

Name Solutions by Mr Foley

Score _____

Find any values of the variable for which the rational expression is undefined. Write answer with \neq .

1) $\frac{a-9}{6-a}$ $\rightarrow 6-a \neq 0$
 $-a \neq -6$
 $a \neq 6$
 NOT normal to use \neq but
 HERE IT WORKS.

1) $a \neq 6$

2) $\frac{x^2-49}{x^2+13x+40}$
 Factor $x^2+13x+40$
 $(x+8)(x+5)$
 $x+8=0 \quad x+5=0$
 $x=-8 \quad x=-5$

2) $x \neq \{-5, -8\}$

Write the rational expression in lowest terms.

3) $\frac{4k-36}{27-3k} = \frac{4(k-9)}{-3(k-9)} = -\frac{4}{3}, k \neq 9$

3) $-\frac{4}{3}$

Perform the indicated operation and express in lowest terms.

4) $\frac{k^2+5k+6}{k^2+6k+8} \cdot \frac{k^2+4k}{k^2+12k+27}$
 Factor all
 $\frac{(k+2)(k+3)}{(k+2)(k+4)} \cdot \frac{k(k+4)}{(k+3)(k+9)}$
 Simplify and we get $\frac{k}{k+9}; k \neq \{-9, -3, -4, -2\}$

4) $\frac{k}{k+9}$

5) $\frac{2k^2+7kp+6p^2}{9k^2-24kp+16p^2} \div \frac{6k^2+17kp+12p^2}{9k^2-16p^2}$
 Factor, Keep, Flip, Change
 Consider
 $\frac{(2k+3p)(k+2p)}{(3k+4p)(3k-4p)} \cdot \frac{(3k+4p)(2k+3p)}{(3k-4p)(3k+4p)} = \frac{(2k+3p)(k+2p)}{(3k-4p)(3k+4p)}$

5) $\frac{k+2p}{3k-4p}$

Divide. Write the answer in lowest terms.

6) $\frac{x^2-25}{x} \div \frac{9x+45}{x-5}$
 $\frac{(x-5)(x+5)}{x} \cdot \frac{x-5}{9(x+5)} = \frac{(x-5)^2}{9x}$

6) $\frac{(x-5)^2}{9x}$

Find the LCD for the fractions in the list.

7) $\frac{1}{r^2+16r+64}, \frac{6}{r^2+8r}$

Factor $(r+8)(r+8), r(r+8)$
 both have $(r+8)$ so LCD = $r(r+8)(r+8)$

7) $\frac{r(r+8)(r+8)}{r^3+16r^2+64r}$ or
 $r(r+8)^2$

Add or subtract. Write the answer in lowest terms.

$$8) \frac{3a+2b}{2} - \frac{3a-2b}{2} = \frac{(3a-3a)+(2b+2b)}{2} = \frac{4b}{2} = 2b$$

$$8) \underline{2b}$$

SOUNDS LIKE a FRANK SINATRA hit
2b 2b 2

$$9) \frac{4}{y^2-3y+2} + \frac{6}{y^2-1} = \frac{4(y+1)}{(y-2)(y-1)(y+1)} + \frac{6(y-2)}{(y+1)(y-2)(y+1)} = \frac{4y+4+6y-12}{(y+1)(y-2)(y+1)} = \frac{10y-8}{(y+1)(y-2)(y+1)}$$

$$9) \frac{10y-8}{(y+1)(y-2)(y+1)}$$

$$10) \frac{x}{x^2-16} - \frac{7}{x^2+5x+4} = \frac{x(x+1)-7(x-4)}{(x-4)(x+4)(x+1)} = \frac{x^2+x-7x+28}{(x-4)(x+4)(x+1)} = \frac{x^2-6x+28}{(x-4)(x+4)(x+1)}$$

$$10) \frac{x^2-6x+28}{(x+4)(x-4)(x+1)}$$

LCD: $(x-4)(x+4)(x+1)$

Simplify the complex fraction.

$$11) \frac{4 + \frac{2}{x}}{\frac{x}{3} + \frac{1}{6}} = \frac{\frac{4x+2}{x}}{\frac{2x+1}{6}} = \frac{2(2x+1)}{x} \cdot \frac{6}{2x+1} = \frac{12}{x}$$

$$11) \underline{\frac{12}{x}}$$

Simplify the expression, using only positive exponents in your answer.

$$12) \frac{x^2-49y^2}{4y-28x} = \frac{\frac{1}{x^2} - \frac{49}{y^2}}{\frac{4}{y} - \frac{28}{x}} = \frac{\frac{y^2}{x^2y^2} - \frac{49x^2}{x^2y^2}}{\frac{4}{x} - \frac{28}{y}} = \frac{\frac{(y-7x)(y+7x)}{x^2y^2}}{\frac{4(y-7x)}{y}} = \frac{(y+7x)}{4x^2y^2}$$

$$12) \underline{\frac{y+7x}{4x^2y^2}}$$

Perform the division.

USE LONG DIVISION

$$13) \frac{p^2+4p-24}{p+8} = \begin{array}{r} p-4 + \frac{8}{p+8} \\ p+8 \overline{) p^2+4p-24} \\ \underline{-(p^2+8p)} \\ -4p-24 \\ \underline{-(-4p-32)} \\ 8 \end{array}$$

$$13) \underline{p-4 + \frac{8}{p+8}}$$

Divide.

$$14) \frac{9y^4+15y^3+5y-1}{3y^2+1} = \begin{array}{r} 3y^2+5y-1 \\ 3y^2+0y+1 \overline{) 9y^4+15y^3+0y^2+5y-1} \\ \underline{-(3y^4+0y^3+3y^2)} \\ 15y^3-3y^2+5y-1 \\ \underline{-(15y^3+0y^2+5y)} \\ 2-3y^2+0y-1 \\ \underline{-(-3y^2+0y-1)} \\ 0 \end{array}$$

$$14) \underline{3y^2+5y-1}$$

The boundary of the graph of the linear inequality will be a _____ line, and the shading will be _____ the line. Fill in the first blank with either solid or dashed. Fill in the second blank with above or below.

15) $y \leq 3x - 1$

\leq, \geq SOLID LINE
 $<, >$ dashed LINE
 $<, \leq$ Below
 $>, \geq$ above

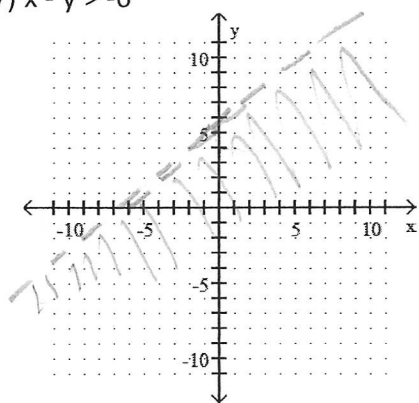
15) SOLID, below

16) $y > -3x + \frac{2}{9}$

16) Dashed, Above

Graph the linear inequality in two variables.

17) $x - y > -6$

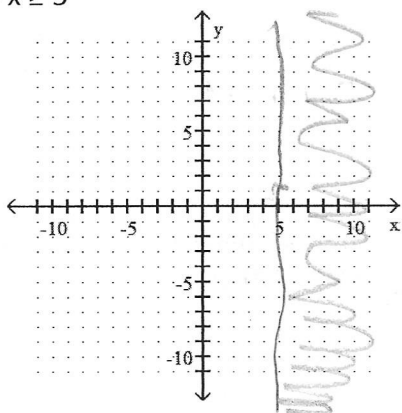


GRAPH $x - y = -6$ USING
DASHED LINE

$-y = -x - 6$ $x - y > -6$
 $y = x + 6$ $-y > -x + 6$
 $y < x - 6$

17) _____

18) $x \geq 5$



NOTE $x \geq$ IS A
VERTICAL LINE

18) _____

Solve the system by substitution. If the system is inconsistent or has dependent equations, say so.

19) $x + y = -4$
 $x + y = -2$

$x + y = -4$
 $x + y = -2 \rightarrow y = -2 - x$
 $x + (-2 - x) = -4$
 $-2 = -4$
 \rightarrow INCONSISTENT

19) _____

Solve the system by elimination. If the system is inconsistent or has dependent equations, say so.

20) $\begin{cases} 9x - 7y = 21 \\ -5x + 4y = -12 \end{cases}$ $\xrightarrow{\text{ELIMINATE } y}$ $\begin{cases} 36x - 28y = 84 \\ -35x - 28y = -84 \end{cases}$ $\xrightarrow{-5(0)+4y=-12}$ $\begin{cases} 4y = -12 \\ y = -3 \end{cases}$

20) $(0, -3)$

21) $\begin{cases} 5x - 2y = 3 \\ -20x + 8y = -12 \end{cases}$ $\xrightarrow{20x - 8y = 12}$ $\begin{cases} 20x - 8y = 12 \\ -20x + 8y = -12 \end{cases}$ $\xrightarrow{0=0}$ $\begin{cases} 0 = 0 \end{cases}$ $\begin{cases} \text{dependent} \\ \text{(means we need} \\ \text{an x or y first)} \end{cases}$

21) dependent

Solve the system of equations.

22) $\begin{cases} 5x + 2y + z = -11 \\ 2x - 3y - z = 17 \\ 7x + y + 2z = -4 \end{cases}$ $\xrightarrow{\text{See separate Page 6}}$

22) $(0, -6, 1)$

Solve the system of equations. If the system is inconsistent or has dependent equations, say so.

23) $\begin{cases} 2x + 10y + 10z = 90 \\ x + 5y + 5z = -15 \\ x + y + z = -6 \end{cases}$ $\xrightarrow{\text{see Page 6}}$

23) $(0, -6, 1)$

24) $\begin{cases} x + \frac{1}{2}y - \frac{1}{2}z = 3 \\ 4x + 2y - 2z = 12 \\ -2x - y + z = -6 \end{cases}$ $\xrightarrow{\text{see page 6}}$

24) DEPENDENT

Solve the problem using a system of equations.

25) Paul invested twice as much money in an account paying 5% interest than he did in an account paying 1% interest. If the total interest paid was \$330, how much did he invest in each? $\xrightarrow{\text{Page 6}}$

25) \$6000, \$3000

Solve the problem.

26) The perimeter of a rectangle is 34 cm. The length is 11 cm longer than the width. What are the length and width of the rectangle?

$\begin{matrix} \text{width} & & \text{length} \\ & \text{width} & \\ & & \text{length} \end{matrix}$ $\begin{cases} 2(w+11) + 2(w) = 34 \\ 2w + 22 + 2w = 34 \\ 4w + 22 = 34 \\ 4w = 12 \\ w = 3 \end{cases}$ $\xrightarrow{\text{Page 6}}$ $\begin{cases} \text{length} = 3 + 11 = 14 \end{cases}$

26) $w = 3$
 $l = 14$

Solve the problem.

- 27) The sum of a student's three scores is 210. If the first is 23 points more than the second, and the sum of the first two is 15 more than twice the third, what was the first score?

27) 84

Page 7

Solve the problem.

- 28) A \$116,000 trust is to be invested in bonds paying 7%, CDs paying 6%, and mortgages paying 10%. The bond and CD investment together must equal the mortgage investment. To earn a \$9460 annual income from the investments, how much should the bank invest in bonds?

28) 22000

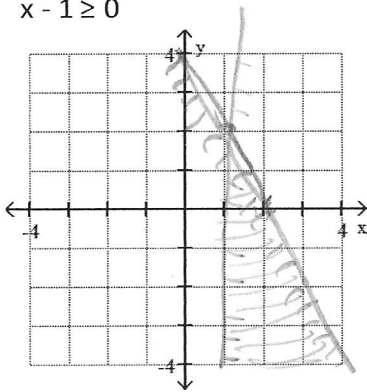
I disagree with answer key

Page 7

Graph the system of inequalities.

- 29) $2x + y \leq 4$
 $x - 1 \geq 0$

29) _____



$$\begin{aligned} 2x + y &\leq 4 \\ y &\leq -2x + 4 \\ x - 1 &\geq 0 \\ x &\geq 1 \end{aligned}$$

$$\begin{array}{lcl} \textcircled{22} & 5x+2y+z=-11 & (1) \\ & 2x-3y-z=17 & (2) \\ & 7x+y+2z=-4 & (3) \end{array} \quad \begin{array}{lcl} (1)+(2) & 5x+2y+z=-11 & 2(2)+3 \\ & 2x-3y-z=17 & \\ & 7x-y & =6 \quad (4) \end{array} \quad \begin{array}{lcl} 2(2)+3 & 4x-6y-2z=34 & \\ & 7x+y+2z=-4 & \\ & 11x-5y & =30 \quad (5) \end{array}$$

$$\begin{array}{lcl} 11x-5y=30 & (4) & \\ 7x-y=6 & (5) & \end{array} \xrightarrow{(4)+(-5)(5)} \begin{array}{lcl} 11x-5y=30 & & \\ -35x+5y=-30 & & \\ \hline -24y=0 & & \\ \hline y=0 & & \end{array}$$

$$\begin{array}{lcl} 11x-5y=30 & & \\ 11(0)-5y=30 & & \\ -5y=30 & & \\ \hline y=-6 & & \end{array}$$

$$\begin{array}{lcl} 5x+2y+z=-11 & & \\ 5(0)+2(-6)+z=-11 & & \\ 0-12+z=-11 & & \\ \hline z=1 & & \end{array}$$

$$(0, -6, 1)$$

$$\begin{array}{lcl} \textcircled{23} & 2x+10y+10z=90 & \\ & x+5y+5z=-15 & \rightarrow \\ & x+y+z=-4 & \end{array} \quad \begin{array}{lcl} 2x+10y+10z=90 & & \\ -2x-10y-10z=30 & & \\ \hline 0=120 & & \text{INCONSISTENT} \end{array}$$

$$\begin{array}{lcl} \textcircled{24} & x+\frac{1}{2}y-\frac{1}{2}z=3 & \rightarrow \\ & 4x+2y-2z=12 & \\ & -2x-y+z=-6 & \rightarrow \end{array} \quad \begin{array}{lcl} 4x+2y-2z=12 & & \\ 4x+2y-2z=12 & & \\ \hline 0=0 & & \text{DEPENDENT} \end{array}$$

$$\textcircled{25} \quad \begin{array}{l} 1^{\text{st}} \text{ Acct} \\ 5\% x + 1\% y = \$330 \end{array}$$

$$\begin{array}{l} x = 2y \\ x \text{ is double the other amount so we set} \\ 0.05x + 0.01y = 330 \end{array}$$

$$\begin{array}{l} x = 2y \\ \text{substitute} \\ 0.05(2y) + 0.01y = 330 \end{array}$$

$$0.10y + 0.01y = 330$$

$$0.11y = 330$$

$$11y = 33000$$

$$y = 3000$$

$$x = 2y$$

$$x = 6000$$

$$\begin{array}{l} 1^{\text{st}} - 5\% \text{ Acct} - \$6000 \\ 2^{\text{nd}} - 1\% \text{ Acct} - \$3000 \end{array}$$

(17) $a + b + c = 210 \rightarrow a + b + c = 210$ (1)
 $a = b + 23$ $a - b = 23$ (2)
 $a + b = 2c + 15$ $a + b - 2c = 15$ (3)

Add 1, 2 AND 2, 3

$$\begin{array}{r} a + b + c = 210 \\ a - b = 23 \\ \hline 2a + c = 233 \end{array} \quad \begin{array}{r} a - b = 23 \\ a + b - 2c = 15 \\ \hline 2a - 2c = 38 \\ 2a = 2c + 38 \end{array}$$

SAME TERM SO I CAN SAY

$$\begin{array}{r} 2a + c = 233 \\ (2c + 38) + c = 233 \\ 3c + 38 = 233 \\ 3c = 195 \\ c = 65 \end{array} \quad \begin{array}{r} 2a + c = 233 \\ 2a + 65 = 233 \\ 2a = 168 \\ a = 84 \end{array}$$

$$\begin{array}{r} a - b = 23 \\ 84 - b = 23 \\ -b = -61 \\ b = 61 \end{array}$$

SCORES are 84, 61, 65
 (Someone needs TO STUDY)

(28) $\begin{array}{l} \text{Bond} \\ 7\% \end{array} b + \begin{array}{l} \text{CD} \\ 6\% \end{array} c + \begin{array}{l} \text{Mortgage} \\ 10\% \end{array} m = 0 \rightarrow b + c - m = 0$
 $0.07b + 0.06c + 0.10m = 9460$
 $b + c + m = 116000$

We get

$$\begin{array}{r} b + c - m = 0 \\ b + c + m = 116000 \\ 7b + 6c + 10m = 946000 \end{array} \quad \begin{array}{l} (1) \\ (2) \\ (3) \end{array} \quad \begin{array}{l} a) 2b + 2c = 116000 (4) \\ b) 2b + 2c = 116000 (5) \end{array}$$

$$\begin{array}{r} 10b + 10c - 10m = 0 \\ 7b + 6c + 10m = 946000 \\ \hline 17b + 16c = 946000 (5) \\ -16b - 16c = -924000 -6(4) \\ \hline b = 22000 \end{array}$$

$$\begin{array}{r} 2b + 2c = 116000 \\ 2(22000) + 2c = 116000 \\ 44000 + 2c = 116000 \\ 2c = 72000 \\ c = 36000 \end{array}$$

$$\begin{array}{r} b + c + m = 116000 \\ 22000 + 36000 + m = 116000 \\ m = 58000 \end{array}$$

also $b + c = m$