

Factor: $3x^2 + 7x + 2$

Mar 25-8:02 AM

Factoring Complex Trinomials ($ax^2 + bx + c$, $a \neq 1$)

Apr. 4
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Expand $(x + 4)(2x + 3)$. What are the x-terms?

$$\begin{aligned} (x + 4)(2x + 3) &= 2x^2 + \underbrace{3x + 8x} + 12 \\ &= 2x^2 + 11x + 12 \end{aligned}$$

To factor $2x^2 + 11x + 12$, we need to do these steps in reverse order.

How do the numbers 3 and 8 relate to 2, 11, and 12?

$$3 + 8 = 11$$

Sum

$$3 \times 8 = 2 \times 12 = 24$$

product

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Once you have broken the middle term, you can factor by grouping

$$\begin{aligned}
 2x^2 + 11x + 12 &= \underline{2x^2 + 3x} + \underline{8x + 12} \\
 &= 1x(2x+3) + 4(2x+3) \\
 &= (2x+3)(x+4)
 \end{aligned}$$

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Ex. Factor $6m^2 + 13m - 5$

Numbers add to: +13 (sum)

Numbers multiply to: -30 (product)

Numbers are:

-2 and 15 (integers)

Product	Sum
-1×30	29 X
<u>-2×15</u>	13 ✓
-3×10	7 X
-5×6	1 X
-6×5	

This technique is called SPI
(sum, product, integers)

$$\begin{aligned}
 &6m^2 + 13m - 5 \\
 &= 6m^2 - 2m + 15m - 5 \\
 &= 2m(3m-1) + 5(3m-1) \\
 &= (3m-1)(2m+5)
 \end{aligned}$$

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Ex. Factor $6m^2 + 13m - 5$

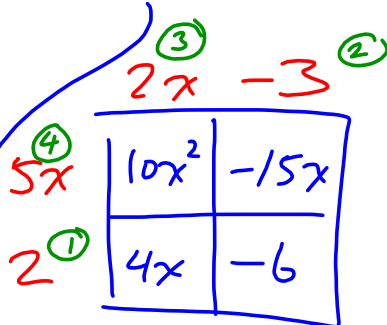
Numbers are: -2 and 15

Now factor by grouping:

$$6m^2 + 13m - 5 =$$

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Ex. Factor: $10x^2 - 11x - 6$ (using an area model)



$$(2x - 3)(5x + 2)$$

OR

$$= 10x^2 + 4x - 15x - 6$$

$$= 2x(5x + 2) - 3(5x + 2) - 10x - 6$$

$$= (5x + 2)(2x - 3)$$

$$S: -11$$

$$P: -60$$

I:

$$1 \times -60$$

$$2 \times -30$$

$$3 \times -20$$

$$4 \times -15 \quad -11$$

$$5 \times -12$$

$$6 \times -10$$

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Assigned Work:

p.223-224 #3bc, 5abc, 6,
#7abc, 11, 15, 17 (Challenging)

Look for common factors first!!!

$$(2x+3)(\text{shaded box})$$

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$$\begin{aligned} \text{S(a)} \quad & 2x^2 + x - 6 \\ & = \underbrace{2x^2 + 4x}_{\downarrow} - \underbrace{3x - 6}_{\downarrow} \\ & = 2x(x+2) - 3(x+2) \\ & = (x+2)(2x-3) \end{aligned}$$

S	1
P	-12
I	4, -3

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$$\begin{aligned}
 7(b) \quad & 18m^2 - 3m - 10 \\
 & = 18m^2 - 15m + 12m - 10 \\
 & = 3m(6m - 5) + 2(6m - 5) \\
 & = (6m - 5)(3m + 2)
 \end{aligned}$$

$$\begin{array}{l}
 S \quad -3 \\
 P \quad -180 \\
 I
 \end{array}$$

$$\begin{array}{c}
 10 \times -18 \\
 \wedge \quad \wedge \\
 2 \times 5 \times 3 \times 3 \times 2
 \end{array}$$

$$\begin{array}{cc}
 20 & 9 \\
 -15 & 12
 \end{array}$$

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$$\begin{aligned}
 11(d) \quad & 5b^3 - 17b^2 + 6b \\
 & = b(5b^2 - 17b + 6)
 \end{aligned}$$

$$\begin{array}{l}
 S \quad -17 \\
 P \quad 30 \\
 I
 \end{array}$$

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15(a) $8x^2 - 13xy + 5y^2$

$$8x^2 - 13xy + 5y^2$$

$$= 8x^2 - 5xy - 8xy + 5y^2$$

$$= x(8x - 5y) - 1y(8x - 5y)$$

$$= (8x - 5y)(x - 1y)$$

$$\rightarrow (8x - 5y)(x - y)$$

S -13
P 40
I -5, -8

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17.(a)

$$12(a-2)^4 + 52(a-2)^2 - 40$$

let $x = (a-2)^2$

$$= 12x^2 + 52x - 40$$

$$= 4(3x^2 + 13x - 10)$$

S 13
P -30
I 15, 2

$$= 4[3x^2 + 15x - 2x - 10]$$

$$= 4[3x(x+5) - 2(x+5)]$$

$$= 4(x+5)(3x-2)$$

$$= 4[(a-2)^2 + 5][3(a-2)^2 - 2]$$

we should expand these and see if they can be factored further. ;)

$$= 4[(a^2 - 4a + 4) + 5][3(a^2 - 4a + 4) - 2]$$

$$= 4[a^2 - 4a + 9][3a^2 - 12a + 12 - 2]$$

$$= 4(a^2 - 4a + 9)(3a^2 - 12a + 10) \checkmark$$

S -4 S -12
P 9 P 30
I not possible I not possible

Apr 5-2:08 PM