4.2 (Day 2) Solving Quadratics by Factoring

Zero Product Property: If $a \times b = 0$ then a = 0 or b= 0

To solve equations:
1. Set equation = 0 (write in descending order) standard form
2. Factor fully
3. Set each factor = 0 and solve.
4. Write a solution { } or x = #, #

Example 1 : Solve the following.

A) $x^2 + 6x + 9 = 0$ (Verify your solution)

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

$x+3=0$ $\quad$ $x+3=0$

$x=-3$ $\quad$ $x=-3$

$x=\{-3\}$

Verify "Does the left side of the quadratic equation equal the right side when I substitute $x=-3$?"

$(-3)^2+6(-3)+9=0$

$9-18+9=0$

$0=0$ ✓

B) $2x^2 + 8x = 42$ (Verify your solution) set equation equal to zero

$-42 \quad -42$

$2x^2+8x-42=0$

$2(x^2+4x-21)=0$

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

$x+7=0$ $\quad$ $x-3=0$

$x=-7$ $\quad$ $x=3$

$x=\{-7, 3\}$

Verify

$x=-7$

$2(-7)^2+8(-7)=42$

$2(49)-56=42$

$98-56=42$

$42=42$ ✓

$x=3$

$2(3)^2+8(3)=42$

$2(9)+24=42$

$18+24=42$

$42=42$ ✓

C) $2x(x-6)+3x=2x-9$ (step1) Get into standard form

$2x^2-12x+3x=2x-9$ $\quad$ (−2x, +9, −2x, +9)

$2x^2-12x-2x+3x+9=0$

$2x^2-11x+9=0$

$(2x-9)(x-1)=0$

$2x-9=0$ $\quad$ $x-1=0$

$\frac{2x}{2}=\frac{9}{2}$ $\quad$ $x=1$

$x=\frac{9}{2}$

$x=\{\frac{9}{2}, 1\}$

D) $2a^2+a+2=0$ → show the graph to see the x-int.

$a=\emptyset$ or $\{\ \}$ "Empty Set"

No solutions, therefore the graph does not cross the x-axis, nor is there a solution to the equation

e) $x^2+6x=0$

$x(x+6)=0$

$x=0 \quad x+6=0$ -6

$x=0 \quad x=-6$

$x=\{0,-6\}$

f) $\frac{x^2}{2}+\frac{7}{6}x=1$ -1

$(6)\frac{x^2}{2}(6)+\frac{7}{6}x(6)-1(6)=0$

$3x^2+7x-6=0$

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

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

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

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

$3x \quad -2$

$x \quad 3$

stop here if necessary.

Example #2 Without factoring, determine if d – 5 is one of the factors of $-\frac{3}{10}x^2+\frac{11}{10}x+2=0$

$d-5=0$

$d=5$

$-\frac{3}{10}(5)^2+\frac{11}{10}(5)+2=0$

$-\frac{75}{10}+\frac{55}{10}+2=0$

$-\frac{20}{10}+2=0$

$-2+2=0$

$0=0$

Yes (d-5) is a factor of the quadratic equation

Example #3 - Page 231 #13

A flare is launched from a boat. The height , h, in metres, of the flare above the water is approximately modelled by the function $h(t) = 150t – 5t^2$, where t is the number of seconds after the flare is launched.

a) What equation could you use to determine the time it takes for the flare to return to the water?

b) How many seconds will it take for the flare to return to the water?

a) $0=150t-5t^2$

b) $0=-5t^2+150t$

$0=-5t(t-30)$

$-5t=0 \quad t-30=0$ $+30$

$\frac{-5t}{-5}=\frac{0}{-5} \quad t=30$

$t=0$

It would take the the flare 30secs to return to the water

Assignment: Page 230 #7acde, 8ace, 9ac, 10ace, 12