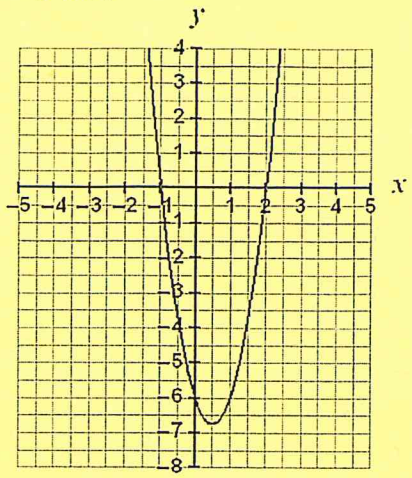
Quadratic Review Packet Name: Ms. Dawson

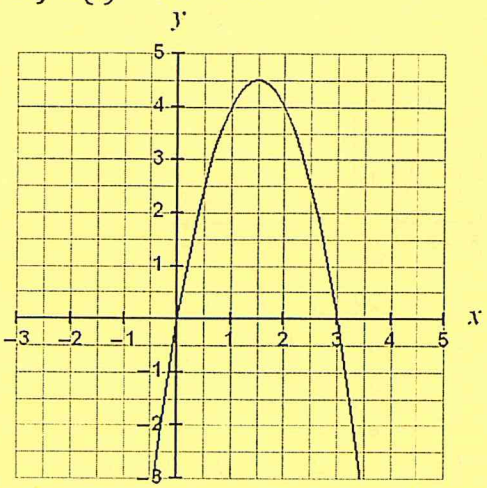
For #1-2, a quadratic function and its graph are shown. Identify the solutions, or roots, of the related quadratic equation.

1.) $g(x) = 3x^2 - 3x - 6$



Solve: $0 = 3x^2 - 3x - 6$ $x =$ -1 or 2

2.) $h(x) = -2x^2 + 6x$



Solve: $0 = -2x^2 + 6x$ $x =$ 0 or 3

For #3-5, solve for the variables by using square roots. (Factor first!)

3.) $(5x - 1)^2 = 12$

$\sqrt{(5x-1)^2} = \pm\sqrt{12}$

$5x - 1 = \pm 3.46$

$5x = 1 \pm 3.46$

$x = \frac{1 \pm 3.46}{5}$

$x = .89, -.49$

4.) $x^2 + 10x + 25 = 121$

$\sqrt{(x+5)^2} = \pm\sqrt{121}$

$x + 5 = \pm 11$

$x = -5 \pm 11$

$x = -16, 6$

5.) $4x^2 + 4x + 1 = 30$

$\sqrt{(2x+1)^2} = \pm\sqrt{30}$

$2x + 1 = \pm 5.47$

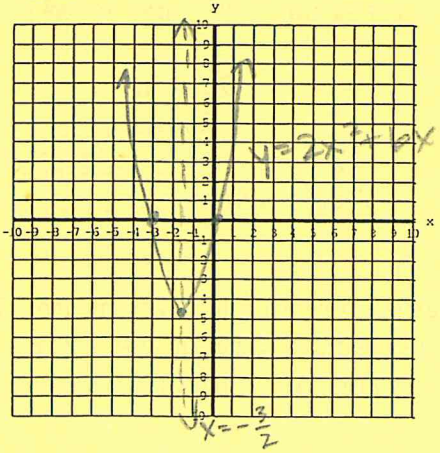
$2x = -1 \pm 5.47$

$x = \frac{-1 \pm 5.47}{2}$

$x = 2.24, -3.24$

For #6, find the vertex of the parabola. Graph the function and find the requested information

6.) $y = 2x^2 + 6x$ $a =$ 2, $b =$ 6, $c =$ 0



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

$= \frac{-6}{4}$

$= -\frac{3}{2}$

y-int - (0,0)

Domain: $\mathbb{R}$

Range: $y \geq -\frac{9}{2}$

Vertex: $(-\frac{3}{2}, -\frac{9}{2})$

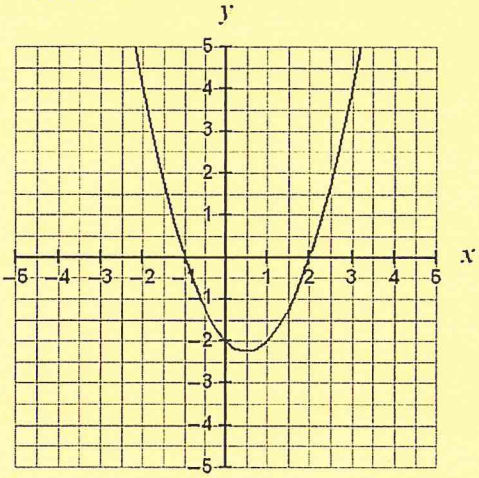
Max or min? min

x-intercepts: $x = 0, -3$

Axis of symmetry: $x = -\frac{3}{2}$

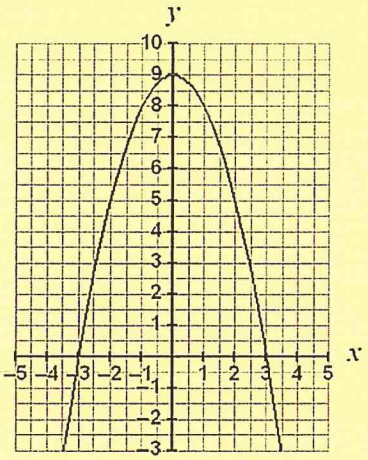
For #1-2, a quadratic function and its graph are shown. Identify the solutions, or roots, of the related quadratic equation.

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



Solve: $0 = x^2 - x - 2$ $x =$ -1 or 2

2.) $y = -x^2 + 9$



Solve: $0 = -x^2 + 9$ $x =$ -3 or 3

For #3-5, solve for the variables by using square roots. (Factor first!)

3.) $3x^2 - 1 = 35$

$3x^2 = 36$

$\sqrt{x^2} = \pm\sqrt{12}$

$x = \pm 3.46$

4.) $(x + 3)^2 = 18$

$x + 3 = \pm 4.24$

$x = -3 \pm 4.24$

$x = 1.24, -7.24$

5.) $x^2 + 6x + 9 = 8$

$\sqrt{(x+3)^2} = \pm\sqrt{8}$

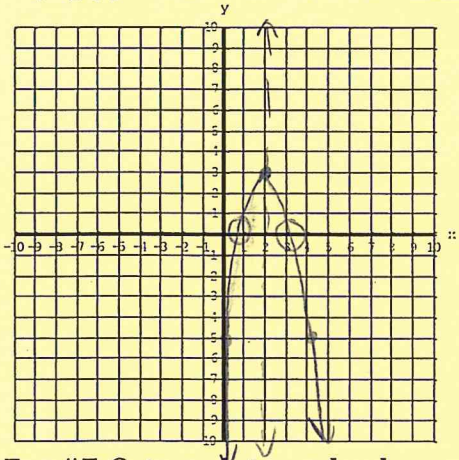
$x + 3 = \pm 2.83$

$x = -3 \pm 2.83$

$x = -.17, -5.83$

For #6, find the vertex of the parabola. Graph the function and find the requested information

6.) $g(x) = -2x^2 + 8x - 5$ $a =$ -2, $b =$ 8, $c =$ -5



$x = \frac{-8}{2 \cdot -2}$

$= \frac{-8}{-4}$

y-int $(0, -5)$

Vertex: (2, 3)
Max or min? Max
Direction of opening? Up
Wider or narrower than $y = x^2$? narrower
Domain: ℝ
Range: $y \leq 3$
x-intercepts: $x = .76, 3.22$
Axis of symmetry: $x = 2$

For #7-8, translate and solve:

7.) The square of a positive number minus twice the number is 35. Find the number.

Let n = x $x^2 - 2x = 35$

$x^2 - 2x - 35 = 0$

$(x - 7)(x + 5) = 0$

$x = 7, -5$

8.) The length of a rectangle is 2ft greater than its width. The area of the rectangle is 24ft².
Find the length and the width of the rectangle.

w | 24

w+2

$24 = (w+2)w$

$24 = w^2 + 2w$

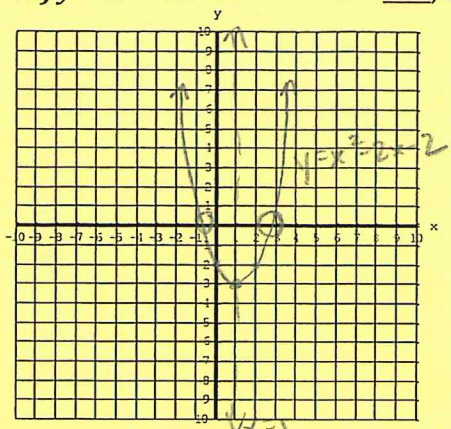
$0 = w^2 + 2w - 24$

$w = 4, -6$

4 x 6ft

For #1-2, find the vertex of each parabola. Graph the function and find the requested information

1.) $y = x^2 - 2x - 2$ $\quad a = \underline{1}$, $b = \underline{-2}$, $c = \underline{-2}$



$x = \frac{--2}{2 \cdot 1}$

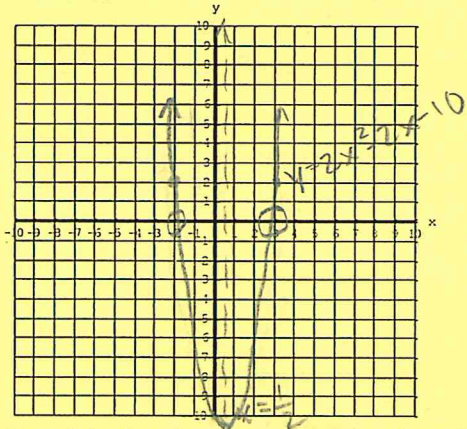
$= \frac{2}{2}$

$x = 1$

y-int: $(0, -2)$

Vertex: $(1, -3)$
Max or min? min
Direction of opening? up
Wider or narrower than $y = x^2$? neither
Domain: $\mathbb{R}$
Range: $y \geq -3$
x-intercepts: $x = 2.73, -.73$
Axis of symmetry: $x = 1$

2.) $g(x) = 2x^2 - 2x - 10$ $\quad a = \underline{2}$, $b = \underline{-2}$, $c = \underline{-10}$



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

$= \frac{2}{4}$

$x = \frac{1}{2}$

y-int: $(0, -10)$

Vertex: $\left(\frac{1}{2}, -\frac{21}{2}\right)$
Max or min? Min
Direction of opening? up
Wider or narrower than $y = x^2$? narrower
Domain: $\mathbb{R}$
Range: $y \geq -\frac{21}{2}$
x-intercepts: $x = 2.79, -1.79$
Axis of symmetry: $x = \frac{1}{2}$

For #3-6, solve by completing the square. Leave answer as a simplified fraction or a decimal rounded to the neatest hundredth.

3.) $x^2 - 2x - 17 = 0$

$c = \left(\frac{-2}{2}\right)^2 = 1$

$x^2 - 2x + 1 = 17 + 1$

$\sqrt{(x-1)^2} = \pm\sqrt{18}$

$x - 1 = \pm 4.24$

$x = 1 \pm 4.24$

$x = 5.24, -3.24$

4.) $x^2 + 2x - 14 = 0$

$c = 1$

$x^2 + 2x + 1 = 14 + 1$

$\sqrt{(x+1)^2} = \pm\sqrt{15}$

$x + 1 = \pm 3.87$

$x = -1 \pm 3.87$

$x = 2.87, -4.87$

5.) $2x^2 - 8x - 13 = 7$

$\frac{2x^2 - 8x}{2} = \frac{20}{2}$

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

$x^2 - 4x + 4 = 10 + 4$

$\sqrt{(x-2)^2} = \pm\sqrt{14}$

$x - 2 = \pm 3.74$

$x = 2 \pm 3.74$

$x = 5.74, -1.74$

6.) $x^2 - x = 3$

$c = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$

$x^2 - x + \frac{1}{4} = 3 + \frac{1}{4}$

$\sqrt{\left(x - \frac{1}{2}\right)^2} = \pm\sqrt{\frac{13}{4}}$

$x - \frac{1}{2} = \pm 1.80$

$x = .5 \pm 1.80$

$x = 2.3, -1.3$

For #7, translate and solve:

7.) The length of a rectangle is 4ft less than its width. The area of the rectangle is 60ft². Find the length and the width of the rectangle.

W	60
W − 4	

$A = w(w-4)$

$A = w^2 - 4w$

$4 + 60 = w^2 - 4w + 4$

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

$\pm\sqrt{64} = \sqrt{(w-2)^2}$

$\pm 8 = w - 2$

$2 \pm 8 = w$

$w = 10, -6$ ft

$l = 6$ ft

For #1-3, solve by completing the square. Leave answer as a simplified fraction or a decimal rounded to the neatest hundredth.

1.) $x^2+20x+3=-7$

$c=\left(\frac{20}{2}\right)^2$

$x^2+20x+100=-10+100=100$

$\sqrt{(x+10)^2}=\pm\sqrt{90}$

$x+10=\pm 9.49$

$x=-10\pm 9.49$

$x=-.51,-19.49$

2.) $x^2+x-1=0$

$c=\left(\frac{1}{2}\right)^2=\frac{1}{4}$

$x^2+x+\frac{1}{4}=1+\frac{1}{4}$

$\sqrt{(x+\frac{1}{2})^2}=\pm\sqrt{\frac{5}{4}}$

$x+\frac{1}{2}=\pm 1.12$

$x=.5\pm 1.12$

$x=1.62,-.62$

3.) $4x^2+4x-11=0$

$\frac{4x^2+4x}{4}=\frac{11}{4}$

$x^2+x+\frac{1}{4}=\frac{11}{4}+\frac{1}{4}$ $\quad c=\left(\frac{1}{2}\right)^2=\frac{1}{4}$

$\sqrt{(x+\frac{1}{2})^2}=\pm\sqrt{\frac{15}{4}}$

$x+\frac{1}{2}=\pm 1.94$

$x=-.5\pm 1.94$

$x=1.44,-2.44$

For #5-8, solve by the quadratic formula. ~~Leave in simplified radical form.~~

5.) $2x^2+5x+3=0$

$a=2,\ b=5,\ c=3$

$x=\frac{-5\pm\sqrt{25-4\cdot 2\cdot 3}}{2\cdot 2}$

$=\frac{-5\pm\sqrt{25-24}}{4}$

$=\frac{-5\pm\sqrt{1}}{4}$

$=\frac{-5\pm 1}{4}$

$x=\frac{-4}{4},\frac{-6}{4}$

$x=-1,-\frac{3}{2}$

6.) $2x^2+x-6=0$

$a=2,\ b=1,\ c=-6$

$x=\frac{3}{2},-2$

7.) $3x^2-2x-5=0$

$a=3,\ b=-2,\ c=-5$

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

8.) $-x^2-2x+5=0$

$a=-1,\ b=-2,\ c=5$

$x=-3.45,1.45$

9.) $-2x^2+6x+9=0$

$a=-2,\ b=6,\ c=9$

$x=-1.10,4.10$

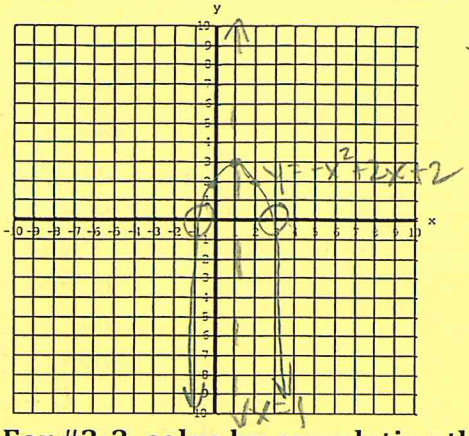
10.) $x^2+x-4=0$

$a=1,\ b=1,\ c=-4$

$x=1.56,-2.56$

For #1, find the vertex of the parabola. Graph the function and find the requested information

1.) $y = -x^2 + 2x + 2$ $a = \underline{-1}$, $b = \underline{2}$, $c = \underline{2}$



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

$x = 1$

Vertex: (1, 3)
Max or min? MAX
Direction of opening? down
Wider or narrower than $y = x^2$? neither
Domain: $\mathbb{R}$
Range: $y \leq 3$
x-intercepts: $x = -.73, 2.73$
Axis of symmetry: $x = 1$

For #2-3, solve by completing the square. Leave answer as a simplified fraction or a decimal rounded to the neatest hundredth.

2.) $4x^2 - 8x = 3$

$\frac{4x^2}{4} - \frac{8x}{4} = \frac{3}{4}$

$c = \left(\frac{2}{2}\right)^2 = 1$

$x^2 - 2x + 1 = \frac{3}{4} + \frac{1}{4}$

$\sqrt{(x-1)^2} = \pm\sqrt{\frac{7}{4}}$

$x - 1 = \pm 1.32$

$x = 1 \pm 1.32$

$x = 2.32, -.32$

3.) $3x^2 + 6x - 42 = 0$

$\frac{3x^2}{3} + \frac{6x}{3} = \frac{42}{3}$

$c = \left(\frac{2}{2}\right)^2 = 1$

$x^2 + 2x + 1 = 14 + 1$

$\sqrt{(x+1)^2} = \pm\sqrt{15}$

$x + 1 = \pm 3.87$

$x = -1 \pm 3.87$

$x = -4.87, 2.87$

For #4-5, solve by using the quadratic formula. Leave answer as a simplified fraction or a decimal rounded to the neatest hundredth.

4.) $5x - 1 = -6x^2$

$a = \underline{6}$, $b = \underline{5}$, $c = \underline{-1}$

$6x^2 + 5x - 1 = 0$

$x = \frac{1}{6}, -1$

5.) $2x^2 - 8x - 13 = 7$

$a = \underline{2}$, $b = \underline{-8}$, $c = \underline{-20}$

$2x^2 - 8x - 20 = 0$

$x = 5.74, -1.74$

For #6-7, solve by factoring.

6.) $10x^2 + 13x = 3$

$10x^2 + 13x - 3 = 0$

-30

$15 \quad -2$

$10x^2 + 15x - 2x - 3 = 0$

$5x(2x+3) - 1(2x+3) = 0$

$(5x-1)(2x+3) = 0$

$x = \frac{1}{5}, -\frac{3}{2}$

7.) $5x^2 - 45 = 0$

$5(x^2 - 9) = 0$

$5(x-3)(x+3) = 0$

$x = \pm 3$

For #8-9, translate and solve.

8.) The product of two consecutive odd integers is 35. Find the numbers.

x = first #

$x + 2$ = second number

$x(x+2) = 35$

$x^2 + 2x = 35$

$x^2 + 2x - 35 = 0$

→ quadratic formula

$x = 5, -7$

5, 7 or −5, −7

9.) The length of a rectangle is three centimeters less than the width. If the area of the rectangle is 54cm², find the dimensions of the rectangle.

w | 54 / $w - 3$

$A = w(w-3)$

$A = w^2 - 3w$

$54 = w^2 - 3w$

$0 = w^2 - 3w - 54$

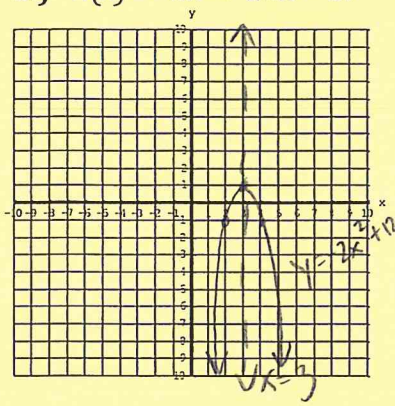
Quad formula

$x = 9, -6$

9 × 6 cm

For #1-2, find the vertex of each parabola. Graph the function and find the requested information

1.) $h(x) = -2x^2 + 12x - 17$



$x = \frac{-12}{2 \cdot -2}$

$= \frac{-12}{-4}$

$x = 3$

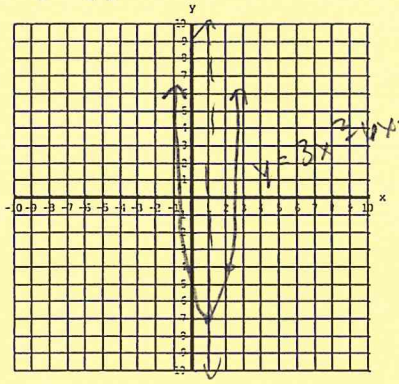
y-int: $(0, -17)$

does n't fit SD
I used a t-chart

x	y
2	-1

Vertex: $(3, 1)$
Max or min? Max
Direction of opening? down
Wider or narrower than $y = x^2$? Narrower
Domain: $\mathbb{R}$
Range: $y \leq 1$
x-intercepts: $x = 2.29, 3.71$
Axis of symmetry: $x = 3$

2.) $h(x) = 3x^2 - 6x - 4$



$x = \frac{--6}{2 \cdot 3}$

$= \frac{6}{6}$

$x = 1$

y-int: $(0, -4)$

Vertex: $(1, -7)$
Max or min? Min
Direction of opening? UP
Wider or narrower than $y = x^2$? Narrower
Domain: $\mathbb{R}$
Range: $y \geq -7$
x-intercepts: $x = 2.53, -.53$
Axis of symmetry: $x = 1$

For #3-4, solve by using square roots

3.) $5 - 6y^2 = -103$

$-6y^2 = -108$

$\sqrt{y^2} = \pm\sqrt{18}$

$y = \pm 4.24$

4.) $(4x - 3)^2 = 32$

$\sqrt{(4x-3)^2} = \pm\sqrt{32}$

$4x - 3 = \pm 5.66$

$4x = 3 \pm 5.66$

$x = \frac{3 \pm 5.66}{4}$

$x = 2.17, -.67$

For #5-6, solve by completing the square. Leave answer as a simplified fraction or a decimal rounded to the neatest hundredth.

5.) $x^2 + 2x - 18 = 8$

$c = \left(\frac{2}{2}\right)^2 = 1$

$x^2 + 2x + 1 = 26 + 1$

$\sqrt{(x+1)^2} = \pm\sqrt{27}$

$x + 1 = \pm 5.2$

$x = -1 \pm 5.2$

$x = -6.2, 4.2$

6.) $2x^2 + x - 6 = 0$

$c = \left(\frac{1}{2} \cdot \frac{1}{2}\right)^2 = \left(\frac{1}{4}\right)^2 = \frac{1}{16}$

$\frac{2x^2 + x}{2} = \frac{6}{2}$

$x^2 + \frac{1}{2}x + \frac{1}{16} = 3 + \frac{1}{16}$

$\sqrt{\left(x + \frac{1}{4}\right)^2} = \pm\sqrt{\frac{49}{16}}$

$x + \frac{1}{4} = \pm\frac{7}{4}$

$x = -\frac{1}{4} \pm \frac{7}{4}$

$x = \frac{6}{4}, -\frac{8}{4}$

$x = \frac{3}{2}, -2$

For #7-8, solve by factoring.

7.) $8x^2 - 2x - 18 = -15$

-24
$-6 \quad 4$

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

$8x^2 - 6x + 4x - 3 = 0$

$2x(4x-3) + 1(4x-3) = 0$

$(2x+1)(4x-3) = 0$

$x = -\frac{1}{2}, \frac{3}{4}$

8.) $\frac{6x^2 + 3x - 3}{3} = \frac{0}{3}$

$2x^2 + x - 1 = 0$

-2
$2 \quad -1$

$2x^2 + 2x - x - 1 = 0$

$2x(x+1) - 1(x+1) = 0$

$(2x-1)(x+1) = 0$

$x = \frac{1}{2}, -1$

For #9-10, solve by using the quadratic formula. Leave answer as a simplified fraction or a decimal rounded to the neatest hundredth.

9.) $8x^2 - 15x - 5 = -3$

$a = 8$, $b = -15$, $c = -2$

$8x^2 - 15x - 2 = 0$

$x = 2, -\frac{1}{8}$

10.) $3x^2 + 4x - 1 = 0$

$a = 3$, $b = 4$, $c = -1$

$x = .22, -1.55$

For #11-13, Write the expression for the discriminant. Use this to find the number of real solutions for each equation:

11.) $2x^2 - 3x + 1 = 0$

$d = (-3)^2 - 4 \cdot 2 \cdot 1$

$= 9 - 8$

$d = 1$

Two solutions

12.) $x^2 + 4x = -7$

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

$d = 4^2 - 4(1)(7)$

$= 16 - 28$

$d = -12$

No solution

13.) $x^2 - 6x + 9 = 0$

$d = (-6)^2 - 4(1)(9)$

$= 36 - 36$

$d = 0$

1 one solution

For #14-15, translate and solve.

14.) The square of a negative number added to four times that number equals negative three. Find the number.

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

$x^2 + 4x + 4 = 1$

$\sqrt{(x+2)^2} = \pm\sqrt{1}$

$x + 2 = \pm 1$

$x = -2 \pm 1$

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

$x = -3, -1$

15.) The length of a rectangle is two more centimeters than the width. If the area of the rectangle is 48cm², find the dimensions of the rectangle.

W | 48

W + 2

$A = w(w+2)$

$A = w^2 + 2w$

$c = \left(\frac{2}{2}\right)^2 = 1$

$1 + 48 = w^2 + 2w + 1$

$\pm\sqrt{49} = \sqrt{(w+1)^2}$

$\pm 7 = w + 1$

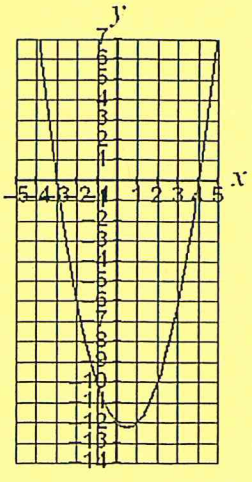
$w = -1 \pm 7$

$w = 6$, ~~-8~~

$\ell = 8$

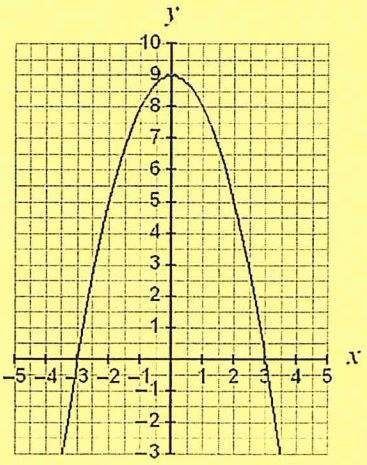
For #16-17, a quadratic function and its graph are shown. Identify the solutions, or roots, of the related quadratic equation.

16.) $f(x) = x^2 - x - 12$



Solve: $0 = x^2 - x - 12$ $x = 4$ or -3

17.) $y = -x^2 + 9$



Solve: $0 = -x^2 + 9$ $x = -3$ or 3