







Rational Expression  
 Numerator → Polynomial  
 Denominator → Polynomial  
 7x+14

4.4 Add & Subtract With Binomial and Trinomial Denominators

- Steps:
1. Factor First!
  2. State NPV's.
  3. Find the LCM and create a common denominator.
  4. Simplify.





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Ex.) Simplify.

a)  $\frac{(n-5) \cdot 4n}{(n-5)(n+4)} + \frac{3n \cdot (n-4)}{(n-5)(n+4)}$

LCM:  $(n+4)(n-5)$

$$= \frac{4n^2 - 20n + 3n^2 + 12n}{(n+4)(n-5)}$$

$$= \frac{7n^2 - 8n}{(n+4)(n-5)}$$

$$= \frac{n(7n-8)}{(n+4)(n-5)} \quad n \neq -4, 5$$

b)  $\frac{1}{x^2 - 36} - \frac{1}{6x - x^2}$

$$= \frac{1}{(x+6)(x-6)} - \frac{1}{-x(-6+x)}$$

$$= \frac{1}{(x+6)(x-6)} - \frac{1}{-x(x-6)}$$

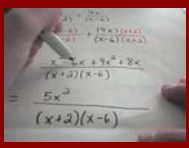
$$\frac{x}{x} \cdot \frac{1}{(x+6)(x-6)} + \frac{1}{x(x-6)} \cdot \frac{(x+6)}{(x+6)}$$

LCM:  $x(x+6)(x-6)$

$$= \frac{x + x + 6}{x(x+6)(x-6)}$$

$$= \frac{2x+6}{x(x+6)(x-6)} = \frac{2(x+3)}{x(x+6)(x-6)}$$

$x \neq \pm 6, 0$



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Ex.) Simplify.

a)  $\frac{(p+1)(p-1)}{(p+1)(p-2)} + \frac{(p+3)(p-2)}{(p+1)(p-2)}$

LCM:  $(p-2)(p+1)$

$$= \frac{p^2 - 1 + p^2 + p - 6}{(p+1)(p-2)}$$

$$= \frac{2p^2 + p - 7}{(p+1)(p-2)}$$

$p \neq -1, 2.$

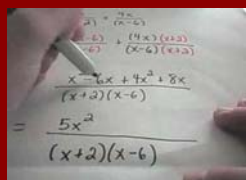
b)  $\frac{2}{e-3} - \frac{3e}{9-e^2}$

$$= \frac{2}{(e-3)} - \frac{3e}{-1(-9+e^2)}$$

$$= \frac{(e+3) \cdot 2}{(e+3)(e-3)} + \frac{3e}{(e+3)(e-3)}$$

$$= \frac{2e+6+3e}{(e+3)(e-3)}$$

$$= \frac{5e+6}{(e+3)(e-3)} \quad e \neq \pm 3$$



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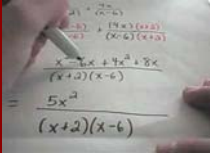
Ex.) Simplify.

a)  $\frac{5}{x^2 - 25} + \frac{4}{x^2 + 10x + 25}$

$$= \frac{(x+5) \cdot 5}{(x+5)(x+5)(x-5)} + \frac{4 \cdot (x-5)}{(x+5)(x+5)(x-5)}$$

LCM:  $(x+5)^2(x-5)$

$$= \frac{5x+25+4x-20}{(x+5)^2(x-5)} = \frac{9x+5}{(x+5)^2(x-5)} \quad x \neq \pm 5$$



**rational expressions**

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Ex.) Simplify.

$$b) \frac{(n-3)}{n^2 + 3n - 18} - \frac{(n-2)}{n^2 + n - 20}$$

$$\frac{(n+6)(n-3)}{(n+5)(n-4)} - \frac{(n-2)(n+6)}{(n+5)(n-4)(n+6)}$$

$$= \frac{n^2 + n - 20 + -n^2 - 4n + 12}{(n+5)(n-4)(n+6)}$$

$$= \frac{-3n - 8}{(n+5)(n-4)(n+6)} \quad n \neq -6, -5, 3, 4.$$



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Ex.) Simplify. (Hint: Remember BEDMAS.)

$$a) \frac{2x}{x+3} + \frac{3x}{2x+8} \div \frac{x^2}{3x+12}$$

$$= \frac{2x}{(x+3)} + \frac{3x}{2(x+4)} \cdot \frac{3(x+4)}{x^2}$$

$$\frac{2x}{2x} \cdot \frac{2x}{(x+3)} + \frac{9}{2x(x+3)}$$

$$= \frac{4x^2 + 9x + 27}{2x(x+3)} \quad x \neq -3, -4, 0$$

Pg. 336 # 3, 6-10.