

Name SOLUTIONS!

Each of the 18 questions is worth 5 points plus 1 points for each of 10 homework problems for a total of 100

Express the rational expression in lowest terms.

$$1) \frac{2x+4}{10x^2+24x+8}$$

$$\frac{2(x+2)}{2(5x^2+12x+4)}$$

PR=20 50=12 # = 10, 2

$$\frac{2(x+2)}{2(5x^2+10x+2x+4)}$$

$$\frac{2(x+2)}{2[5x(x+2)+2(x+2)]}$$

$$\frac{2(x+2)}{2(5x+2)(x+2)}$$

$$\boxed{\frac{1}{(5x+2)}}$$

Perform the indicated operation and express in lowest terms.

$$2) \frac{k^2+10k+21}{k^2+11k+28} \cdot \frac{k^2+4k}{k^2+11k+24}$$

$$\frac{(k+7)(k+3)}{(k+7)(k+4)} \cdot \frac{k(k+4)}{(k+8)(k+3)}$$

$$\boxed{\frac{k}{(k+8)}}$$

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

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

$$\boxed{\frac{(2x-5)}{(3x+5)}}$$

Add or subtract as indicated. Write the answer in lowest terms.

$$4) \frac{4}{r} + \frac{5}{r-7}$$

$$\frac{(r-7)}{(r-7)} \cdot \frac{4}{r} + \frac{r}{r} \cdot \frac{5}{(r-7)}$$

$$\frac{4(r-7) + 5r}{r(r-7)}$$

$$\frac{4r - 28 + 5r}{r(r-7)}$$

$$\boxed{\frac{9r - 28}{r(r-7)}}$$

$$5) \frac{1}{6x^4y^2} - \frac{11}{3xy}$$

$$\frac{1}{6x^4y^2} - \frac{11}{3xy} \cdot \frac{2x^3y}{2x^3y}$$

$$\frac{1}{6x^4y^2} - \frac{22x^3y}{6x^4y^2}$$

$$\boxed{\frac{1 - 22x^3y}{6x^4y^2}}$$

$$6) \frac{1}{x-3} - \frac{5}{3-x}$$

$$\frac{1}{x-3} - \frac{5}{3-x} \cdot \frac{-1}{-1}$$

$$\frac{1}{x-3} - \frac{-5}{x-3}$$

$$\frac{1}{x-3} + \frac{5}{x-3}$$

$$\boxed{\frac{6}{x-3}}$$

Simplify the complex fraction.

$$7) \frac{\frac{x}{2}}{\frac{5}{x+5}}$$

$$\frac{x}{2} \cdot \frac{(x+5)}{5}$$

$$\boxed{\frac{x(x+5)}{10}}$$

$$8) \frac{4 + \frac{2}{x}}{\frac{x}{4} + \frac{1}{8}}$$

$$\frac{\left(4 + \frac{2}{x}\right) \cdot 8x}{\left(\frac{x}{4} + \frac{1}{8}\right) \cdot 8x}$$

$$\frac{4(8x) + \frac{2}{x}(8x)}{\frac{x}{4}(8x) + \frac{1}{8}(8x)}$$

$$\frac{\frac{x}{4}(8x) + \frac{1}{8}(8x)}{\frac{x}{4}(8x) + \frac{1}{8}(8x)}$$

$$\frac{32x + 16}{2x^2 + x}$$

$$\frac{16(2x+1)}{x(2x+1)}$$

$$\boxed{\frac{16}{x}}$$

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

$$9) \frac{x^{-2} - 49y^{-2}}{7y - 49x}$$

$$\frac{\frac{1}{x^2} - \frac{49}{y^2}}{7(y-7x)} \cdot \frac{x^2 y^2}{x^2 y^2}$$

$$\frac{\frac{1}{x^2}(x^2 y^2) - \frac{49}{y^2}(x^2 y^2)}{7(y-7x) x^2 y^2}$$

$$\frac{y^2 - 49x^2}{7x^2 y^2 (y-7x)}$$

$$\frac{(y+7x)(y-7x)}{7x^2 y^2 (y-7x)}$$

$$\boxed{\frac{y+7x}{7x^2 y^2}}$$

Solve the equation.

$$10) 1 + \frac{1}{x} = \frac{20}{x^2}$$

$$x^2 \left( 1 + \frac{1}{x} \right) = x^2 \left( \frac{20}{x^2} \right)$$

$$x^2 + x = 20$$

$$x^2 + x - 20 = 0$$

$$(x+5)(x-4) = 0$$

$$\boxed{x = -5, 4}$$

$$11) \frac{4}{x-2} = 1 + \frac{6}{x+2}$$

$$\frac{(x+2)}{(x+2)} \cdot \frac{4}{(x-2)} = \frac{(x+2)(x-2)}{(x+2)(x-2)} \cdot 1 + \frac{(x-2)}{(x-2)} \cdot \frac{6}{(x+2)}$$

$$4(x+2) = x^2 - 4 + 6x - 12$$

$$4x + 8 = x^2 + 6x - 16$$

$$0 = x^2 + 2x - 24$$

$$(x+6)(x-4) = 0$$

$$\boxed{x = -6, 4}$$

$$12) \frac{4x-6}{2x+1} = \frac{2x-1}{x+4}$$

$$(4x-6)(x+4) = (2x-1)(2x+1)$$

$$4x^2 + 16x - 6x - 24 = 4x^2 - 1$$

$$10x - 23 = 0$$

$$10x = 23$$

$$\boxed{x = \frac{23}{10}}$$

Solve the formula for the specified variable.

13)  $\frac{1}{a} + \frac{1}{b} = \frac{1}{c}$  for c

$$abc \left( \frac{1}{a} + \frac{1}{b} \right) = abc \left( \frac{1}{c} \right)$$

$$bc + ac = ab$$

$$c(a+b) = ab$$

$$c = \frac{ab}{a+b}$$

Solve the problem.

14) A plane flies 440 miles with the wind and 330 miles against the wind in the same length of time. If the speed of the wind is 23 mph, what is the speed of the plane in still air?

$$D = RT \quad T = \frac{D}{R}$$

	D	R	T
WITH	440	R+23	440/(R+23)
AGAINST	330	R-23	330/(R-23)

TIME IS THE SAME

$$\frac{440}{(R+23)} = \frac{330}{(R-23)}$$

$$440(R-23) = 330(R+23)$$

$$440R - 10120 = 330R + 7590$$

$$110R = 17710$$

$$R = 161$$

$$161 \text{ mph}$$

15) Frank can type a report in 3 hours and James takes 5 hours. How long will it take the two of them typing together?

$A = RT \quad R = \frac{A}{T}$  FRANK'S RATE IS  $\frac{1}{3}$   
 JAMES " "  $\frac{1}{5}$

	T	R	A
F	x	$\frac{1}{3}$	$\frac{x}{3}$
J	x	$\frac{1}{5}$	$\frac{x}{5}$

$$\frac{x}{3} + \frac{x}{5} = 1$$

$$15 \cdot \frac{x}{3} + 15 \cdot \frac{x}{5} = 15 \cdot 1$$

$$5x + 3x = 15$$

$$8x = 15$$

$$x = \frac{15}{8}$$

$$\frac{15}{8} \text{ hrs}$$

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

$$16) \begin{aligned} x + y &= 14 \\ y &= 5x - 4 \end{aligned}$$

$$\begin{aligned} x + (5x - 4) &= 14 \\ 6x - 4 &= 14 \\ 6x &= 18 \\ x &= 3 \end{aligned}$$

$$\begin{aligned} y &= 5(3) - 4 \\ y &= 11 \end{aligned}$$

$$\boxed{(3, 11)}$$

$$17) \begin{aligned} 5x - 2y &= -1 \\ x + 4y &= 35 \end{aligned}$$

$$\begin{aligned} x &= -4y + 35 \\ 5(-4y + 35) - 2y &= -1 \\ -20y + 175 - 2y &= -1 \\ -22y &= -176 \\ y &= 8 \end{aligned}$$

$$\begin{aligned} x + 4(8) &= 35 \\ x + 32 &= 35 \\ x &= 3 \end{aligned}$$

$$\boxed{(3, 8)}$$

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

$$18) \begin{aligned} x - 4y &= -4 \\ -4x - 3y &= -3 \end{aligned}$$

$$\begin{aligned} 4(x - 4y) &= 4(-4) \\ 4x - 16y &= -16 \\ \underline{-4x - 3y} &= \underline{-3} \\ -19y &= -19 \\ y &= 1 \end{aligned}$$

$$\begin{aligned} x - 4(1) &= -4 \\ x - 4 &= -4 \\ x &= 0 \end{aligned}$$

$$\boxed{(0, 1)}$$