Your Name

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3/9/21

Factoring Trinomials Notes

a ≠1

2. $(6-5y-4y^2)-(-7y-3y^2+14y^3)$

$6-5y-4y^2+7y+3y^2-14y^3$

$-14y^3-y^2+2y+6$

10. $3x^2-20x-7$

$(3x+1)(x-7)$

	$3x$	1
x	$3x^2$	x
-7	$-21x$	-7

$=-20x$

Factor out GCF and its an a=1 Trinomial

ex. $6x^2 - 42x + 72$

$ax^2 + bx + c$

$6(1x^2 - 7x + 12)$

$6(x-4)(x-3)$

c: 12; $-4 \cdot -3$; $-4 + -3 = -7$

Factor Pairs for	Sum of Factors

Box Method/ Guess & Check

a is not 1

ex. $2x^2 - 3x - 2$

$(2x+1)(x-2)$

$1x$

$-4x$

	2x	1
x	$2x^2$	x
-2	-4x	-2

$= -3x$

ac

-4

1 4

+ −3

	x	-2
2x	$2x^2$	
1		-2

ex. $3x^2 - x - 24$

$(x-3)(3x+8)$

	3x	8
x	$3x^2$	8x
-3	-9x	-24

$= -1x$

$3x^2 + 8x - 9x - 24$

AC By Grouping Method

$ax^2 + bx + c$ $a \cdot c$

Notice: Three terms and the coefficient of x^2 is not 1.

Step 1: Factor out GCF first.

Step 2: Find two numbers that multiply to what *a* and *c* multiply to (the product is *ac*) and add to the middle term *b* $\_ \cdot \_ = a \cdot c$ $\_ + \_ = b$

Step 3. Rewrite the trinomial where the middle term has been split using the two numbers you found

Step 4. Continue to factor by grouping.

ex. $2x^2 - 3x - 2$ (a, b, c) Step 2: $a \cdot c$ $2 \cdot -2$, $-4 \cdot 1$, $-4 + 1 = -3 = b$

Step 3 rewrite and split: $2x^2 - 4x + 1x - 2$

$2 \cdot x \cdot x + 2x \cdot -2 + 1 \cdot x + 1 \cdot -2$

$2x(x-2) + 1(x-2)$ ☆

$(x-2)(2x+1)$

$2x^2 + x - 4x - 2$

$x(2x+1) - 2(2x+1)$

$(2x+1)(x-2)$

Factor Pairs for	Sum of Factors

ex. $2x^2 - 1x - 6$ (a, b, c) Step 2: $a \cdot c$ $2 \cdot -12$, $3 \cdot -4$, $3 + -4 = -1 = b$

$2x^2 + 3x - 4x - 6$

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

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

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

Factor Pairs for -12		Sum of Factors
1	12	
2	6	
3	-4	-1

5. $3x^2 + 2x - 8$

$a=3 \quad b=2 \quad c=-8$

$3x^2 - 4x + 6x - 8$

Not done $1x(3x-4) + 2(3x-4)$

Done $(3x-4)(x+2)$

$a \cdot c$

$3 \cdot -8$

-24

$-4 \quad 6$

$+$

2

b

$a \cdot c = -24$	$+2$
1	24
2	12
3	8
$-4 \cdot 6$	2
$4 \cdot -6$	-2

11. $9p^2 + 6p - 8$

AC Factor by grouping

$9p^2 + 12p - 6p - 8$

$3p(3p+4) - 2(3p+4)$

$(3p+4)(3p-2)$

$9 \cdot -8$, -72, $+12$, -6, $+6$, b

AC Bottoms Up Method

$ax^2 + bx + c$

Step 1: Factor out GCF first.

Step 2: Find two numbers that multiply to what *a* and *c* multiply to (the product is *ac*) and add to the middle term *b*

Step 3. Write the numbers in the factors as (x+) and (x+)

Step 4. Divide by the 'a' in both factors

Step 5. Simplify the fractions

Step 6. Slide any bottom left (denominator) infront of the x term for that factor.

ex. $2x^2 - 3x - 2$

a·c: $2 \cdot -2$, -4, 1, -4, $+3$, b

Factor Pairs for -4: $1, -4$; Sum of Factors: -3

Divide by a: $\frac{(x+1)}{2}\frac{(x-4)}{2}$

Simplify fractions: $(x+\frac{1}{2})(x-2)$

$(2x+1)(x-2)$

ex. $2x^2 - x - 6$

a·c: $2 \cdot -6$, -12, 3, -4, -1, b

Factor Pairs for: $1, 12$; $2, 6$; $3, -4$; Sum of Factors: 13 or 11, ± 4, ± 8, ± 7, ± 1

$\frac{(x+3)}{2}\frac{(x-4)}{2}$

$(x+\frac{3}{2})(x-2)$

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

Remember: It is the simple things in life. . . .

The Zero Product Property

Anything times 0 equals 0

a(0)= 0 (0)b = 0

if ab = 0 then **either b was 0 or a was 0**

Factor or solve each trinomial

a b c

$3m^2 - 8m - 3 = 0$

$3m^2 + 1m - 9m - 3 = 0$

$m(3m+1) - 3(3m+1) = 0$

$(3m+1)(m-3) = 0$

$3m+1=0 \quad m-3=0$

$m = -\frac{1}{3} \quad m = 3$

a·c = -9, b = -8

2. $16r^2 - 8r + 1$

6. $16r^2 - 8r + 1$

$16r^2 - 4r - 4r + 1$

$4r(4r-1) - 1(4r-1)$

Not same

$(4r-1)(4r-1)$

$4r-1=0$

$4r=1$

$r=\frac{1}{4}$ twice

a·c = 16, b = -8

3. $8m^2 - 44m + 48 = 0$

$4(2m^2 - 11m + 12) = 0$ a·c = 24

$4(2m^2 - 3m - 8m + 12) = 0$ b = -11

$4(m(2m-3) - 4(2m-3)) = 0$

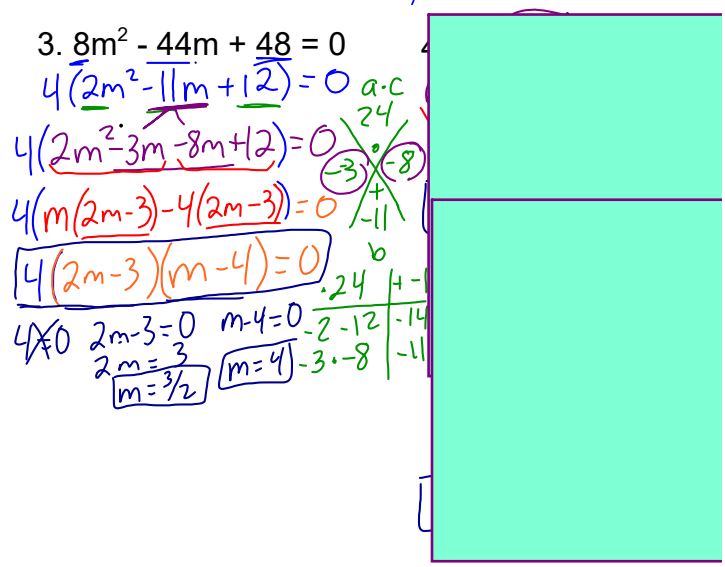
$4(2m-3)(m-4) = 0$

$4 \neq 0 \quad 2m-3=0 \quad m-4=0$

$2m=3 \quad m=4$

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

-3, -8



Factoring Trinomials: $ax^2 + bx + c$

Factor each trinomial, if possible. If the trinomial cannot be factored using integers, write *prime*.

1. $2x^2 + 5x + 2$
   $(x + 2)(2x + 1)$

2. $3n^2 + 5n + 2$
   $(3n + 2)(n + 1)$

3. $2s^2 + 9s - 5$
   $(s + 5)(2s - 1)$

4. $3g^2 - 7g + 2$
   $(3g - 1)(g - 2)$

5. $2t^2 - 11t + 15$
   $(t - 3)(2t - 5)$

6. $2x^2 + 3x - 6$
   prime

7. $2y^2 + y - 1$
   $(y + 1)(2y - 1)$

8. $4h^2 + 8h - 5$
   $(2h + 5)(2h - 1)$

9. $4x^2 - 3x - 3$
   prime

10. $4b^2 + 15b - 4$
    $(4b - 1)(b + 4)$

11. $9p^2 + 6p - 8$
    $(3p - 2)(3p + 4)$

12. $6q^2 - 13q + 6$
    $(3q - 2)(2q - 3)$

13. $3a^2 + 30a + 63$
    $3(a + 7)(a + 3)$

14. $10w^2 - 19w - 15$
    $(2w - 5)(5w + 3)$

Solve each equation. Check your solutions.

15. $2x^2 + 7x + 3 = 0$ $\left\{-3, -\frac{1}{2}\right\}$

16. $3w^2 + 14w + 8 = 0$ $\left\{-4, -\frac{2}{3}\right\}$

17. $3n^2 - 7n + 2 = 0$ $\left\{\frac{1}{3}, 2\right\}$

18. $5d^2 - 22d + 8 = 0$ $\left\{\frac{2}{5}, 4\right\}$

19. $6h^2 + 8h + 2 = 0$ $\left\{-1, -\frac{1}{3}\right\}$

20. $8p^2 - 16p = 10$ $\left\{-\frac{1}{2}, \frac{5}{2}\right\}$

21. $9y^2 + 18y - 12 = 6y$ $\left\{-2, \frac{2}{3}\right\}$

22. $4a^2 - 16a = -15$ $\left\{\frac{3}{2}, \frac{5}{2}\right\}$

23. $10b^2 - 15b = 8b - 12$ $\left\{\frac{4}{5}, \frac{3}{2}\right\}$

24. $6d^2 + 21d = 10d + 35$ $\left\{-\frac{7}{2}, \frac{5}{3}\right\}$