

099 § 8, 3 #s 1-12 ALL, 15, 19, 25, 29, 31, 35, 36, 39, 47, 53

#s 1-10 combine the following fractions

$$\textcircled{1} \quad \frac{3}{4} + \frac{1}{2} = \frac{3}{2 \cdot 2} + \frac{1}{2} \cdot \frac{2}{2} = \frac{3+2}{2 \cdot 2} = \boxed{\frac{5}{4}}$$

$$\textcircled{2} \quad \frac{5}{6} + \frac{1}{3} = \frac{5}{3 \cdot 2} + \frac{1}{3} \cdot \frac{2}{2} = \frac{5+2}{3 \cdot 2} = \boxed{\frac{7}{6}}$$

$$\textcircled{3} \quad \frac{2}{5} - \frac{1}{15} = \frac{2}{5} \cdot \frac{3}{3} - \frac{1}{5 \cdot 3} = \frac{6-1}{5 \cdot 3} = \frac{5}{15} = \boxed{\frac{1}{3}}$$

$$\textcircled{4} \quad \frac{5}{8} - \frac{1}{4} = \frac{5}{2 \cdot 2 \cdot 2} - \frac{1}{2 \cdot 2} \cdot \frac{2}{2} = \frac{5-2}{2^3} = \boxed{\frac{3}{8}}$$

$$\textcircled{5} \quad \frac{5}{6} + \frac{7}{8} = \frac{5}{2 \cdot 3} \cdot \frac{2 \cdot 2}{2 \cdot 2} + \frac{7}{2 \cdot 2 \cdot 2} \cdot \frac{3}{3} = \frac{20+21}{3 \cdot 2^3}$$

$\downarrow \quad \downarrow$   
 $2 \cdot 3 \quad 2 \cdot 2 \cdot 2$   
LCD = 2, 2, 2, 3

$$= \boxed{\frac{41}{24}}$$

$$\textcircled{6} \quad \frac{3}{4} + \frac{2}{3} = \frac{3}{2 \cdot 2} \cdot \frac{3}{3} + \frac{2}{3} \cdot \frac{2 \cdot 2}{2 \cdot 2} = \frac{9+8}{12} = \boxed{\frac{17}{12}}$$

$\downarrow \quad \downarrow$   
 $2 \cdot 2 \quad 3$   
LCD = 2, 2, 3

099 § 5.3 #5 7-12 AU, 15, 17, 21, 23, 25, 27, 29, 31, 35, 36, 39, 47, 53

$$\textcircled{7} \quad \frac{9}{48} - \frac{3}{54} = \frac{9}{2^4 \cdot 3} - \frac{3}{2 \cdot 3^3} = \frac{3}{2^4 \cdot 3} - \frac{1}{2 \cdot 3^3}$$

$$\begin{array}{r} 2 \overline{)48} \\ 2 \overline{)24} \\ 2 \overline{)12} \\ 2 \overline{)6} \\ \underline{\phantom{2}3} \end{array}$$

$$\begin{array}{r} 2 \overline{)54} \\ 3 \overline{)27} \\ 3 \overline{)9} \\ \underline{\phantom{3}3} \end{array}$$

LCD =  $2^4 \cdot 3^3$

$$= \frac{81 - 24}{2^4 \cdot 3^3} = \frac{57}{2^4 \cdot 3^3}$$

~~$\frac{57}{432}$~~   
 Almost!  
 OK to leave this fraction, AFAIC.

Wait! Let's make sure this is reduced!

$$3 \overline{)57} \\ \underline{\phantom{3}19}$$

Aha! So

$$\frac{57}{432} = \frac{3 \cdot 19}{2^4 \cdot 3^3} = \frac{19}{2^4 \cdot 3^2}$$

$$\boxed{\frac{19}{2^4 \cdot 3^2}}$$

$$\boxed{\frac{19}{144}}$$

is Book answer.

is OK answer.

~~7~~  $\textcircled{7}$  Re-Do: Teacher SHOULD find lowest

terms BEFORE LCD!

$$\frac{9}{48} = \frac{3}{16}! \quad \frac{3}{54} = \frac{1}{18}!$$

$$3 \overline{)9} \\ \underline{\phantom{3}3}$$

$$\frac{9}{48} - \frac{3}{54} = \frac{3 \cdot 3}{2^4 \cdot 3} - \frac{3}{2 \cdot 3^3} = \frac{3}{2^4} - \frac{1}{2 \cdot 3^2}$$

$$= \frac{3}{2^4} \cdot \frac{3^2}{3^2} - \frac{1}{2 \cdot 3^2} \cdot \frac{2^3}{2^3} = \frac{27 - 8}{2^4 \cdot 3^2} = \boxed{\frac{19}{2^4 \cdot 3^2} = \frac{19}{144}}$$

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ALL

8)  $\frac{6}{28} - \frac{5}{42}$

$= \frac{3}{14} - \frac{5}{42} = \frac{3}{2 \cdot 7} - \frac{5}{2 \cdot 3 \cdot 7} = \frac{3}{2 \cdot 7} \cdot \frac{3}{3} - \frac{5}{2 \cdot 3 \cdot 7}$

$= \frac{9-5}{2 \cdot 3 \cdot 7} = \frac{4}{2 \cdot 3 \cdot 7} = \frac{2 \cdot 2}{2 \cdot 3 \cdot 7} = \boxed{\frac{2}{21}}$

9)  $\frac{3}{4} - \frac{1}{8} + \frac{2}{3} = \frac{3}{2 \cdot 2} \cdot \frac{2 \cdot 3}{2 \cdot 3} - \frac{1}{2 \cdot 2 \cdot 2} \cdot \frac{3}{3} + \frac{2}{3} \cdot \frac{2 \cdot 2}{2 \cdot 2}$

LCD = 2 · 2 · 2 · 3

$= \frac{18-3+16}{2^3 \cdot 3} = \boxed{\frac{31}{24}}$

10)  $\frac{1}{3} - \frac{5}{6} + \frac{5}{12} = \frac{1}{3} \cdot \frac{2^2}{2^2} - \frac{5}{2 \cdot 3} \cdot \frac{2}{2} + \frac{5}{2^2 \cdot 3}$

LCD = 2<sup>2</sup> · 3 = 12

$= \frac{4-10+5}{LCD} = \boxed{\frac{-1}{12}}$

~~11~~ #s 11-22 combine the rational expressions.  
 Reduce all answers to lowest terms.

11)  $\frac{x}{x+3} + \frac{3}{x+3} = \frac{x+3}{x+3} = \boxed{1}$

12)  $\frac{5x}{5x+2} + \frac{2}{5x+2} = \frac{5x+2}{5x+2} = \boxed{1}$

099 § 8.3 #s 15, 19, 25, 29, 31, 35, 36, 39, 47, 53

$$(15) \quad \frac{x}{x^2-y^2} - \frac{y}{x^2-y^2} = \frac{x-y}{x^2-y^2} = \frac{x-y}{(x-y)(x+y)} = \boxed{\frac{1}{x+y}}$$

$$(19) \quad \frac{1}{a} + \frac{2}{a^2} - \frac{3}{a^3} = \frac{1}{a} \cdot \frac{a^2}{a^2} + \frac{2}{a^2} \cdot \frac{a}{a} - \frac{3}{a^3}$$

$$= \boxed{\frac{a^2+2a-3}{a^3}} \quad \left( = \frac{(a+3)(a-1)}{a^3} \right)$$

#s 25-end same instructions

$$(25) \quad \frac{3x+1}{2x-6} - \frac{x+2}{x-3} = \frac{3x+1}{2(x-3)} - \frac{x+2}{x-3} \cdot \frac{2}{2}$$

$$2x-6 = 2(x-3) = \text{LCD}$$

$$= \frac{3x+1}{2(x-3)} - \frac{2(x+2)}{2(x-3)} = \frac{3x+1 - (2x+4)}{2(x-3)}$$

$$= \frac{3x+1-2x-4}{2(x-3)} = \frac{x-3}{2(x-3)} = \boxed{\frac{1}{2}}$$

$$(29) \quad \frac{x+1}{2x-2} - \frac{2}{x^2-1} = \frac{x+1}{2(x-1)} - \frac{2}{(x-1)(x+1)}$$

$$\text{LCD} = 2(x-1)(x+1)$$

$$= \frac{x+1}{2(x-1)} \cdot \frac{x+1}{x+1} - \frac{2}{(x-1)(x+1)} \cdot \frac{2}{2} =$$

$$= \frac{(x+1)(x+1) - 4}{2(x-1)(x+1)} = \frac{x^2+2x+1-4}{\text{LCD}} = \frac{x^2+2x-3}{\text{LCD}}$$

$$= \frac{(x+3)(x-1)}{2(x+1)(x-1)} = \boxed{\frac{x+3}{2(x+1)}}$$

099 8, 9#5 31, 35, 36, 39, 47, 53

$$(31) \quad \frac{1}{a-b} - \frac{3ab}{a^2-b^2}$$

$$= \frac{1}{a-b} - \frac{3ab}{(a-b)(a^2+ab+b^2)} \quad \text{LCD} = (a-b)(a^2+ab+b^2)$$

$$= \left( \frac{1}{a-b} \right) \left( \frac{a^2+ab+b^2}{a^2+ab+b^2} \right) - \frac{3ab}{(a-b)(a^2+ab+b^2)}$$

$$= \frac{a^2+ab+b^2-3ab}{\text{LCD}} = \frac{a^2-2ab+b^2}{\text{LCD}}$$

$$= \frac{(a-b)^2}{(a-b)(a^2+ab+b^2)} = \boxed{\frac{a-b}{a^2+ab+b^2}}$$

(35)  $-\frac{3}{3-x} = +\frac{3}{x-3}$ , first of all

$$\frac{x}{x^2-5x+6} + \frac{3}{x-3} = \frac{x}{(x-3)(x-2)} + \left( \frac{3}{(x-3)} \right) \left( \frac{x-2}{x-2} \right)$$

$$= \frac{x+3x-6}{(x-3)(x-2)} = \frac{4x-6}{(x-3)(x-2)} = \boxed{\frac{2(2x-3)}{(x-3)(x-2)}}$$

099 of 5.3#s 36, 39, 47, 53

$$\begin{aligned} \textcircled{36} \quad & \frac{x}{x^2+4x+4} - \frac{2}{x+2} && \text{LCD} = (x+2)(x+2) = (x+2)^2 \\ & = \frac{x}{(x+2)^2} - \frac{2}{x+2} \cdot \frac{x+2}{x+2} = \frac{x-2(x+2)}{\text{LCD}} \\ & = \frac{x-2x-4}{\text{LCD}} = \boxed{\frac{-x-4}{(x+2)^2}} \quad \text{OR} \quad -\frac{x+4}{(x+2)^2} \end{aligned}$$

$$\begin{aligned} \textcircled{39} \quad & \frac{1}{a^2-5a+6} + \frac{3}{a^2-a-2} && \text{LCD} = \\ & = \frac{1}{(a-3)(a-2)} + \frac{3}{(a-2)(a+1)} && (a-3)(a-2)(a+1) \\ & = \left( \frac{1}{(a-3)(a-2)} \right) \left( \frac{a+1}{a+1} \right) + \left( \frac{3}{(a-2)(a+1)} \right) \left( \frac{a-3}{a-3} \right) \\ & = \frac{1(a+1) + 3(a-3)}{\text{LCD}} = \frac{a+1+3a-9}{\text{LCD}} \\ & = \frac{4a-8}{\text{LCD}} = \frac{4(a-2)}{(a-3)(a-2)(a+1)} = \boxed{\frac{4}{(a-3)(a+1)}} \end{aligned}$$

099 § 5.3 # 47, 53

$$\textcircled{47} \quad \frac{2x-1}{x^2+x-6} - \frac{x+2}{x^2+5x+6}$$

$$\text{LCD} = (x+3)(x-2)(x+2)$$

$$= \frac{2x-1}{(x+3)(x-2)} - \frac{x+2}{(x+3)(x+2)}$$

$$= \left( \frac{2x-1}{(x+3)(x-2)} \right) \left( \frac{x+2}{x+2} \right) - \left( \frac{x+2}{(x+3)(x+2)} \right) \left( \frac{x-2}{x-2} \right)$$

$$= \frac{(2x-1)(x+2) - (x+2)(x-2)}{\text{LCD}}$$

$$= \frac{2x^2 + 3x - 2 - (x^2 - 4)}{\text{LCD}} = \frac{2x^2 + 3x - 2 - x^2 + 4}{\text{LCD}}$$

$$= \frac{x^2 + 3x + 2}{\text{LCD}} = \frac{(x+2)(x+1)}{(x+3)(x-2)(x+2)} = \boxed{\frac{x+1}{(x+3)(x-2)}}$$

099 § 8/3 #53

$$\textcircled{53} \frac{2x+8}{x^2+5x+6} - \frac{x+5}{x^2+4x+3} - \frac{x-1}{x^2+3x+2}$$

$$= \frac{2x+8}{(x+2)(x+3)} - \frac{x+5}{(x+3)(x+1)} - \frac{x-1}{(x+2)(x+1)}$$

$$\text{LCD} = (x+2)(x+3)(x+1)$$

$$= \left( \frac{2x+8}{(x+2)(x+3)} \right) \left( \frac{x+1}{x+1} \right) - \left( \frac{x+5}{(x+3)(x+1)} \right) \left( \frac{x+2}{x+2} \right) - \left( \frac{x-1}{(x+2)(x+1)} \right) \left( \frac{x+3}{x+3} \right)$$

$$= \frac{(2x+8)(x+1) - (x+5)(x+2) - (x-1)(x+3)}{\text{LCD}}$$

$$= \frac{2x^2 + 10x + 8 - (x^2 + 7x + 10) - (x^2 + 2x - 3)}{\text{LCD}}$$

$$= \frac{\cancel{2x^2} + 10x + 8 - \cancel{x^2} - 7x - 10 - \cancel{x^2} - 2x + 3}{\text{LCD}}$$

$$= \frac{x+1}{(x+1)(x+2)(x+3)} = \boxed{\frac{1}{(x+2)(x+3)}}$$