Solve Quadratics- Zero Product Property

Secondary Math II Notes

Solve by Inspection

The following equations consist of factored quadratic expressions that are set equal to zero. Find value(s) of x that will make each statement true by simply looking at the equation.

A. $(x+1)(x+2)=0$ $x=-1,-2$	B. $(x-5)(x+3)=0$ $x=5,-3$
C. $x(x+4)=0$ $x=0,-4$	D. $(x-7)^2=0$ $x=7$ *m*. 2

The Zero Product Property

Zero Product Property in Symbols:

If $(qx+r)(sx+t)=0,$

then the solutions occur when:

$qx+r=0 \quad \left(x=\frac{r}{q}\right) \quad OR \quad sx+t=0 \quad \left(x=\frac{t}{s}\right).$

Thus, the two solutions are $x=\frac{r}{q},\frac{t}{s}$

Zero Product Property in Words: If I have two factors that are set equal to zero, then I can find the solution(s) to the quadratic equation by setting each of the factors equal to zero and solving the linear equations that result.

WARNING: Note that this factored quadratic is set equal to 2 i[illegible] of 0. The Zero Product Property does NOT apply here. Setting each factored equal to [illegible]ying the linear equations that result will NOT give you solutions to the equation.

Solve the equations below using by using the zero product property or by inspection.

E. $(5x+7)(2x-9)=0$

$(5x+7)=0 \; so \; x=-\frac{7}{5}$

$OR \; (2x-9)=0 \; so \; x=\frac{9}{2}$

$x=-\frac{7}{5},\frac{9}{2}$

F. $(x-14)(2x+3)=0$

$(x-14)=0 \; so \; x=14$

$OR \; (2x+3)=0 \; so \; x=-\frac{3}{2}$

$x=-\frac{3}{2},14$

G. $\left(x+\frac{3}{2}\right)(2x+3)=0$

$\left(x+\frac{3}{2}\right)=0 \; so \; x=-\frac{3}{2}$

$OR \; (2x+3)=0 \; so \; x=-\frac{3}{2}$

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

H. $3(x+10)(x-4)=0$

$x=-10,\ 4$

Change to factored form then solve the equations given.

I. $x^2+3x-10=0$

$x=-5,2$

J. $x^2-12x+36=0$

$x=6$ *m*. 2

K. $x^2-9=0$

$x=\pm 3$

L. $5x^2+15x+10=0$

$x=-1$ *m*. 2

Solving Quadratics- Square Root Method

Secondary Math II Notes

Challenge		
Solve the following quadratic equations by inspection. **Warning:** Each of these equations has 2 unique solutions. Be sure that you do not miss one.		
A. $x^2 = 9$ $x = \pm 3$	B. $x^2 = 16$ $x = \pm 4$	C. $x^2 = 49$ $x = \pm 7$
D. $x^2 = -25$ $x = \pm 5i$	E. $4x^2 + 19 = 0$ $x = \pm\sqrt{11}$	F. $(x+1)^2 = 9$ $x = -4, 2$

The Square Root Method		
STEPS:	EXAMPLE: $4x^2 - 25 = 0$	EXAMPLE: $(2x+3)^2 - 3 = 6$
Use the properties of algebra to isolate the quantity squared.	$4x^2 = 25$ $x^2 = \frac{25}{4}$	$(2x+3)^2 = 9$
Eliminate the power of 2 by taking the square root of both sides. Remember that you must include both the positive and the negative options for the solutions.	$x^2 = \frac{25}{4}$ $x = \pm\sqrt{\frac{25}{4}}$ $x = \pm\frac{5}{2}$	$(2x+3)^2 = 9$ $2x + 3 = \pm\sqrt{9}$ $2x + 3 = \pm 3$
Isolate the variable. If necessary, rewrite using two separate equations to account for the positive and negative solutions.	$x = \pm\frac{5}{2}$	$2x + 3 = \pm 3$ $2x = \pm 3 - 3$ $x = \frac{\pm 3 - 3}{2}$ $x = -3, 0$

Things you may see- Problems that can be Solved by Inspection	
1. $9(x+3)^2 = 49$ $x = -\frac{16}{3}, -\frac{2}{3}$	2. $25(x-2)^2 = 11$ $x = \pm\frac{\sqrt{11}}{5} + 2$
3. $25(x)^2 - 10 = 10$ $x = 0\ (mult. 2)$	4. $2(x+5)^2 = 11$ $x = -5 \pm \sqrt{\frac{11}{2}}i$