

2.4 notes

Thursday, September 24, 2020 11:20 AM

Method for factoring trinomials in this form

Foundations and Precalculus 10

2.4 - Factor by Decomposition (part 2)

aka. Rainbow Split

$$ax^2 + bx + c$$

Ex#1: Factor $6m^2 + 13m - 5$

② $\frac{-2}{-2} + \frac{15}{5} = 13$
 $\frac{-2}{-2} \cdot \frac{15}{5} = -30$

$\begin{matrix} -1 \cdot 30 & 1 \cdot -30 \\ -2 \cdot 15 & 2 \cdot -15 \\ -3 \cdot 10 & 3 \cdot -10 \\ -5 \cdot 6 & 5 \cdot -6 \end{matrix}$

④ $\frac{6m^2}{2m} - \frac{2m}{2m} + \frac{15m}{5} - \frac{5}{5}$

⑤ $2m(3m-1) + 5(3m-1)$

$(3m-1)(2m+5)$

- Step 1:** Multiply the coefficients of the first and last terms. ($a \times c$)
- Step 2:** Find two numbers that multiply to ($a \times c$) and add to b .
- Step 3:** Re-write the b - value as two terms instead of one.
- Step 4:** Divide the question into two binomials and divide the GCF from each of the binomial terms.
- Step 5:** You should have a common binomial term. Write a multiplication statement (GCF)(Left over terms)

- Pre-step: factor out GCF
- ① rainbow
 - ② puzzle $- + = b$
 $- \cdot - = \text{rainbow}$
 - ③ split
 - ④ group
 - ⑤ answer: (binomial)(binomial)

check:

$(3m-1)(2m+5)$

$= 6m^2 + 15m - 2m - 5$

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

decompose from 3 terms to 4 terms

Ex#2: Factor $5x^2 - 11x + 2$

③ $\frac{-1}{-1} + \frac{-10}{-10} = -11$ ②

$\frac{-1}{-1} \cdot \frac{-10}{-10} = 10$

④ $\frac{5x^2}{5x} - \frac{10x}{5x} - \frac{1x}{-1} + \frac{2}{-1}$

$= 5x(x-2) - 1(x-2)$

⑤ $(x-2)(5x-1)$

check:

$(x-2)(5x-1)$

$= 5x^2 - 1x - 10x + 2$

$= 5x^2 - 11x + 2 \checkmark$

Foundations and Precalculus 10

Ex#3: Factor $2x^2 + 11x + 15$

$$= \frac{2x^2}{x} + \frac{5x}{x} + \frac{6x}{3} + \frac{15}{3}$$

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

$$\frac{5}{5} + \frac{6}{6} = 11$$

$$\frac{5}{5} \cdot \frac{6}{6} = 30$$

1 · 30
2 · 15
3 · 10
5 · 6

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

check: $(2x+5)(x+3)$

$$= 2x^2 + 6x + 5x + 15$$

$$= 2x^2 + 11x + 15 \checkmark$$

Ex#4: Factor $24x^2 - 72x + 54$

* GCF: 6 *

answer will have 3 factors: $6() ()$

$$= 6(4x^2 - 12x + 9)$$

$$\frac{-6}{-6} + \frac{-6}{-6} = -12$$

$$\frac{-6}{-6} \cdot \frac{-6}{-6} = 36$$

$$= 6\left(\frac{4x^2}{2x} - \frac{6x}{2x} - \frac{6x}{-3} + \frac{9}{-3}\right)$$

$$= 6[2x(2x-3) - 3(2x-3)]$$

$$= 6(2x-3)(2x-3) \quad \text{or} \quad = 6(2x-3)^2$$

check: $6(2x-3)(2x-3)$

$$= 6(4x^2 - 6x - 6x + 9)$$

$$= 6(4x^2 - 12x + 9)$$

$$= 24x^2 - 72x + 54 \checkmark$$

HW p177 #8ac, 13ace, 15aceg, 18ace, 19ab