

Name: KEY

Read all directions and problems carefully! Show all appropriate work for credit

1. Find the following quotients using long division. (17 pts.)

$$\frac{6x+26+2x^3}{x+2}$$

$$\begin{array}{r} x+2 \overline{) 2x^3 + 0x^2 + 6x + 26} \\ \underline{\oplus 2x^3 \oplus 4x^2} \\ -4x^2 + 6x \\ \underline{\oplus 4x^2 \oplus 8x} \\ 14x + 26 \\ \underline{\oplus 14x \oplus 28} \\ \end{array}$$

$$= \boxed{2x^2 - 4x + 14 - \frac{2}{x+2}} \quad (+9)$$

$$\frac{6x^3 - 13x^2 - 4x + 15}{3x - 5}$$

$$\begin{array}{r} 3x-5 \overline{) 6x^3 - 13x^2 - 4x + 15} \\ \underline{\oplus 6x^3 \oplus 10x^2} \\ -3x^2 - 4x \\ \underline{\oplus 3x^2 \oplus 5x} \\ -9x + 15 \\ \underline{\oplus 9x \oplus 15} \\ \end{array}$$

$$= \boxed{2x^2 - x - 3} \quad (+8)$$

2. Find the sums or differences of the following fractions/rational expressions. Leave your answers reduced to lowest terms. (20 pts.)

$$-7\frac{5}{12} + 9\frac{7}{12}$$

$$= \frac{-84}{12} + \frac{115}{12}$$

$$= \frac{26 \div 2}{12 \div 2} = \frac{13}{6} \text{ OR } 2\frac{1}{6}$$

(+5)

$$\frac{2y^2}{x-y} + \frac{3x^3}{y-x}$$

$$= \frac{2y^2}{x-y} - \frac{3x^3}{x-y}$$

$$\boxed{\frac{2y^2 - 3x^3}{x-y}}$$

(+7)

$$\frac{3a}{a^2+3a-10} - \frac{6}{a^2+3a-10}$$

$$\frac{3a-6}{a^2+3a-10} = \frac{3(a-2)}{(a+5)(a-2)}$$

$$= \boxed{\frac{3}{a+5}} \quad (+8)$$

3. Find the LCM of the following numbers/expressions. (18 pts.)

$32x^4y^2$; $48x^6y^4$

LCM: $96x^6y^4z^2$ (+4)

$t^2+10t+25$; t^2-25

$(t+5)(t+5)$; $(t-5)(t+5)$

LCM: $(t+5)(t+5)(t-5)$ (+7)

$3a^2-5a-2$; $3a^2+4a+1$

$-6 \quad -5$; $3 \quad 4$

$3a^2-6a+1a-2$; $3a^2+3a+1a+1$
 $3a(a-2)+1(a-2)$; $3a(a+1)+1(a+1)$
 $(a-2)(3a+1)$; $(a+1)(3a+1)$

LCM: $(a-2)(3a+1)(a+1)$ (+7)

4. Find the sums or differences of the following fractions/rational expressions. Leave your answers reduced to lowest terms. (27 pts.)

$\frac{17}{18} - \frac{4}{24}$

LCM: ~~24~~
~~48~~
 72

$-\frac{68}{72} - \frac{63}{72}$

$-\frac{131}{72}$ or $-\frac{59}{72}$ (+5)

$\frac{5(m+9)}{5 \cdot 6m} + \frac{3(m-5)}{3 \cdot 10m}$

LCD: $30m$

$\frac{5m+45}{30m} + \frac{3m-15}{30m}$

$\frac{5m+3m+45-15}{30m} = \frac{8m+30}{30m}$

$= \frac{2(4m+15)}{30m}$

$= \frac{4m+15}{15m}$ (+9)

$\frac{(a-6)}{(a-6)} \cdot \frac{1}{(a+1)} + \frac{a(a+1)}{a-6} - \frac{5a-2}{a^2+5a-6}$

LCD: $(a-6)(a+1)$

$\frac{a-6}{(a-6)(a+1)} + \frac{a^2+a}{(a-6)(a+1)} - \frac{5a-2}{(a-6)(a+1)}$

$\frac{a-6+a^2+a-5a+2}{LCD} = \frac{a^2-3a-4}{LCD} = \frac{(a-4)(a+1)}{(a-6)(a+1)}$

$\frac{(a-4)}{(a-6)}$ (+13)

45

5. Simplify the following complex fractions completely. (18 pts.)

$$\frac{\frac{60}{1} \left(\frac{5}{4} - \frac{7}{12} \right) \frac{60}{1}}{\frac{60}{1} \left(\frac{7}{5} + \frac{13}{20} \right) \frac{60}{1}}$$

ALL LCD: $\frac{60}{1}$

$$\frac{\frac{a^2 - 16b^2}{ab} \frac{ab}{1}}{\frac{a+4b}{b} \frac{ab}{1}}$$

ALL LCD: $\frac{ab}{1}$

$$\frac{15(5) - 7(5)}{12(7) + 13(3)} = \frac{75 - 35}{84 + 39}$$

$$= \frac{40}{123} \text{ (+4)}$$

$$\frac{a^2 - 16b^2}{(a+4b)a}$$

$$\frac{(a-4b)(\cancel{a+4b})}{(\cancel{a+4b})a}$$

$$\frac{(a-4b)}{a}$$

(+7)

$$\frac{\frac{v^2}{1} \left(\frac{1}{v} - \frac{2}{v^2} \right) \frac{v^2}{1}}{v^2 \left(1 + \frac{4}{v} - \frac{12}{v^2} \right) \frac{v^2}{1}}$$

ALL LCD: $\frac{v^2}{1}$

$$\frac{v-2}{v^2+4v-12} = \frac{1(\cancel{v-2})}{(v+6)(\cancel{v-2})}$$

$$= \frac{1}{v+6} \text{ (+7)}$$