Name __Key__

Per _____

Use the given values to set up a variation equation and find the value of the missing variable.

1. $y = \dfrac{K}{X}$

1. y varies inversely as x and y = 5 when x = 10, find y when x = 2

$5 = \dfrac{K}{10}$ $K = 50$

$y = \dfrac{50}{2} = 25$

2. y varies jointly as x and z and and y = 12 when x = -2 and z = 3. Find y when x = 4 and z = -1.

$y = KXZ$ $y = (-2)(4)(-1)$

$12 = K(-2)(3)$ $12 = -6K$

$K = -2$

Answers (right column):

1. $y = 25$

2. $y = 8$

Perform the indicated operation. Simplify the results and state restrictions.

3. $\dfrac{x^2 + 2x + 1}{2x^2 + 3x + 1}$

$\dfrac{(x+1)(x+1)}{(2x+1)(x+1)}$

3. $\dfrac{x+1}{2x+1}$

$x \neq -\frac{1}{2}, -1$

4. $\dfrac{x^2 + 5x + 4}{x^2 + 2x + 1} \cdot \dfrac{2x+2}{x+4}$

$\dfrac{(x+4)(x+1)}{(x+1)(x+1)} \cdot \dfrac{2(x+1)}{x+4}$

4. 2

$x \neq -1, -4$

5. $\dfrac{x^2 - 9}{x^2 - 5x + 6} \div \dfrac{x^2 + 5x + 6}{x^2 - 4}$

$\dfrac{(x-3)(x+3)}{(x-2)(x-3)} \cdot \dfrac{(x-2)(x+2)}{(x+2)(x+3)}$

5. 1

$x \neq 2, 3, -2, -3$

6. $\dfrac{y}{9y^2 - 9} + \dfrac{4}{y^2 + 2y + 1}$

LCD: $9(y-1)(y+1)(y+1)$

$9(y^2 - 1)$ → $9(y-1)(y+1)$

$(y+1)(y+1)$

$\dfrac{y(y+1)}{9(y-1)(y+1)} + \dfrac{4(9 \cdot (y-1))}{(y+1)(y+1)}$

$\dfrac{y^2 + y + 36y - 36}{9(y-1)(y+1)(y+1)}$

6. $\dfrac{y^2 + 37y - 36}{9(y-1)(y+1)^2}$

$x \neq 1, -1$

7. $\dfrac{6n}{n^2 - 9} - \dfrac{3}{n+3} \cdot \dfrac{(n-3)}{(n-3)}$

LCD: $(n-3)(n+3)$

$(n-3)(n+3)$

$\dfrac{6n}{(n-3)(n+3)} - \dfrac{3(n-3)}{(n-3)(n+3)}$

$\dfrac{6n - 3n + 9}{(n-3)(n+3)} = \dfrac{3n+9}{(n-3)(n+3)}$

$= \dfrac{3(n+3)}{(n-3)(n+3)}$

7. $\dfrac{3}{n-3}$

$x \neq 3, -3$

8. $\dfrac{\frac{n^2 - 6n + 9}{n+3}}{\frac{2n^2 - 18}{1}}$ ... $\dfrac{n^2 - 6n + 9}{n+3} \div (2n^2 - 18)$

$\dfrac{1}{(n-3)(n-3)} \cdot \dfrac{2(n^2 - 9)}{n+3}$

$\dfrac{1}{(n-3)(n-3)} \cdot \dfrac{2(n-3)(n+3)}{n+3}$

8. $\dfrac{2}{n-3}$

$x \neq 3, -3$

$LCD: 12d$

Solve the equation. Be sure to identify restrictions and check for extraneous solutions.

$12d$ 9. $\left(\dfrac{2}{d}+\dfrac{1}{4}=\dfrac{11}{12}\right)$ $d\neq 0$

$\dfrac{24d}{d}+\dfrac{12d}{4}=\dfrac{(12d)11}{12}$

$24+3d=11d$

$24=8d$

$d=3$

9. __$d=3$__

10. $\dfrac{3}{x-1}=\dfrac{2}{x+4}$ $\quad L$ $\quad x\neq 1$
$\qquad\qquad\qquad\qquad x\neq -4$

$3(x+4)=2(x-1)$

$3x+12=2x-2$

$x=-14$

10. __$x=-14$__

$LCD:$ $x-1$
$\quad x-1$
$\quad x\neq 1$

11. $\left(\dfrac{2}{x-1}\right)\left(4-\dfrac{x}{x-1}\right)x-1$

$\dfrac{2(x-1)}{x-1}=4(x-1)-\dfrac{x(x-1)}{x-1}$

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

$2=4x-4-x$

$6=3x$

$x=2$

11. __$x=2$__

12. $\dfrac{1}{r^2-1}=\dfrac{2}{r^2+r-2}$ $\quad$ $LCD:(r+2)(r-1)(r+1)$
$\quad$ $(r-1)(r+1)$ $\quad$ $(r+2)(r-1)$ $\quad$ $r\neq -2,1,-1$

$r^2+r-2=2(r^2-1)$

$r^2+r-2=2r^2-2$

$0=r^2-r$

$0=r(r-1)$

$r=0, r=1$

12. __$r=0$__

13. $\dfrac{4y^2}{y^2-9}-\dfrac{2y}{y+3}=\dfrac{3}{y-3}$

$(y-3)(y+3)$

$4y^2-2y(y-3)=3(y+3)$ $\qquad$ $LCD: (y-3)(y+3)$

$4y^2-2y^2+6y=3y+9$ $\qquad\qquad y\neq 3,-3$

$2y^2+3y-9=0$

$(2y+3)(y-3)$ $\quad$ $(2y-3)(y+3)$

$y=-3/2,3$ $\qquad\qquad y=3/2,-3$

13. __$y=+3/2$__