Algebra II

Test Review Unit 11

Name Key Date _____

Test Review: Rational Expressions and Equations. Your test will also consist of graphing Rational equations.

1. Simplify: $\left(\frac{-5x}{3y}\right)\left(\frac{39x^2y^3}{15xy}\right)$

a) $-\frac{39x^2y}{3}$ (b) $-\frac{13x^2y}{3}$

c) $\frac{13x^2y^2}{3}$ d) $\frac{13x^3y^3}{3}$

$\frac{-5}{15} \cdot \frac{39}{3} \frac{x^3y^3}{x\,y^2}$

$= -\frac{1}{3} \cdot 13\,x^2 \cdot y$

$= \frac{-13x^2y}{3}$

2. Simplify the expression $\frac{9}{x^2-16} \cdot \frac{4-x}{21}$.

a) $-\frac{3}{7x-28}$ (b) $-\frac{3}{7x+28}$

c) $\frac{1}{x+4}$ d) $\frac{2}{7x+28}$

$\frac{9}{(x+4)(x-4)} \cdot \frac{-1(x-4)}{21} = \frac{-3}{7(x+4)}$

$= \frac{-3}{7x+28}$

3. Simplify: $\frac{m^2-7m+12}{m^2-m-6} \cdot \frac{m^2+7m+10}{m^2+m-20}$

a) 0 (b) 1 c) $\frac{1}{m+5}$ d) $\frac{m+5}{m-4}$

$\frac{(m-4)(m-3)}{(m-3)(m+2)} \cdot \frac{(m+5)(m+2)}{(m+5)(m-4)}$

$= 1$

4. Simplify: $\frac{10a+8-3a^2}{a^2-a-12} \cdot \frac{9a^3-81a}{3a^2-7a-6}$

a) $-\frac{3a+2}{a-4}$ b) $-\frac{3}{a}$

(c) $-9a$ d) $18a^2$

$-\frac{(3a^2-10a-8)}{a^2-a-12} \cdot \frac{9a^3-81a}{3a^2-7a-6}$

$= -\frac{(3a+2)(a-4)}{(a-4)(a+3)} \cdot \frac{9a(a^2-9)}{(3a+2)(a-3)}$

$= -\frac{9a(a+3)(a-3)}{(a+3)(a-3)} = -9a$

5. Simplify: $4abc \div \frac{2a^2b}{3d^2}$

a) $\frac{6cd}{a}$ (b) $\frac{6cd^2}{a}$ c) $\frac{12cd^2}{a}$ d) $\frac{12acd^2}{2a^2}$

$4abc \cdot \frac{3d^2}{2a^2b}$

$= \frac{12abcd^2}{2a^2b}$

$= \frac{6cd^2}{a}$

6. Simplify the expression $\frac{x^2-xy}{cx^2-cy^2} \div \frac{x^3-x^2}{cx^2-cx}$.

(a) $\frac{1}{x+y}$ b) $\frac{x}{x+y}$ c) $\frac{x}{x^2+y}$ d) $x+y$

$\frac{x(x-y)}{c(x^2-y^2)} \cdot \frac{cx^2-cx}{x^3-x^2}$

$= \frac{x(x-y)}{c(x+y)(x-y)} \cdot \frac{cx(x-1)}{x^2(x-1)}$

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

7. Find the quotient $\frac{\frac{2}{3}+\frac{5}{9}}{\frac{1}{4}+\frac{1}{12}}$, and express in lowest terms.

a) $\frac{1}{3}$ b) $\frac{4}{3}$ c) $\frac{8}{3}$ (d) $\frac{11}{3}$

$\frac{\frac{6}{9}+\frac{5}{9}}{\frac{3}{12}+\frac{1}{12}} = \frac{\frac{11}{9}}{4/12} = \frac{11}{9}\cdot\frac{12}{4}$

$= \frac{11}{9}\cdot 3 = \frac{33}{9} = \frac{11}{3}$

8. Simplify the expression $\frac{\frac{m^3p^4}{5m}}{\frac{8mp^5}{p^2}}$.

a) $\frac{p}{40}$ b) $\frac{m}{40}$ (c) $\frac{mp}{40}$ d) $\frac{m^2p}{50}$

$\frac{m^3p^4}{5m}\cdot\frac{p^2}{8mp^5} = \frac{m^3p^6}{40m^2p^5}$

$= \frac{mp}{40}$

9. Find the expression that is equivalent to $\frac{-1}{x^2}+\frac{3}{xy}$. LCD = x^2y

a) $\frac{-y+3x}{xy}$ (b) $\frac{-y+3x}{x^2y}$

c) $\frac{2}{x^2+xy}$ d) $\frac{-y+3x^2}{x^2y^2}$

$-\frac{1}{x^2}\cdot\frac{y}{y} + \frac{3}{xy}\cdot\frac{x}{x}$

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

10. Simplify: $\frac{1}{m^2-9}+\frac{1}{3m+9} \longrightarrow 3(m+3)$ LCD = $3(m+3)(m-3)$ $(m+3)(m-3)$

a) $\frac{m}{3(m+3)}$ b) $\frac{2m}{3(m-3)}$

c) $\frac{2}{m^2+3m}$ (d) $\frac{m}{3(m+3)(m-3)}$

$\frac{1}{(m+3)(m-3)}\cdot\frac{3}{3} + \frac{1}{3(m+3)}\cdot\frac{(m-3)}{(m-3)}$

$= \frac{3+(m-3)}{3(m+3)(m-3)} = \frac{m}{3(m+3)(m-3)}$

11. Simplify the expression $\frac{9}{8-y}+\frac{6}{y-8}$.

(a) $-\frac{3}{y-8}$ b) $-\frac{15}{y-8}$ c) $\frac{5}{8-y}$ d) $\frac{15}{16}$

$\frac{-9}{y-8} + \frac{6}{y-8} = \frac{-3}{y-8}$

12. Simplify: $\frac{-1}{7z}+\frac{3}{z+2}+\frac{4}{7z(z+2)}$ LCD = $7z(z+2)$

a) $\frac{10z+1}{7z(z+2)}$ (b) $\frac{20z+2}{7z(z+2)}$

c) $\frac{20z+2}{7z^2(z+2)}$ d) $\frac{20z^2+2}{7z(z^2+2)}$

$-\frac{1}{7z}\cdot\frac{(z+2)}{(z+2)} + \frac{3}{(z+2)}\cdot\frac{7z}{7z} + \frac{4}{7z(z+2)}$

$= \frac{-z-2+21z+4}{7z(z+2)} = \frac{20z+2}{7z(z+2)}$

13. Simplify: $\frac{6}{y^2} - \frac{2}{y}$ LCD = y^2

a) $\frac{8}{y^3}$ (b) $\frac{6-2y}{y^2}$

c) $\frac{9-2y}{y^2-y}$ d) $\frac{16-3y}{y^3}$

$\frac{6}{y^2} - \frac{2}{y} \cdot \frac{y}{y} = \frac{6-2y}{y^2}$

14. Find the difference $\frac{2x}{x+y} - \frac{3x}{2x+2y}$, and express in lowest terms. $\rightarrow 2(x+y)$

a) $-\frac{x}{x+y}$ (b) $\frac{x}{2(x+y)}$ LCD = $2(x+y)$

c) $\frac{x}{2(x^2+y^2)}$ d) $\frac{x^2}{2(x^2+y^2)}$

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

$= \frac{x}{2(x+y)}$

for these 2 problems you can also cross-multiply

Solve.

15. $\frac{2}{y+5} = \frac{7}{y}$ LCD = $y(y+5)$

exclude $y=0$, $y=-5$

$\frac{2y(y+5)}{(y+5)} = \frac{7y(y+5)}{y}$

$2y = 7(y+5)$

$2y = 7y+35$

$-5y = 35$

$y = -7$

16. $\frac{5h-2}{h+2} = \frac{5h-4}{h+4}$ LCD = $(h+2)(h+4)$

exclude $h=-2$, $h=-4$

$(5h-2)(h+4) = (5h-4)(h+2)$

$5h^2+20h-2h-8 = 5h^2+10h-4h-8$

$5h^2+18h-8 = 5h^2+6h-8$

$18h = 6h$ DO NOT divide by h

$12h = 0$ FACTOR

$\frac{12h}{12} = \frac{0}{12}$

$h = 0$

17. $\frac{r-3}{3r} - \frac{5}{12} + \frac{1}{r} = \frac{6-r}{6r}$ LCD = $12r$

exclude $r=0$

$\frac{(r-3)\cdot 12r}{3r} - \frac{5\cdot 12r}{12} + \frac{12r}{r} = \frac{(6-r)\cdot 12r}{6r}$

$4(r-3) - 5r + 12 = 2(6-r)$

$4r-12-5r+12 = 12-2r$

$-r = 12-2r$

$r = 12$

18. $\frac{4}{v-4} + \frac{v}{4-v} - 2 = 0$ LCD = $v-4$

exclude $v=4$

$\frac{4}{v-4} - \frac{v}{v-4} - 2 = 0$

$4 - v - 2(v-4) = 0$

$4 - v - 2v + 8 = 0$

$12 - 3v = 0$

$12 = 3v$

$v = 4$ This value was excluded because it makes our denominator = 0

$\therefore$ No Solution

19. $\frac{18}{n^2-9} + 1 = \frac{n}{n+3}$

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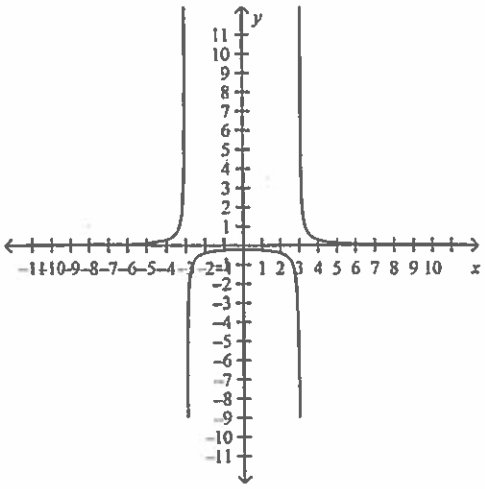
Test Review Unit 11

Short Answer

1. State the horizontal and vertical asymptotes, domain, and range of the graph below.



VA $x = -3$, $x = 3$

HA $y = 0$

Domain $(-\infty, -3) \cup (-3, 3) \cup (3, \infty)$

(This means all Reals except $x = -3$ and $x = 3$)

Range $(-\infty, 0) \cup (0, \infty)$

(This means all reals except $y = 0$)

2. State the vertical asymtote(s) for each rational function.

a) $f(x) = \frac{3}{x+5}$

VA $x = -5$

HA $y = 0$

b) $f(x) = \frac{x-4}{x^3 - 49x}$

$x^3 - 49x = 0$

$x(x^2 - 49) = 0$

$x(x+7)(x-7) = 0$

VA $x = 0$, $x = -7$, $x = 7$

HA $y = 0$

c) $f(x) = \frac{5}{(x-5)(x+9)}$

VA $x = 5$, $x = -9$

HA $y = 0$

VA look at x-values that make denominator = 0

HA look at ratio of biggest powers

- if denominator larger, $y = 0$
- if numerator larger, None
- if equal, ratio of coefficients