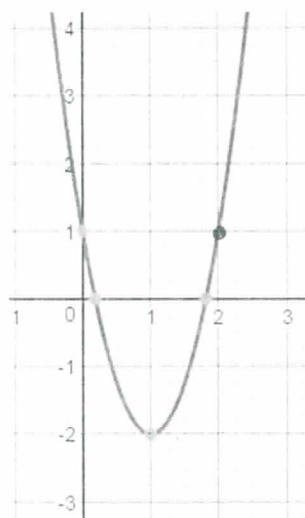
$$20 = -4x^2 + 4x + 15$$

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

$$x = \frac{-4 \pm \sqrt{16 - 4(-4)(-5)}}{-8} = \frac{-4 \pm \sqrt{-64}}{-8}$$

no sol.

17) Write the equation of the quadratic.



$$y = 3(x-1)^2 - 2$$