Solving Quadratics

GRAPHING

FACTORING *

SQUARE ROOTS

COMPLETING the SQUARE

QUADRATIC FORMULA

y-intercept

1 Solve $x^2 - 4x - 5 = 0$ by graphing.

$x = \frac{-b}{2a} = \frac{4}{2(1)} = \frac{4}{2} = 2$

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

$y = 4 - 4 \cdot 2 - 5$

$y = 4 - 8 - 5$

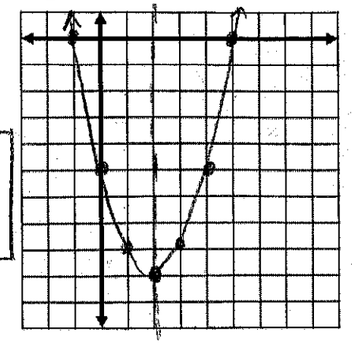
$y = -9$

$x = 2$

$(2, -9)$

$(-1, 0)$

$(5, 0)$



y-int.

2 Solve $\frac{1}{2}x^2 - 4x + 6 = 0$ by graphing.

$x = \frac{-b}{2a} = \frac{4}{2(\frac{1}{2})} = \frac{4}{1} = 4$

$y = \frac{1}{2}(4)^2 - 4(4) + 6$

$y = \frac{1}{2} \cdot 16 - 4 \cdot 4 + 6$

$y = 8 - 16 + 6$

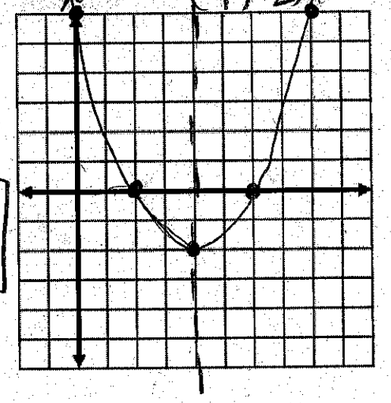
$y = -2$

$x = 4$

$(4, -2)$

$(2, 0)$

$(6, 0)$



GRAPHING *

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QUADRATIC FORMULA

3 Solve $x^2 - 11x + 30 = 0$ by factoring.

$(x-5)(x-6) = 0$

$(5,0)\ (6,0)$

4 Solve $x^2 - 5x - 14 = 0$ by factoring.

$(x-7)(x+2) = 0$

$(7,0)\quad (-2,0)$

5 Solve $3x^2 + 11x + 6 = 0$ by factoring.

$18 \mid 11$

$2 \cdot 9$

	$3x$	2
x	$3x^2$	$2x$
3	$9x$	6

$(3x+2)(x+3) = 0$

$3x+2=0 \qquad (-3,0)$

$3x = -2$

$x = \left(-\frac{2}{3}, 0\right)$

6 Solve $5x^2 - 14x + 8 = 0$ by factoring.

$40 \mid -14$

$-4 \cdot -10$

	$5x$	-4
x	$5x^2$	$-4x$
-2	$-10x$	8

$(5x-4)(x-2) = 0$

$\left(\frac{4}{5}, 0\right)\quad (2,0)$

FACTORING *

SQUARE ROOTS

COMPLETING the SQUARE

7 Solve $x^2 = 81$ using square roots.

$\sqrt{x^2} = \pm\sqrt{81}$

$x = \pm 9$ (-9,0) (9,0)

8 Solve $\frac{6x^2}{6} = \frac{384}{6}$ using square roots.

$\sqrt{x^2} = \pm\sqrt{64}$ (-8,0) (8,0)

$x = \pm 8$

9 Solve $2x^2 - 7 = 25$ using square roots.

$+7 \quad +7$

$\frac{2x^2}{2} = \frac{32}{2}$ (-4,0) (4,0)

$\sqrt{x^2} = \pm\sqrt{16}$

$x = \pm 4$

10 Solve $\frac{4(x-3)^2}{4} = \frac{144}{4}$ using square roots.

$\sqrt{(x-3)^2} = \sqrt{36}$

$x - 3 = -6$ and 6

$+3 \quad +3 \quad +3$

$x = (-3,0) \quad (9,0)$

11 Solve $3(x+1)^2 + 9 = 84$ using square roots.

$-9 \quad -9$

$\frac{3(x+1)^2}{3} = \frac{75}{3}$

$\sqrt{(x+1)^2} = \pm\sqrt{25}$

$x + 1 = -5$ and 5

$-1 \quad -1 \quad -1$

$x = (-6,0) \quad (4,0)$

SQUARE ROOTS

12 Solve $x^2 + 6x = 16$ by completing the square.

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

$x^2 + 6x + 9 = 16 + 9$

$\sqrt{(x+3)^2} = \pm\sqrt{25}$

$x + 3 = -5$ and 5

$-3 \quad -3 \quad -3$

$x = (-8, 0) \quad (2, 0)$

13 Solve $x^2 - 12x = -27$ by completing the square.

$c = \left(\frac{b}{2}\right)^2 = \left(\frac{-12}{2}\right)^2 = (-6)^2 = 36$

$x^2 - 12x + 36 = -27 + 36$

$\sqrt{(x-6)^2} = \pm\sqrt{9}$

$x - 6 = -3$ and 3

$+6 \quad +6 \quad +6$

$x = (3, 0) \quad (9, 0)$

14 Solve $2x^2 + 12x + 10 = 0$ by completing the square.

$\frac{2}{2}(x^2 + 6x + 5) = \frac{0}{2}$ $\quad x^2 + 6x + 5 = 0$

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

$x^2 + 6x + 9 + 5 - 9 = 0$

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

$+4 \quad +4$

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

$x + 3 = -2$ and 2

$-3 \quad -3 \quad -3$

$x = (-5, 0) \quad (-1, 0)$

15 Solve $\frac{2x^2}{2} + \frac{8x}{2} = \frac{42}{2}$ by completing the square.

$x^2 + 4x = 21$

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

$x^2 + 4x + 4 = 21 + 4$

$\sqrt{(x+2)^2} = \pm\sqrt{25}$

$x + 2 = -5$ and 5

$-2 \quad -2 \quad -2$

$x = (-7, 0) \quad (3, 0)$

the Quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

16 Solve $x^2 + 5x - 14 = 0$ using the quadratic formula

$$x = \frac{-5 \pm \sqrt{5^2 - 4(1)(-14)}}{2(1)}$$

$$x = \frac{-5 \pm \sqrt{25 + 56}}{2}$$

add $\frac{-5+\sqrt{81}}{2}$

plot $x = \frac{-5-9}{2} = \frac{-14}{2} = (-7,0)$ $x = \frac{-5+9}{2} = \frac{4}{2} = (2,0)$

17 Solve $2x^2 - 7x + 5 = 0$ using the quadratic formula

$$x = \frac{7 \pm \sqrt{7^2 - 4(2)(5)}}{2(2)}$$

$$x = \frac{7 \pm \sqrt{49 - 40}}{4} = \frac{7 \pm \sqrt{9}}{4}$$

$$= \frac{7-3}{4} = \frac{4}{4} = (1,0) \qquad = \frac{7+3}{4} = \frac{10}{4} = \left(\frac{5}{2},0\right)$$

18 Solve $6x^2 + 5x - 4 = 0$ using the quadratic formula

$$x = \frac{-5 \pm \sqrt{5^2 - 4(6)(-4)}}{2(6)}$$

$$= \frac{-5 \pm \sqrt{25+96}}{12} = \frac{-5 \pm \sqrt{121}}{12} = \frac{-5-11}{12} = \frac{-16}{12} = \left(\frac{-4}{3},0\right)$$

$$= \frac{-5+11}{12} = \frac{6}{12} = \left(\frac{1}{2},0\right)$$

19 Solve $x^2 - 8x - 11 = 0$ using the quadratic formula

$$x = \frac{8 \pm \sqrt{8^2 - 4(1)(-11)}}{2(1)}$$

$$= \frac{8 \pm \sqrt{64+44}}{2} = \frac{8 \pm \sqrt{108}}{2} = \frac{8-10.4}{2} = \frac{-2.4}{2}$$

$$= \frac{8+10.4}{2} = \frac{18.4}{2} = (9.2,0)$$

(-1.2,0)

20 Solve $2x^2 - 8x - 15 = 0$ using the quadratic formula

$$x = \frac{8 \pm \sqrt{8^2 - 4(2)(-15)}}{2(2)} = \frac{8 \pm \sqrt{64+120}}{4}$$

$$= \frac{8 \pm \sqrt{184}}{4} = \frac{8-13.6}{4} = \frac{-5.6}{4} = (-1.4,0)$$

$$= \frac{8+13.6}{4} = \frac{21.6}{4} = (5.4,0)$$