Name (key) Date

Algebra 2 Chapter 5 Test Review (Part 1)

Please do your work on an extra sheet of paper.

1) The monthly minimum payment p due on a certain credit card with a fixed rate varies directly as the balance b, and $p = \$19.80$ when $b = \$1100$. Find p when $b = \$3000$.

$p = \$54$

2) The time t that it takes Hannah to bike to school varies inversely as her average speed s. If she can bike to school in 25 min when her average speed is 6mi/h, what would her average speed need to be to get to school in 20 min?

$s = 7.5$ mi/h

3) Newton's Law of Gravity states that any two objects have a gravitational force between them that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

a) Write Newton's Law of Gravitation using F for the gravitational force, m_1 and m_2 for the masses, G for the constant of proportionality, and r for the distance between the objects.

$F = \frac{Gm_1m_2}{r^2}$

b) If two objects of mass 1.0 kg and 2.0 kg located 1.0 m apart exert a gravitational force of 1.3333×10^{-10} N on each other, what is the value of the gravitational constant?

$G = 6.6665 \times 10^{-11}$ N

c) What is the gravitational force between two football players with masses of 115 kg and 130 kg who are lined up 1.5m from one another?

$F = 4.4295 \times 10^{-7}$ N

Simplify. Identify any x-vales for which the expression is undefined.

4) $\frac{24x^{14}y^{10}z^6}{9x^{16}y^4z^{10}}$

$\frac{8y^6}{3x^2z^4}$

5) $\frac{x+4}{3x^2+11x-4} = \frac{1}{3x-1}$

$x \neq 1/3 \quad x \neq -4$

6) $\frac{6x^2+7x-3}{-3x^2+x} = \frac{2x+3}{-x}$

$x \neq 0 \quad x \neq 1/3$

7) $\frac{x^{3y}+4x^{2y}-3x^y-12}{x^y+4} = x^{2y}-3$

$x^y \neq -4$

Perform the indicated operation. Assume all expressions are defined.

8) $\frac{2x+14}{x^2-25} \cdot \frac{8x+40}{6x+42}$

$\frac{8}{3(x-5)}$

9) $\frac{3x^2+15x-18}{36x^3-12x^2} \cdot \frac{9x^3-3x^2}{9x^2+36x-108}$

$\frac{x-1}{12(x-2)}$

10) $\frac{3x^2+6x-24}{x^2-x-20} \div \frac{3x^3-9x^2+6x}{x}$

$\frac{1}{(x-5)(x-1)}$

11) $\frac{4x^2-12x-72}{8x^2+32x-40} \div \frac{x^2-9x+18}{x^2+2x-15}$

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

12) $\frac{2a^2-2a-12}{a^2-49} \cdot \frac{4a^2-1}{2a^2+5a+2} \cdot \frac{2a^2-13a-7}{2a^2-7a+3}$

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

13) $\frac{m^3+n^3}{mp-mq-np+nq} \div \frac{mn-m^2-n^2}{mp-mq+np-nq}$

$\frac{-(m+n)^2}{(m-n)}$

Add or subtract. Identify any x-values for which the expression is undefined.

14) $\frac{7x}{x^2-5x} + \frac{x^2}{x-5}$

$\frac{7+x^2}{(x-5)}$ $x \neq 0$ $x \neq 5$

15) $\frac{2x}{x-1} - \frac{9}{x-2}$

$\frac{2x^2-13x+9}{(x-1)(x-2)} \Rightarrow$ $x \neq 1$ $x \neq 2$

16) $\frac{4x^2}{3x+4} - \frac{2}{2x-3}$

$\frac{8x^3-12x^2-6x-8}{(3x+4)(2x-3)}$ $x \neq -\frac{4}{3}$ $x \neq \frac{3}{2}$

17) $\frac{6}{x^2+4x-32} - \frac{x-5}{x-4}$

$\frac{-x^2-3x+46}{(x+8)(x-4)}$ $x \neq 4$ $x \neq -8$

18) $\frac{x+7}{x^2+13x+42} - \frac{10x}{x^2+8x+7}$

$\frac{-9x^2-52x+7}{(x+6)(x+7)(x+1)}$ $x \neq 6$ $x \neq -7$ $x \neq -1$

19) $\frac{x-1}{x+2} + \frac{4}{x^2-4} - \frac{6x}{x-2}$

$\frac{-5x^2+15x+6}{(x+2)(x-2)}$ $x \neq 2$ $x \neq$

20) $(x+2)^{-2} - (x^2-4)^{-1}$

$\frac{-4}{(x+2)(x+2)(x-2)}$ $x \neq 2$ $x \neq -2$

Solve each equation.

21) $\frac{4x}{x-4} = \frac{2x+8}{x-4}$

$x = -2$

22) $-\frac{6}{x} + 1 = \frac{7}{x^2}$

$x = 7$ $x = -1$

23) $\frac{2}{d+2} + \frac{8}{d-2} = \frac{14}{d^2-4}$

$d = 1/5$

Solve each inequality algebraically.

24) $\frac{12}{s-5} > 3$

25) $\frac{7z}{z-4} \geq 6$

27) $\frac{-9x}{x+12} < -5$

Not on test

Word Problems:

28) An artist is designing a picture whose length, l, and width, w, satisfy the Golden Ratio, which is $\frac{w}{l} = \frac{l}{l+w}$. If the length of the frame is 24 inches, what is width of frame?

$l = -12 \pm 12\sqrt{5} \approx 14.83$ in

29) Team A can wash all the windows in the school x hours. It takes Team B 3 hours longer to do the same job. If the teams work together, they can complete the job in 8.5 hours. How long does it take Team B to do the job alone?

18.6 h

30) Vicki and Lorena motor downstream at about 6 knots (nautical miles per hour) in their boat. The return trip against the current, and they can motor at only 3 knots.
Vicki wants to find the average speed for the entire trip.

a) Write an expression for the time it takes to travel downstream plus the time is takes for the return trip if the distance in each direction is d.

$\frac{d}{6} + \frac{d}{3}$

b) What is the total distance they travel downstream and upstream in terms of d?

$2d$

c) Write an expression for their average speed using the expressions for the total time and the total distance.

$$\frac{2d}{\left(\frac{d}{6} + \frac{d}{3}\right)}$$

d) Vicki says that the average speed is 4 knots. Lorena says that the average speed is 4.5 knots. Explain who is correct and why.

Vichi (4 knots) is correct because you cannot just average the two speed. The total distance / time must be calculated.

(Key)

① $p = kb$

$19.80 = k(1100)$

$k = .018$

$p = (.018)(3000)$

$\boxed{p = 54}$

② $t = \frac{k}{s}$

$25 = \frac{k}{6}$

$k = 150$

$t = \frac{150}{s}$

$20 = \frac{150}{s}$

$\boxed{s = 7.5}$

③ a) $F = \frac{Gm_1m_2}{r^2}$

b) $1.3333 \times 10^{-10} = \frac{G(1.0)(2.0)}{(1.0)^2}$

$1.3333 \times 10^{-10} = 2G$

$G = 6.6665 \times 10^{-11}\ N$

c) $F = \frac{(115)(130)(6.6665 \times 10^{-11})}{(1.5)^2}$

$F = 4.4295 \times 10^{-7}\ N$

④ $\frac{24x^{14}y^{10}z^{6}}{9x^{16}y^{4}z^{10}} = \boxed{\frac{8y^{6}}{3x^{2}z^{4}}}$

⑤ $\frac{(x+4)}{(3x^2+11x-4)} = \frac{(x+4)}{(3x^2+12x-1x-4)} = \frac{(x+4)}{3x(x+4)-1(x+4)} = \frac{(x+4)}{(x+4)(3x-1)} = \boxed{\frac{1}{3x-1}}$

$x \neq \frac{1}{3} \quad x \neq -4$

⑥ $\frac{6x^2+7x-3}{-3x^2+x} = \frac{(6x^2+9x-2x-3)}{-x(3x-1)} = \frac{3x(2x+3)(-1)(2x+3)}{-x(3x-1)} =$

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

$x \neq 0$

$x \neq \frac{1}{3}$

⑦ $\frac{(x^{3y}+4x^{-y}(3x^{y}-12)}{x^{y}+4} = \frac{x^{2y}(x^{y}+4)-3(x^{y}+4)}{(x^{y}+4)} =$

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

(8) $\frac{2x+14}{x^2-25} \cdot \frac{8x+40}{6x+42} \Rightarrow \frac{2(x+7)}{(x+5)(x-5)} \cdot \frac{8(x+5)}{6(x+7)} = \boxed{\frac{8}{3(x-5)}}$

(9) $\frac{3(x^2+5x-6)}{12x^2(3x-1)} \cdot \frac{3x^2(3x-1)}{9(x^2+4x-12)} = \frac{3(x+6)(x-1)}{12x^2(3x-1)} \cdot \frac{3x^2(3x-1)}{9(x+6)(x-2)}$

$\boxed{\frac{x-1}{12(x-2)}}$

(3) $\frac{3(x^2+2x-8)}{(x-5)(x+4)} \div \frac{3x(x^2-3x+2)}{x} = \frac{3(x-2)(x+4)}{(x-5)(x+4)} \cdot \frac{x}{3x(x-2)(x-1)}$

$\boxed{\frac{1}{(x-5)(x-1)}}$

( ) $\frac{4(x^2-3x-18)}{8(x^2+4x-5)} \cdot \frac{(x+5)(x-3)}{(x-6)(x-3)} = \frac{4(x-6)(x+3)}{8(x+5)(x-1)} \cdot \frac{(x+5)(x-3)}{(x-6)(x-3)}$

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

$\frac{2(a^2-1a-6)}{(a+7)(a-7)} \cdot \frac{(2a+1)(2a-1)}{(2a^2+4a)(a+2)} \cdot \frac{(2a^2-14a)+(a-7)}{(2a^2-6a)(1a+3)} =$

$\frac{(a-3)(a+2)}{a+7)(a-7)} \cdot \frac{(2a+1)(2a-1)}{2a(a+2)+1(a+2)} \cdot \frac{2a(a-7)+1(a-7)}{2a(a-3)-1(a-3)} =$

$\frac{(a-3)(a+2)}{+7)(a-7)} \cdot \frac{(2a+1)(2a-1)}{(2a+1)(a+2)} \cdot \frac{(2a+1)(a-7)}{(2a-1)(a-3)} = \boxed{\frac{2(2a+1)}{(a+7)}}$

(13) $\frac{m^3+n^3}{(mp-mq)+(-np+nq)} \cdot \frac{(mp-mq)+(np-nq)}{mn-m^2-n^2} =$

$\frac{(m+n)(m^2-mn+n^2)}{m(p-q)+(n)(p-q)} \cdot \frac{m(p-q)+(n)(p-q)}{mn-m^2-n^2} =$

$\frac{(m+n)(m^2-mn+n^2)}{(m-n)(p-q)} \cdot \frac{(m+n)(p-q)}{mn-m^2-n^2} = \frac{(m+n)(-1)(-m^2+mn-n^2)}{(m-n)} \cdot \frac{(m+n)}{(mn-m^2-n^2)}$

$\frac{-(m+n)(m+n)}{(m-n)} = \boxed{\frac{-(m+n)^2}{(m-n)}}$

(14) $\frac{2x}{x(x-5)} + \frac{x^2}{(x-5)} = \frac{2}{(x-5)} + \frac{x^2}{(x-5)} = \boxed{\frac{2+x^2}{(x-5)}}$

$x \neq 0, x \neq 5$

(15) $\frac{2x^{(x-2)}}{(x-1)_{(x-2)}} - \frac{9^{(x-1)}}{(x-2)(x-1)} =$

$\frac{2x(x-2)}{(x-1)(x-2)} - \frac{9(x-1)}{(x-1)(x-2)} =$

$\frac{2x^2-4x-9x+9}{(x-1)(x-2)} = \boxed{\frac{2x^2-13x+9}{(x-1)(x-2)}}$

$x \neq 1 \quad x \neq 2$

(16) $\frac{4x^{2(2x-3)}}{(3x+4)_{(2x-3)}} - \frac{2^{(3x+4)}}{(2x-3)_{(3x+4)}}$

$\frac{4x^2(2x-3)}{(3x+4)(2x-3)} - \frac{2(3x+4)}{(3x+4)(2x-3)} = \frac{8x^3-12x^2}{(3x+4)(2x-3)} - \frac{(6x+8)}{(3x+4)(2x-3)} = \boxed{\frac{8x^3-12x^2+(6x-8)}{(3x+4)(2x-3)}}$

(17) $\frac{6}{(x+8)(x-4)} - \frac{(x-5)\cdot(x+8)}{(x-4)\cdot(x+8)} = \frac{6}{(x+8)(x-4)} - \frac{x^2+3x-40}{(x+8)(x-4)} = \boxed{\frac{-x^2-3x+46}{(x+8)(x-4)}}$

(18) $\frac{((x+7))^{(x+1)}}{(x+6)((x+7))_{(x+1)}} - \frac{10x^{(x+6)}}{(x+7)(x+1)(x+6)} = \frac{(x+7)(x+1)}{(x+6)(x+7)(x+1)} - \frac{10x(x+6)}{(x+7)(x+1)(x+6)} =$

$\frac{x^2+8x+7}{(x+6)(x+7)(x+1)} - \frac{10x^2+60x}{(x+6)(x+7)(x+1)} = \boxed{\frac{-9x^2-52x+7}{(x+6)(x+7)(x+1)}}$

(19) $\frac{x-1^{(x-2)}}{(x+2)_{(x-2)}} + \frac{4}{(x+2)(x-2)} - \frac{6x^{(x+2)}}{(x-2)(x+2)} = \frac{x^2-3x+2}{(x+2)(x-2)} + \frac{4}{(x+2)(x-2)} - \frac{6x^2+12x}{(x+2)(x-2)} =$

$\boxed{\frac{-5x^2-15x+6}{(x+2)(x-2)}}$

(20) $\frac{1}{(x+2)^2} - \frac{1}{(x^2-4)} \Rightarrow \frac{1}{(x+2)(x+2)}\cdot\frac{(x-2)}{(x-2)} - \frac{1}{(x+2)(x-2)}\cdot\frac{(x+2)}{(x+2)}$

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

(21) $\frac{4}{x-4} = \frac{2(x+4)}{(x-4)} \Rightarrow 4 = 2(x+4)$

$2 = x+4$

$\boxed{x = -2}$

(22) $\left(\frac{-6}{x}\right)^{x^2} \cdot 8^{x^2} = \left(\frac{1}{x^2}\right)^{x-}$ LCD $= x^2$

$-6x + x^2 = ?$

$x^2 - 6x - ? = 0$

$(x-?)(x+1) = 0$

$\boxed{x = ? \quad x = -1}$

(23) $\frac{2}{(d+2)} + \frac{8}{(d-2)} = \frac{14}{(d+2)(d-2)}$ $(d+2)(d-2)$

$2d - 4 + 8d + 16 = 14$

$10d + 12 = 14$

$10d = 2$

$\boxed{d = 1/5}$

(28) $\frac{w}{l} = \frac{l}{l+w}$ LCD $24(24+w)$

$l = 24$

$\frac{w}{24} = \frac{24}{24+w}$

$(24)(24+w)\left(\frac{w}{24}\right) = (24)(24+w)\left(\frac{24}{24+w}\right)$

$24w + w^2 = 576$

$w^2 + 24w - 576 = 0$

$\frac{-24 \pm \sqrt{(24)^2 - 4(1)(-576)}}{2(1)} = \frac{-24 \pm \sqrt{576 + 2304}}{2} = \frac{-24 \pm \sqrt{2880}}{2}$

$\frac{-24 \pm \sqrt{576 \cdot 5}}{2} = \frac{-24 \pm 24\sqrt{5}}{2} = -12 \pm 12\sqrt{5}$

$\boxed{l = -12 + 12\sqrt{5} \approx 14.83}$

(29) Team A's rate: $\frac{1}{x}$ school windows per hour

Team B's rate: $\frac{1}{x+3}$ school windows per hour

Together: 8.5 hr to complete job

$\frac{1}{x}(8.5) + \frac{1}{x+3}(8.5) = 1$ complete job

$\frac{8.5}{x} + \frac{8.5}{x+3} = \frac{1}{(x+3)}$ LCD $= (x)(x+3)$

$8.5x + 25.5 + 8.5x = x^2 + 3x$

$0 = x^2 - 14x - 25.5$

$\frac{14 \pm \sqrt{(14)^2 - 4(1)(25.5)}}{2(1)} = \frac{14 \pm \sqrt{196 + 102}}{2} =$

$\frac{14 \pm \sqrt{298}}{2} \Rightarrow \frac{14 + \sqrt{298}}{2} = 15.6$ h

$15.6 + 3 = 18.6$

(30) a) time = $\frac{\text{distance}}{\text{rate}}$

$$\boxed{\frac{d}{6} + \frac{d}{3}}$$

b) Total distance = $2d$

c) Avg speed = $\frac{\text{total distance}}{\text{total time}}$

$$\frac{2d}{\left(\frac{d}{6} + \frac{d}{3}\right)}$$

d) $\frac{2d}{\left(\frac{d}{6} + \frac{d}{3}\right)}$ $\overset{(6)}{}$ $\overset{(6)}{}$ LCD = 6

$$\frac{12d}{\left(\frac{d}{6}\right) + \left(\frac{d}{3}\right)} = \frac{12d}{d + 2d} = \frac{12d}{3d} = \boxed{4 \text{ knots}}$$

Name Key

Rational Expression Worksheet Review #16
Adding/Subtracting/Solving

Add or subtract these rational expressions. Show your common denominators and numerators on this sheet or separate paper. FACTOR denominators when possible.

1. $\frac{3}{8x}-\frac{1}{4}\Rightarrow$ LCD: $8x$

$\frac{3}{8x}-\frac{1}{4}\cdot\frac{2x}{2x}=\frac{3}{8x}-\frac{2x}{8x}=\boxed{\frac{3-2x}{8x}}$

2. $\frac{2}{6x-30}+\frac{7}{x-5}\Rightarrow\frac{2}{6(x-5)}+\frac{7}{x-5}=$

$\frac{1}{3(x-5)}+\frac{7}{(x-5)}\cdot\frac{(3)}{(3)}$ LCD $3(x-5)$

$\frac{1}{3(x-5)}+\frac{21}{3(x-5)}=\boxed{\frac{22}{3(x-5)}}$

3. $\frac{7}{12}\times\frac{4}{4}-\frac{4x}{3x}\times\frac{4}{4}$ LCD: $12x$

$\frac{7x}{12x}-\frac{16x}{12x}=\frac{-9x}{12x}=\boxed{\frac{-3}{4}}$

4. $\frac{3}{y+3}+\frac{2y}{y^2+8x+15}=\frac{3}{(y+3)}+\frac{2y}{(y+3)(y+5)}$

LCD: $(y+3)(y+5)$

$\frac{(y+5)3}{(y+5)(y+3)}+\frac{2y}{(y+5)(y+3)}=\frac{3y+15}{(y+3)(y+5)}+\frac{2y}{(y+3)(y+5)}$

$\frac{5y+15}{(y+3)(y+5)}=\frac{5(y+3)}{(y+3)(y+5)}=\boxed{\frac{5}{y+5}}$

5. $\frac{5x}{x-7}+\frac{2x}{4x-28}=\frac{5x}{x-7}+\frac{2x}{4(x-7)}$

$4(x-7)$

$\frac{20x}{4(x-7)}+\frac{2x}{4(x-7)}=\frac{22x}{4(x-7)}=\boxed{\frac{11x}{2(x-7)}}$

6. $\frac{6}{y+8}-\frac{3y}{y^2+11x+24}$

$(y+3)$

$\frac{6}{(y+3)(y+8)}-\frac{3y}{(y+8)(y+3)}=\frac{6y+18-3y}{(y+3)(y+8)}=$

$\boxed{\frac{3y-18}{(y+3)(y+8)}}$

Solve each equation for *x*. SHOW WORK!

7.) $\frac{3x}{x+7}-\frac{8}{x+7}=\frac{-23}{x+7}$

$3x-8=-23$

$\frac{3x}{3}=\frac{-15}{3}$

$\boxed{x=-5}$

8.) $\frac{2}{5(x-8)}+\frac{4}{5}=\frac{6}{(x-8)}$ LCD: $5(x-8)$

$(5)(x-8)\quad(5)(x-8)\quad(5)(x-8)$

$2+4x-32=30$

$4x-30=30$

$4x=60$

$\boxed{x=15}$

Name Key

Rational Expression Worksheet Review #15: Simplify/Multiply/Divide

Simplify ***(remember to factor when necessary).***

1. $\frac{24x^6y^3}{56x^4y^7} =$ $\boxed{\frac{3x^2}{7y^4}}$

2. $\frac{x^2+6x+8}{5x+10} = \frac{(x+2)(x+4)}{5(x+2)} =$ $\boxed{\frac{x+4}{5}}$

3. $\frac{x^2-3x-40}{x^2+2x-15} = \frac{(x-8)(x+5)}{(x+5)(x-3)} =$ $\boxed{\frac{x-8}{x-3}}$

Multiply or divide ***(remember to factor when necessary).***

4. $\frac{6x+18}{x^2+5x+4} \cdot \frac{x^2-x-2}{x^2+4x+3} = \frac{6(x+3)}{(x+4)(x+1)} \cdot \frac{(x+1)(x-2)}{(x+3)(x+1)}$ $\boxed{\frac{6(x-2)}{(x+4)(x+1)}}$

5. $\frac{x^2-x-12}{4x+12} \div \frac{x^2+x-20}{3x+15} \Rightarrow \frac{(x-4)(x+3)}{4(x+3)} \cdot \frac{3(x+5)}{(x+5)(x-4)}$ $\boxed{\frac{3}{4}}$

6. $\frac{35x^4}{45x^3} \div \frac{5x^6}{9x^2} = \frac{5x}{7} \cdot \frac{9}{5x^3} =$ $\boxed{\frac{9}{7x^3}}$

7. $\frac{6x-24}{x^2-9x+20} \cdot \frac{5x-25}{3x-6} = \frac{2\cdot 3(x-4)}{(x-4)(x-5)} \cdot \frac{5(x-5)}{3(x-2)}$ $\boxed{\frac{10}{3(x-2)}}$

8. $\frac{7x-14}{4x^2} \cdot \frac{12x^3}{2x-4} = \frac{7(x-2)}{4x^2} \cdot \frac{3\cdot 12x^x}{2(x-2)} =$ $\boxed{\frac{21x}{2}}$

9. $\frac{3x-21}{x^2-3x-28} \cdot \frac{5x+20}{2x+8} = \frac{3(x-7)}{(x-7)(x+4)} \cdot \frac{5(x+4)}{2(x+4)}$ $\boxed{\frac{15}{2(x+4)}}$

10. $\frac{x^2-7x-8}{2x+6} \div \frac{x^2-3x-4}{4x+12} = \frac{(x-8)(x+1)}{2(x+3)} \cdot \frac{2\cdot 4(x+3)}{(x+1)(x-4)}$ $\boxed{\frac{2(x-8)}{(x-4)}}$

11. $\frac{25xy^3}{35x^4y^2} \cdot \frac{14xy}{10x^2y^3} = \frac{5y}{7x^3} \cdot \frac{7}{5xy^2} =$ $\boxed{\frac{1}{x^4y}}$

12. $\frac{4x}{x+1} \cdot \frac{x^2-6x-7}{x^2-7x} = \frac{4x}{(x+1)} \cdot \frac{(x-7)(x+1)}{x(x-7)}$ $\boxed{4}$

13. $\frac{6x+30}{x^2+7x+10} \cdot \frac{7x+14}{6x} = \frac{6(x+5)}{(x+2)(x+5)} \cdot \frac{7(x+2)}{6x}$ $\boxed{\frac{7}{x}}$