

# 7.10 Quadratic Formula

Math 20-2

Name \_\_\_\_\_

## Quadratic Formula

Date \_\_\_\_\_

How do you solve quadratic equations when you can not factor? Use the Quadratic Formula

1)  $2a^2 + 9a - 18 = 0$  (factoring and quadratic formula)

quad = 0



$$2a^2 + 9a - 18 = 0$$

$$\frac{2a^2 + 12a - 3a - 18}{2a \quad -3} = 0$$

$$2a(a+6) - 3(a+6) = 0$$

$$(a+6)(2a-3) = 0$$

$$a+6 = 0 \quad 2a-3 = 0$$

$$\begin{array}{r} -6 \quad -6 \\ \hline 2a = 3 \\ \frac{2a}{2} = \frac{3}{2} \\ a = \frac{3}{2} = 1.5 \end{array}$$

2)  $4r^2 + 9 = 8 + 4r$  (factoring and quadratic formula)

$$\frac{4r^2 + 9 - 8 - 4r}{-9 \quad -8} = 0 \quad \text{quad} = 0$$

$$\frac{4r^2 + 1 - 4r}{-4r \quad -4r}$$

$$4r^2 - 4r + 1 = 0$$

$\begin{array}{r} 4 \\ -2 \quad -2 \\ -4 \end{array}$

$$\frac{4r^2 - 2r - 2r + 1}{2r \quad -1} = 0$$

$$2r(2r-1) - 1(2r-1) = 0$$

$$(2r-1)(2r-1) = 0$$

$$\frac{2r-1}{+1 \quad +1} = 0$$

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

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

$$ax^2 + bx + c = 0$$

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

$$2a^2 + 9a - 18 = 0$$

a = 2  
b = 9  
c = -18

$$x = \frac{-9 \pm \sqrt{81 - 4(2)(-18)}}{2(2)}$$

$$x = \frac{-9 \pm \sqrt{225}}{4}$$

$$x = \frac{-9 + 15}{4} \quad x = \frac{-9 - 15}{4}$$

$$x = \frac{6}{4} \quad x = \frac{-24}{4}$$

$$x = \frac{3}{2} = 1.5 \quad x = -6$$

$$4r^2 - 4r + 1 = 0$$

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

a = 4

b = -4... (-4)<sup>2</sup> = 16

c = 1

$$x = \frac{4 \pm \sqrt{16 - 4(4)(1)}}{2(4)}$$

$$x = \frac{4 \pm \sqrt{0}}{8}$$

$$x = \frac{4+0}{8} \quad x = \frac{4-0}{8}$$

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

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

## 7.10 Quadratic Formula

$$3) 2x^2 + 10x + 11 = 0$$

quad = zero

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

$$a=2 \quad b=10 \quad c=11$$

$$b^2=100$$

$$x = \frac{-10 \pm \sqrt{100 - 4(2)(11)}}{2(2)}$$

$$\begin{aligned} \sqrt{100 - 4(2)(11)} &= \sqrt{12} \\ &= \sqrt{4} \sqrt{3} \\ &= 2\sqrt{3} \end{aligned}$$

$$x = \frac{-10 \pm 2\sqrt{3}}{4}$$

$-10, 2, 4 \div 2$

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

$$\Rightarrow x = \frac{-5 + \sqrt{3}}{2} \quad x = \frac{-5 - \sqrt{3}}{2}$$

$$4) 2x^2 - 12x + 3 = 0$$

$$a=2 \quad b=-12 \quad c=3$$

$$b^2=144$$

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

$$x = \frac{12 \pm \sqrt{144 - 4(2)(3)}}{2(2)}$$

$$\begin{aligned} \sqrt{144 - 24} \\ \sqrt{120} \\ \sqrt{4} \sqrt{30} \\ 2\sqrt{30} \end{aligned}$$

$$x = \frac{12 \pm 2\sqrt{30}}{4}$$

$12, 2, 4 \div 2$

$$x = \frac{6 \pm \sqrt{30}}{2}$$

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5)  $8x^2 + 4x + 4 = 5$

$-5 -5$

quad = zero

$8x^2 + 4x - 1 = 0$

$a=8 \quad b=4 \quad c=-1$   
 $b^2=16$

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

$$x = \frac{-4 \pm \sqrt{16 - 4(8)(-1)}}{2(8)}$$

$\rightarrow 16 + 32 = 48$

$\sqrt{48} = \sqrt{16} \sqrt{3}$   
 $= 4\sqrt{3}$

$$x = \frac{-4 \pm 4\sqrt{3}}{16}$$

$-4, 4, 16 \div 4$

$$x = \frac{-1 \pm \sqrt{3}}{4}$$

6)  $12r^2 - 5 = 11r^2 + 6r$  more  $r^2 \dots -11r^2$

$r^2 - 5 = 6r$

$-6r$

$r^2 - 6r - 5 = 0$

$ax^2 + bx + c = 0$

$a=1 \quad b=-6 \quad c=-5$   
 $b^2=36$

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

$$x = \frac{6 \pm \sqrt{36 - 4(1)(-5)}}{2(1)}$$

$\rightarrow 36 + 20 = 56$

$\sqrt{56} = \sqrt{4} \sqrt{14}$   
 $= 2\sqrt{14}$

$$x = \frac{6 \pm 2\sqrt{14}}{2}$$

$6, 2, 2 \div 2$

$$x = \frac{3 \pm \sqrt{14}}{1}$$

$x = 3 \pm \sqrt{14}$

## 7.10 Quadratic Formula

7)  $9n^2 + 10n = 21$  (rounded to nearest tenth)

$$ax^2 + bx + c = 0$$

$$9n^2 + 10n - 21 = 0$$

$$a=9 \quad b=10 \quad c=-21$$
$$b^2=100$$

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

$$x = \frac{-10 \pm \sqrt{100 - 4(9)(-21)}}{2(9)}$$

$$\dots 100 + 4(9)(21)$$
$$= \sqrt{856}$$
$$= 29.26$$

$$x = \frac{-10 \pm 29.26}{18}$$

$$x = \frac{-10 + 29.26}{18} = \frac{19.26}{18}$$

$$x = 1.1$$

$$x = \frac{-10 - 29.26}{18} = \frac{-39.26}{18}$$

$$x = -2.2$$