

**Algebra 2 – Chapter 8 Review**

**Tell whether x and y show a direct variation, inverse variation, or neither.**

$$y = kx \quad y = \frac{k}{x}$$

1.  $\frac{xy}{x} = \frac{10}{x}$

$$y = \frac{10}{x}$$

INVERSE

$$K=10$$

2.  $(3) \cancel{x} \frac{y}{3} = x(3)$

$$y = 3x$$

direct

$$K=3$$

3.  $y - 17 = x + 2$

$$\underline{+17 \quad +17}$$

$$y = x + 19$$

neither

4.

x	y
31	217
20	140
17	119
12	84

inverse  
 $x \cdot y$

direct  
 $y/x$

$$6727$$

7

$$2800$$

7

$$119$$

7

$$84$$

7

Direct Variation  
 $K=7$

The variables x and y vary inversely. Use the given values to write an equation relation x and y. Then find y when x = 7.

5.  $x = 5, y = -2 \quad y = \frac{k}{x}$

$$(5) -2 = \frac{k}{5} (5)$$

$$k = -10$$

$$y = \frac{-10}{x}$$

$$y = ? \quad x = 7$$

$$y = \frac{-10}{7}$$

6. The heat loss  $h$  (in watts) through a single-pane glass window varies jointly with the window's area  $A$  (in square meters) and the difference between the inside and outside temperature  $d$  (in kelvins). A single-pane window with an area of 1 square meter and a temperature difference of 1 kelvin has a heat loss of 5.7 watts. Write an equation relating  $h$ ,  $A$ ,  $d$ , and  $a$ . What is the heat loss through a single-pane window with an area of 2.5 square meters and a temperature difference of 20 kelvins?

$$h = \text{heat loss (watts)} = 5.7 \text{ watts}$$

$$A = \text{Area (m}^2\text{)} = 1 \text{ m}^2$$

$$d = \text{diff intemp (Kelvins)} = 1 \text{ K}$$

equation:

$$h = KAd$$

$$5.7 = K(1)(1)$$

$$5.7 = K$$

$$h = ?$$

$$A = 2.5 \text{ m}^2$$

$$d = 20 \text{ K}$$

$$h = 5.7Ad$$

$$h = 5.7(2.5)(20)$$

$$h = 285 \text{ watts}$$

Simplify. State any restrictions on the variables.

$$7. \frac{x^2 - 2x - 3}{x^2 - 7x + 12} \cdot \frac{(x-3)(x+1)}{(x-4)(x-3)}$$

$$\frac{x+1}{x-4} \quad D: R \setminus \{4, 3\}$$

Multiply the rational expressions. State any restrictions on the variables.

8.  $\frac{80x^4}{y^3} \cdot \frac{xy}{5x^2}$

$$= \frac{80x^5y}{5x^2y^3}$$

$$\left[ = \frac{16x^3}{y^2} \right]$$

D: R  
x ≠ 0  
y ≠ 0

9.  $\frac{2(x^2-5)}{x+1} \cdot \frac{x+2}{3x^2-15}$   
 $(x+1) \quad 3(x^2-5)$

$$\left[ = \frac{2(x+2)}{3(x+1)} \quad D: R \quad x = -1 \quad x \neq \pm\sqrt{5} \right]$$

$$\begin{aligned} 3x^2 - 15 &= 0 \\ 3x^2 &= 15 \\ x^2 &= 5 \\ x &= \pm\sqrt{5} \end{aligned}$$

Divide the rational expressions. State any restrictions on the variables.

10.  $\frac{2xyz}{x^2z^2} + \frac{8x^4}{3xz}$

$$\left[ \frac{2xyz}{x^2z^2} \cdot \frac{3x^2}{8x^4} \right]$$

$$= \frac{3x^2yz^2}{4x^4z^2}$$

$$\left[ = \frac{3y}{4x^4} \right]$$

D: R  
x ≠ 0  
y ≠ 0  
z ≠ 0

11.  $\frac{x^2+6x-7}{3x^2} + \frac{x+7}{6x}$

$$\left[ \frac{(x+7)(x-1)}{3x^2} \div \frac{x+7}{6x} \right]$$

$$\left[ \frac{(x+7)(x-1)}{3x^2} \cdot \frac{2(6x)}{x+7} \right]$$

$$\left[ \frac{2(x-1)}{x} \quad D: R \quad x \neq 0 \quad x \neq -7 \right]$$

Perform the indicated operation. State any restrictions on the variables.

12. 
$$-\frac{4}{7x} - \frac{5}{3x}$$
 LCD:  $21x$

$$\begin{array}{r} -4(3) \\ \hline 21x \end{array} \quad \begin{array}{r} -5(7) \\ \hline 21x \end{array}$$

$$\begin{array}{r} -12 - 35 \\ \hline 21x \end{array}$$

$$\begin{array}{r} -47 \\ \hline 21x \end{array}$$

D:  $\mathbb{R}$   
 $x \neq 0$

13. 
$$\frac{x^2 + x - 3}{x^2 - 12x + 32} + \frac{3x(x-4)}{(x-8)(x-4)}$$

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

$$\frac{4x^2 - 11x - 3}{(x-8)(x-4)}$$

$$\frac{(4x+1)(x-3)}{(x-8)(x-4)}$$

D:  $\mathbb{R}$   $x \neq 8$   
 $x \neq 4$

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

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

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

$$\frac{x^2 + 19x}{(x-5)(x+7)}$$

D:  $\mathbb{R}$   $x \neq 5$   
 $x \neq -7$

15. 
$$\frac{\frac{4}{x^2 - 9} + \frac{2}{x-3}}{\frac{1}{x+3} + \frac{1}{x-3}}$$

top: 
$$\frac{4}{(x-3)(x+3)} + \frac{2(x+3)}{(x-3)(x+3)}$$

$$\frac{4 + 2x + 6}{(x-3)(x+3)} = \frac{2x + 10}{(x-3)(x+3)}$$

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

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

$$\frac{2x+10}{(x-3)(x+3)} \div \frac{2x}{(x-3)(x+3)}$$

$$\frac{2x+10}{(x-3)(x+3)} \cdot \frac{(x-3)(x+3)}{2x} =$$

$$\boxed{\frac{x+5}{x}}$$

D:  $\mathbb{R}$   
 $x \neq 3$   
 $x \neq -3$   
 $x \neq 0$

Solve the equation. Check for extraneous solutions.

16.  ~~$\frac{x}{2x+7} = \frac{x-5}{x-1}$~~

$$x(x-1) = (2x+7)(x-5)$$

$$x^2 - x = 2x^2 - \underline{10x+7x-35}$$

$$\begin{array}{r} \cancel{x^2-x} = 2x^2 - 3x - 35 \\ -\cancel{x^2+x} \quad -x^2 + x \end{array}$$

$$0 = x^2 - 2x - 35$$

$$0 = (x-7)(x+5)$$

$$\boxed{x=7} \quad \boxed{x=-5}$$

Check:

$$\frac{7}{2(7)+7} = \frac{7-5}{7-1} \quad \frac{-5}{2(-5)+7} = \frac{-5-5}{-5-1}$$

$$\begin{array}{ll} \frac{7}{21} = \frac{2}{6} & \frac{-5}{-3} = \frac{-10}{-6} \\ \checkmark & \checkmark \\ \frac{1}{3} = \frac{1}{3} & \frac{5}{3} = \frac{5}{3} \end{array}$$

18.  $\left[ \frac{8(x-1)}{x^2-4} = \frac{4}{x-2} \right] (x-2)(x+2)$

$$8(x-1) = 4(x+2)$$

$$\begin{array}{r} 8x-8 = 4x+8 \\ -4x+8 \quad -4x+8 \end{array}$$

$$\frac{4x}{4} = \frac{16}{4}$$

$$\boxed{x=4}$$

Check:

$$\frac{8(4-1)}{4^2-4} = \frac{4}{4-2}$$

$$\frac{8(3)}{12-4} = \frac{4}{2}$$

$$\frac{24}{12} = 2$$

$$2 = 2 \checkmark$$

17.  $\left[ \frac{2(x+7)}{x+4} - 2 = \frac{2x+20}{2x+8} \right] 2(x+4)$

$$2 \cdot 2(x+7) - 2(2(x+4)) = 2x+20$$

$$4(x+7) - 4(x+4) = 2x+20$$

$$4x+28 - 4x - 16 = 2x+20$$

$$\begin{array}{r} 12 = 2x+20 \\ -20 \quad -20 \end{array}$$

$$\frac{-8}{2} = \frac{2x}{2}$$

$$x \neq -4$$

*no solution*

Check:

$$\frac{2(-4+7)}{-4+4} - 2 = \frac{2(-4)+20}{2(-4)+8}$$

$$\frac{2(3)}{0} - 2 = \frac{-8+20}{-8+8}$$

$$\frac{6}{0} - 2 = \frac{12}{0}$$

*x no solution*