MCR3U

U1 - Rational Expressions: Practice

Use this problem set to help yourself prepare for the Test.
Questions? I'm available via Edsby, and in class.
Tuesday after school - extra help session!
Solutions will be posted on Tuesday.

Factor each completely.

1) $a^3 + 14a^2 + 40a$

Common factor when you can

$= a(a^2 + 14a + 40)$ $\times$ | $+$: 40 | 14 : $10, 4$

$= a(a+10)(a+4)$

2) $b^2 - 2b - 63$ $\times$ | $+$: -63 | -2 : $-9, +7$

$= (b-9)(b+7)$

3) $n^2 - 10n + 24$ $\times$ | $+$: 24 | -10 : $-6, -4$

$= (n-6)(n-4)$

4) $x^2 + 9x + 8$ $\times$ | $+$: 8 | 9 : $8, 1$

$= (x+8)(x+1)$

5) $4x^2 + 15x + 9$

×	+
(4)(9) = 36	15

12, 3

$= 4x^2 + 12x + 3x + 9$

$= 4x(x+3) + 3(x+3)$

$= (x+3)(4x+3)$

6) $4p^2 - 49$

difference of squares.

$= (2p-7)(2p+7)$

7) $6k^2 - 17k - 14$

×	+
(6)(-14) = -84	-17

-21, +4

$= 6k^2 - 21k + 4k - 14$

$= 3k(2k-7) + 2(2k-7)$

$= (2k-7)(3k+2)$

8) $6m^2 + 2m$

$= 2m(3m+1)$

Multiply the rational expressions. Be certain to state your restrictions

9) $\frac{18n+81}{6n+27} \cdot \frac{3}{n-2}$ rest $n \neq -\frac{9}{2}, 2$

$= \frac{9(2n+9)}{3(2n+9)} \cdot \frac{3}{n-2}$

$= \frac{9}{n-2}$

10) $\frac{6a+42}{a+2} \cdot \frac{1}{a+7}$ rest : $a \neq -2, -7$

$= \frac{6(a+7)}{a+2} \cdot \frac{1}{a+7}$

$= \frac{6}{a+2}$

11) $\frac{20x+36}{x-4} \cdot \frac{3x-4}{15x^2+7x-36}$ rest : $x \neq 4, \frac{4}{3}, -\frac{9}{5}$

$= \frac{4(5x+9)}{x-4} \cdot \frac{3x-4}{(3x-4)(5x+9)}$

$= \frac{4}{x-4}$

12) $\frac{8}{16p+48} \cdot \frac{2p^2+24p+54}{3}$ rest : $p \neq -3$

$2(p^2+12p+27)$ → 9, 3

$= \frac{8}{16(p+3)} \cdot \frac{2(p+9)(p+3)}{3}$

$= \frac{p+9}{3}$

Divide the Rational Expressions. Be sure to state (ALL) of your restrictions.

13) $\dfrac{n-5}{n^2-7n-18} \div \dfrac{1}{n+2}$ rest: $n \neq 9, -2$

$= \dfrac{n-5}{(n-9)(n+2)} \times \dfrac{n+2}{1}$

$= \dfrac{n-5}{n-9}$

14) $\dfrac{a+7}{a+8} \div \dfrac{4a-36}{a-9}$ rest: $a \neq -8, 9$

$= \dfrac{a+7}{a+8} \div \dfrac{4(a-9)}{a-9}$

$= \dfrac{a+7}{a+8} \times \dfrac{a-9}{4(a-9)}$

$= \dfrac{a+7}{4(a+8)}$

15) $\dfrac{3m^2-11m-4}{24m+8} \div \dfrac{2m^2-7m+3}{2m-1}$ rest: $m \neq -\frac{1}{3}, \frac{1}{2}, 3$

$= \dfrac{(3m+1)(m-4)}{8(3m+1)} \div \dfrac{(2m-1)(m-3)}{2m-1}$

$= \dfrac{(3m+1)(m-4)}{8(3m+1)} \times \dfrac{2m-1}{(2m-1)(m-3)}$

$= \dfrac{m-4}{8(m-3)}$

16) $\dfrac{5b+10}{2b^2+26b+80} \div \dfrac{5b^2+20b+20}{14b+70}$ rest: $b \neq -8, -5, -2$

$2(17+13b+4b^2)$ $-8,-5$ $\quad 5(b^2+4b+4)$ $-2,-2$

$= \dfrac{5(b+2)}{2(b+8)(b+5)} \div \dfrac{5(b+2)^2}{14(b+5)}$

$= \dfrac{5(b+2)}{2(b+8)(b+5)} \times \dfrac{14(b+5)}{5(b+2)^2}$

$= \dfrac{7}{(b+8)(b+2)}$

Add the Rational Expressions. State your restrictions!

17) $\frac{4x}{3x-5}+\frac{3}{5x+5}$ rest $x \neq \frac{5}{3}, -1$

CD: $5(3x-5)(x+1)$

$= \frac{4x}{3x-5} + \frac{3}{5(x+1)}$

$= \frac{4x(5)(x+1)}{(3x-5)(5)(x+1)} + \frac{3(3x-5)}{5(x+1)(3x-5)}$

$= \frac{20x(x+1) + 3(3x-5)}{5(3x-5)(x+1)}$

$= \frac{20x^2+20x+9x-15}{5(3x-5)(x+1)}$

$= \frac{20x^2+29x-15}{5(3x-5)(x+1)}$

18) $\frac{5v}{3v+5}+\frac{5v}{v+6}$ rest $v \neq -\frac{5}{3}, -6$

CD: $(3v+5)(v+6)$

$= \frac{5v(v+6)}{(3v+5)(v+6)} + \frac{5v(3v+5)}{(v+6)(3v+5)}$

$= \frac{5v^2+30v+15v^2+25v}{(3v+5)(v+6)}$

$= \frac{20v^2+55v}{(3v+5)(v+6)}$

$= \frac{5v(4v+11)}{(3v+5)(v+6)}$

19) $\frac{5k}{4k^2}+\frac{6}{3k^2+k-4}$ rest: $k \neq 0, -\frac{4}{3}, 1$

CD: $4k(3k+4)(k-1)$

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

$= \frac{5(3k+4)(k-1) + 6(4k)}{4k(3k+4)(k-1)}$

$= \frac{5(3k^2+k-4) + 24k}{4k(3k+4)(k-1)}$ ($15k^2$, $5k$, -20, $29k$)

$= \frac{15k^2+29k-20}{4k(3k+4)(k-1)}$

20) $\frac{4}{2x^2+8x+6}+\frac{6}{2x^3}$ rest: $x \neq -3, -1, 0$

CD: $x^3(x+3)(x+1)$

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

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

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

$= \frac{2x^3 + 3(x^2+4x+3)}{x^3(x+3)(x+1)}$ ($3x^2$, $12x$, 9)

$= \frac{2x^3+3x^2+12x+9}{x^3(x+3)(x+1)}$

Subtract. Does it really need to be said? :)

21) $\dfrac{4}{2x^3+12x^2} - \dfrac{2x}{x-2}$ rest: $x \neq 0, -6, 2$

CD: $x^2(x+6)(x-2)$

$= \dfrac{2}{2x^2(x+6)} - \dfrac{2x}{x-2}$

$= \dfrac{2(x-2) - 2x(x^2(x+6))}{x^2(x+6)(x-2)}$

$= \dfrac{2x-4-2x(x^3+6x^2)}{x^2(x+6)(x-2)}$

$= \dfrac{2x-4-2x^4-12x^3}{x^2(x+6)(x-2)}$

$= \dfrac{-2x^4-12x^3+2x-4}{x^2(x+6)(x-2)}$

22) $\dfrac{3}{4k^2-28k+24} - \dfrac{6}{3}$ rest $k \neq 6, 1$

CD: $4(k-6)(k-1)$

$= \dfrac{3}{4(k^2-7k+6)} - \dfrac{2}{1}$

$= \dfrac{3}{4(k-6)(k-1)} - \dfrac{2}{1}$

$= \dfrac{3-2(4(k-6)(k-1))}{4(k-6)(k-1)}$

$= \dfrac{3-8(k^2-7k+6)}{4(k-6)(k-1)}$

$= \dfrac{-8k^2+56k-45}{4(k-6)(k-1)}$

Simplify.

23) $\dfrac{p+1}{p^2+2p-35} + \dfrac{p+4}{p^2-2p-24} \cdot \dfrac{p^2-4p-12}{p^2+12p+35}$ rest: $p \neq -7, 2, 6, -4, -5$

$= \dfrac{p+1}{(p+7)(p-5)} + \dfrac{p+4}{(p-6)(p+4)} \cdot \dfrac{(p-6)(p+2)}{(p+5)(p+7)}$ CD $(p+7)(p-5)(p+5)$

$= \dfrac{(p+1)(p+5) + (p+2)(p-5)}{(p+7)(p-5)(p+5)}$

$= \dfrac{p^2+6p+5 + p^2-3p-10}{(p+7)(p-5)(p+5)} = \dfrac{2p^2+3p-5}{(p+7)(p-5)(p+5)}$

$= \dfrac{(2p+5)(p-1)}{(p+7)(p-5)(p+5)}$