Solving Equations by Factoring

Zero Factor Property – If *ab = 0*, then *a = 0* or *b = 0* or both.

Steps to Solving Polynomial Equations by Factoring:

1. Set the polynomial equal to zero.
2. Factor the polynomial completely.
3. Set each of the factors equal to zero and solve.
4. Check your answers in the original equation.

Examples: Solve by factoring.

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

Zero ✓
Factor ✓
Prop $x-2=0$ or $x+3=0$
$x=2$ $x=-3$

2. $x^2-3x-4=0$

Zero ✓
Factor $(x+1)(x-4)=0$
prop $x+1=0$ or $x-4=0$
$x=-1$ $x=4$

3. $x^2+3x-50=38$
-38 -38

Zero
$x^2+3x-88=0$

Factor
$(x+11)(x-8)=0$

$-88 \mid 3$
$-8 \quad 11$

Property
$x+11=0$ or $x-8=0$
$x=-11$ or $x=8$

4. $3x^2-5x=28$

Zero
$3x^2-5x-28=0$

$3(-28)=-84 \mid -5$
$7 \cdot -12$

Factor
$3x^2+7x-12x-28=0$
$x(3x+7)-4(3x+7)=0$
$(3x+7)(x-4)=0$

Property
$3x+7=0$ or $x-4=0$
$3x=-7$
$x=\frac{-7}{3}$ or $x=4$

$5(-14) = -70$ | 33

$-2 + 35$

5. $10x^3 + 66x^2 - 28x = 0$

Zero ✓

Factor $2x(5x^2 + 33x - 14) = 0$

$5x^2 - 2x + 35x - 14$

$x(5x-2) + 7(5x-2)$

$2x(5x-2)(x+7) = 0$

property

$\frac{2x}{2} = \frac{0}{2}$ or $5x - 2 = 0$ or $x + 7 = 0$

$\frac{5x}{5} = \frac{2}{5}$

$x = 0$ or $x = \frac{2}{5}$ or $x = -7$

6. $x^2 + 13x = -36$

Zero: $x^2 + 13x + 36 = 0$

Factor: $(x+4)(x+9) = 0$

property $x + 4 = 0$ or $x + 9 = 0$

$x = -4$ or $x = -9$

7. $2x^3 + 11x^2 - 21x - 5 = 6x - 5$

$-6x + 5 \quad -6x + 5$

Zero $2x^3 + 11x^2 - 27x = 0$

$2(-27) = -54$ | $+11$

-1	54	
-2	27	
-3	18	155
-6	9	32

Factor $x(2x^2 + 11x - 27) = 0$

not factorable

Solve with another method