5.9 Solving Quadratic Equations

Solve, find the x-int/zeros/roots.

What form is the equation in?

Factored Form

- set each factor equal to 0 and solve

Ex. $(3x - 2)(x + 7) = 0$

Ideal! Simplest....

$3x - 2 = 0$

$3x = 2$

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

$x + 7 = 0$

$x = -7$

$\therefore$

$x = -7$ & $x = \frac{2}{3}$

Vertex Form

- rearrange the equation to isolate x

Ex. $2(x - 4)^2 - 10 = 0$

$2(x-4)^2 = 10$

$(x-4)^2 = 5$

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

$x = \pm\sqrt{5} + 4$

$\therefore x = \sqrt{5} + 4$

$x = -\sqrt{5} + 4$

Standard Form

Does it Factor?

yes

no

Factor it.

Ex. $2x^2 - 7x - 15 = 0$

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

	x	-5
$2x$	$2x^2$	$-10x$
3	$3x$	-15

M -30

A -7

N $-10, 3$

$\therefore x = 5$ & $x = -\frac{3}{2}$

Use the Quadratic Formula.

Ex. $3x^2 + 5x + 4 = 0$

M 12

A 5

N ?

$a = 3$

$b = 5$

$c = 4$

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

$$= \frac{-5 \pm \sqrt{5^2 - 4(3)(4)}}{2(3)}$$

$$= \frac{-5 \pm \sqrt{-23}}{6}$$

No zeroes!

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Ex. 1 Solve. Round to 2 decimal places only when necessary.

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

$5x+1=0$ $\quad 2x-3=0$

$5x=-1$ $\quad 2x=3$

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

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

b) $-3(x+5)^2+4=0$

$-3(x+5)^2=-4$

$(x+5)^2=\frac{4}{3}$

$x+5=\pm\sqrt{\frac{4}{3}}$

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

$x\doteq -3.85$ $\quad x\doteq -6.15$

c) $2b^2 - 12b - 54 = 0$

$2(b^2-6b-27)=0$

$2(b-9)(b+3)=0$

$\therefore b=9$ & $b=-3$

M -27

A -6

N $-9,3$

d) $3m^2 + 4m - 8 = 0$

Quad! $a=3$, $b=4$, $c=-8$

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

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

$=\frac{-4\pm\sqrt{112}}{6}$

$\doteq 1.10$ $\quad \doteq -2.43$

M -24

A 4

N ?

24
1, 24
2, 12
3, 8
4, 6

e) $6x^2 - 3x = 0$

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

$x=0$ $\quad 2x-1=0$, $2x=1$, $x=\frac{1}{2}$

f) $5w^2 - 7w + 8 = 0$

quadl

M 40

A -7

N ?

40
1, 40
2, 20
4, 10
5, 8

g) $6x^2 - 17x + 5 = 0$

M 30

A -17

N $-2,-15$

$6x^2-2x-15x+5=0$

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

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

$3x-1=0$, $3x=1$, $x=\frac{1}{3}$ $\quad 2x-5=0$, $x=\frac{5}{2}$

30
1, 30
2, 15

h) $12k^2 - 27 = 0$

$3(4k^2-9)=0$

$3(2k-3)(2k+3)=0$

$2k-3=0$, $k=\frac{3}{2}$ $\quad 2k+3=0$, $k=-\frac{3}{2}$

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