

1. A rectangle has an area of 16 square inches. If the width of the rectangle is 2, find the length.

2. A rectangle has an area of $\frac{10b}{6b-6}$ square inches. If the length of the rectangle is $\frac{b+2}{2b-2}$, find an expression for the width of the rectangle.

10

9

8

7

6

5

4

3

2

1



Warm Up



Objectives Add and Subtract rational expressions

Identify any restrictions that apply to a given rational expression

Homework Workbook page 227: 6, 12, 14, 26, 27, 28



Homework...

Simplify each rational expression. State any restrictions on the variables.

1. $\frac{4x + 6}{2x + 3}$ 2; $x \neq -\frac{3}{2}$

2. $\frac{2y}{y^2 + 6y}$ $\frac{2}{y + 6}$; $y \neq -6, 0$

3. $\frac{20 + 40x}{20x}$ $\frac{2x + 1}{x}$; $x \neq 0$

4. $\frac{7x - 28}{x^2 - 16}$ $\frac{7}{x + 4}$; $x \neq \pm 4$

5. $\frac{3y^2 - 3}{y^2 - 1}$ 3; $y \neq \pm 1$

6. $\frac{3x^2 - 12}{x^2 - x - 6}$ $\frac{3x - 6}{x - 3}$; $x \neq -2, 3$

7. $\frac{x^2 + 3x - 18}{x^2 - 36}$ $\frac{x - 3}{x - 6}$; $x \neq \pm 6$

8. $\frac{x^2 + 13x + 40}{x^2 - 2x - 35}$ $\frac{x + 8}{x - 7}$; $x \neq -5, 7$

Homework...

Multiply. State any restrictions on the variables.

9. $\frac{5a}{5a+5} \cdot \frac{10a+10}{a}$ $10; a \neq -1, 0$

10. $\frac{2x+4}{10x} \cdot \frac{15x^2}{x+2}$ $3x; x \neq 0, -2$

11. $\frac{x^2-5x}{x^2+3x} \cdot \frac{x+3}{x-5}$ $1; x \neq -3, 0, 5$

12. $\frac{x^2-6x}{x^2-36} \cdot \frac{x+6}{x^2}$ $\frac{1}{x}; x \neq 0, \pm 6$

13. $\frac{5y-20}{3y+15} \cdot \frac{7y+35}{10y+40}$ $\frac{7(y-4)}{6(y+4)}; y \neq -5, -4$

14. $\frac{x-2}{(x+2)^2} \cdot \frac{x+2}{2x-4}$ $\frac{1}{2x+4}; x \neq \pm 2$

15. $\frac{3x^3}{x^2-25} \cdot \frac{x^2+6x+5}{x^2}$ $\frac{3x^2+3x}{x-5}; x \neq 0, \pm 5$

16. $\frac{y^2-2y}{y^2+7y-18} \cdot \frac{y^2-81}{y^2-11y+18}$ $\frac{y}{y-2}; y \neq 2, \pm 9$

Homework...

Divide. State any restrictions on the variables.

$$17. \frac{7x^4}{24y^5} \div \frac{21x}{12y^4} \quad \frac{x^3}{6y}; x, y \neq 0$$

$$18. \frac{6x + 6}{7} \div \frac{4x + 4}{x - 2} \quad \frac{3(x - 2)}{14}; x \neq -1, 2$$

$$19. \frac{5y}{2x^2} \div \frac{5y^2}{8x^2} \quad \frac{4}{y}; x, y \neq 0$$

$$20. \frac{3y + 3}{6y + 12} \div \frac{18}{5y + 5} \quad \frac{5(y + 1)^2}{36(y + 2)}; y \neq -2, -1$$

$$21. \frac{y^2 - 49}{(y - 7)^2} \div \frac{5y + 35}{y^2 - 7y} \quad \frac{y}{5}; y \neq 0, \pm 7$$

$$22. \frac{x^2 + 10x + 16}{x^2 - 6x - 16} \div \frac{x + 8}{x^2 - 64} \quad x + 8; x \neq -2, \pm 8$$

$$23. \frac{y^2 - 5y + 4}{y^2 - 1} \div \frac{y^2 - 9}{y^2 + 5y + 4}$$

$$\frac{y^2 - 16}{y^2 - 9}; y \neq \pm 1, \pm 3, -4$$

$$24. \frac{x^2 - 4}{x^2 + 6x + 9} \div \frac{x^2 + 4x + 4}{x^2 - 9}$$

$$\frac{x^2 - 5x + 6}{x^2 + 5x + 6}; x \neq -2, \pm 3$$

Remember your middle school math days...

If we want to add fractions, they must have the same what?

DENOMINATOR

$$\frac{35}{45} + \frac{4}{45} = \frac{35 + 4}{45} = \frac{39}{45}$$

Not a
problem

$$\frac{3}{35} + \frac{2}{14} = \frac{3}{(5)(7)} + \frac{2}{(2)(7)} = \frac{3(2)}{(5)(7)(2)} + \frac{2(5)}{(2)(7)(5)} = \frac{6 + 10}{70} = \frac{16}{70}$$

Problem

Lowest Common
Denominator

$$5 \times 7 \times 2$$

Rational Functions work the same way!

Adding Rational Expressions

Example: $\frac{2}{n+4} + \frac{n^2}{n^2-16}$

$$= \frac{2}{n+4} + \frac{n^2}{(n-4)(n+4)}$$

$$= \frac{2}{n+4} \left(\frac{n-4}{n-4} \right) + \frac{n^2}{(n-4)(n+4)}$$

$$= \frac{2(n-4)}{(n-4)(n+4)} + \frac{n^2}{(n-4)(n+4)}$$

$$= \frac{2(n-4) + n^2}{(n-4)(n+4)} = \frac{n^2 + 2n - 4}{n^2 - 16}$$

1. Factor the denominators
2. Find a common denominator.
3. Multiply each fraction by what's missing from the common denominator.
4. Simplify and combine into one fraction

Adding Rational Expressions

You Try

$$13. \frac{4}{x^2 - 25} + \frac{6}{x^2 + 6x + 5}$$

$$= \frac{4}{(x - 5)(x + 5)} + \frac{6}{(x + 1)(x + 5)}$$

$$= \frac{4}{(x - 5)(x + 5)} \left(\frac{x + 1}{x + 1} \right) + \frac{6}{(x + 1)(x + 5)} \left(\frac{x - 5}{x - 5} \right)$$

$$= \frac{4(x + 1)}{(x - 5)(x + 5)(x + 1)} + \frac{6(x - 5)}{(x + 1)(x + 5)(x - 5)}$$

$$= \frac{4(x + 1) + 6(x - 5)}{(x - 5)(x + 5)(x + 1)} = \frac{4x + 4 + 6x - 30}{(x - 5)(x + 5)(x + 1)} = \frac{10x - 26}{(x - 5)(x + 5)(x + 1)}$$

Subtracting Rational Expressions

Same process, just watch the signs when you combine the numerators

$$\text{EX: } \frac{3}{x-2} - \frac{7x+3}{3x^2-5x-2}$$

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

$$= \frac{3}{x-2} \left(\frac{3x+1}{3x+1} \right) - \frac{7x+3}{(x-2)(3x+1)}$$

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

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

Subtracting Rational Expressions

You Try.

$$9. \quad -\frac{2}{n+4} - \frac{n^2}{n^2-16}$$

$$= -\frac{2}{n+4} - \frac{n^2}{(n+4)(n-4)}$$

$$= -\frac{2}{n+4} \left(\frac{n-4}{n-4} \right) - \frac{n^2}{(n+4)(n-4)}$$

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



ON WORK BOOK PAGE 229
DO PROBLEMS 1 AND 3 FOR ME TO CHECK
WILL COUNT AS A QUIZ GRADE.

TURN IN ON A SEPARATE SHEET OF PAPER.

WORK ON YOUR WORKSHEET

