

Homework 5.1: Multiplying & Dividing Rationals

Name: Key!

Math 3

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

$$1. \frac{4x+6}{2x+3} = \frac{2(2x+3)}{2x+3}$$

$$2. \frac{2y}{y^2+6y} = \frac{2y}{y(y+6)}$$

$$3. \frac{20+40x}{20x} = \frac{20(2x+1)}{20x}$$

$$\boxed{2 \quad x \neq -3/2}$$

$$\boxed{\frac{2}{y+6} \quad y \neq 0, -6}$$

$$\boxed{\frac{2x+1}{x} \quad x \neq 0}$$

$$4. \frac{7x-28}{x^2-16} = \frac{7(x-4)}{(x+4)(x-4)}$$

$$5. \frac{3x^2-12}{x^2-x-6} = \frac{3(x-2)(x+2)}{(x-3)(x+2)}$$

$$6. \frac{x^2+13x+40}{x^2-2x-35} = \frac{(x+5)(x+8)}{(x-7)(x+5)}$$

$$\boxed{\frac{7}{x+4} \quad x \neq \pm 4}$$

$$\boxed{\frac{3(x-2)}{x-3} \quad x \neq 3, -2}$$

$$\boxed{\frac{x+8}{x-7} \quad x \neq 7, -5}$$

Directions: Multiply. State any restrictions on the variables.

$$7. \frac{2x+4}{10x} \cdot \frac{15x^2}{x+2} = \frac{30x^2(x+2)}{10x(x+2)}$$

$$8. \frac{x^2-5x}{x^2+3x} \cdot \frac{x+3}{x-5} = \frac{x(x-5)(x+3)}{x(x+3)(x-5)}$$

$$\boxed{3x \quad x \neq 0, -2}$$

$$\boxed{1 \quad x \neq 0, -3, 5}$$

$$9. \frac{x^2-6x}{x^2-36} \cdot \frac{x+6}{x^2} = \frac{x(x-6)(x+6)}{x^2(x+6)(x-6)}$$

$$10. \frac{x-2}{(x+2)^2} \cdot \frac{x+2}{2x-4} = \frac{(x-2)(x+2)}{(x+2)(x+2)2(x-2)}$$

$$\boxed{\frac{1}{x} \quad x \neq 0, \pm 6}$$

$$\boxed{\frac{1}{2(x+2)} \quad x \neq \pm 2}$$

$$11. \frac{3x^3}{x^2-25} \cdot \frac{x^2+6x+5}{x^2} = \frac{3x^3(x+5)(x+1)}{x^2(x+5)(x-5)}$$

$$12. \frac{y^2-2y}{y^2+7y-18} \cdot \frac{y^2-81}{y^2-11y+18}$$

$$\boxed{\frac{3x(x+1)}{x-5} \quad x \neq \pm 5, 0}$$

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

$$\boxed{\frac{y}{y-2} \quad y \neq \pm 9, \pm 2}$$

Directions: Divide. State any restrictions on the variables.

$$13. \frac{7x^4}{24y^5} \div \frac{21x}{12y^4} = \frac{84x^4 y^4}{504x y^5}$$

$$\frac{x^3}{6y} \quad x \neq 0, y \neq 0$$

$$14. \frac{3y+3}{6y+12} \div \frac{18}{5y+5} = \frac{3(y+1)5(y+1)}{6(y+2)18}$$

$$\frac{15(y+1)^2}{108(y+2)} = \frac{5(y+1)^2}{36(y+2)} \quad y \neq -2, -1$$

$$15. \frac{y^2-49}{(y-7)^2} \div \frac{5y+35}{y^2-7y} = \frac{(y-7)(y+7)y(y-7)}{(y-7)(y-7)5(y+7)}$$

$$\frac{y}{5} \quad y \neq \pm 7$$

$$16. \frac{x^2+10x+16}{x^2-6x-16} \div \frac{x+8}{x^2-64}$$

$$\frac{(x+8)(x+2)(x+8)(x-8)}{(x-8)(x+2)(x+8)}$$

$$x+8 \quad x \neq \pm 8, -2$$

$$17. \frac{y^2-5y+4}{y^2-1} \div \frac{y^2-9}{y^2+5y+4}$$

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

$$\frac{(y-4)(y+4)}{(y-3)(y+3)} \quad y \neq \pm 3, \pm 1, -4$$

$$18. \frac{x^2-4}{x^2+6x+9} \div \frac{x^2+4x+4}{x^2-9}$$

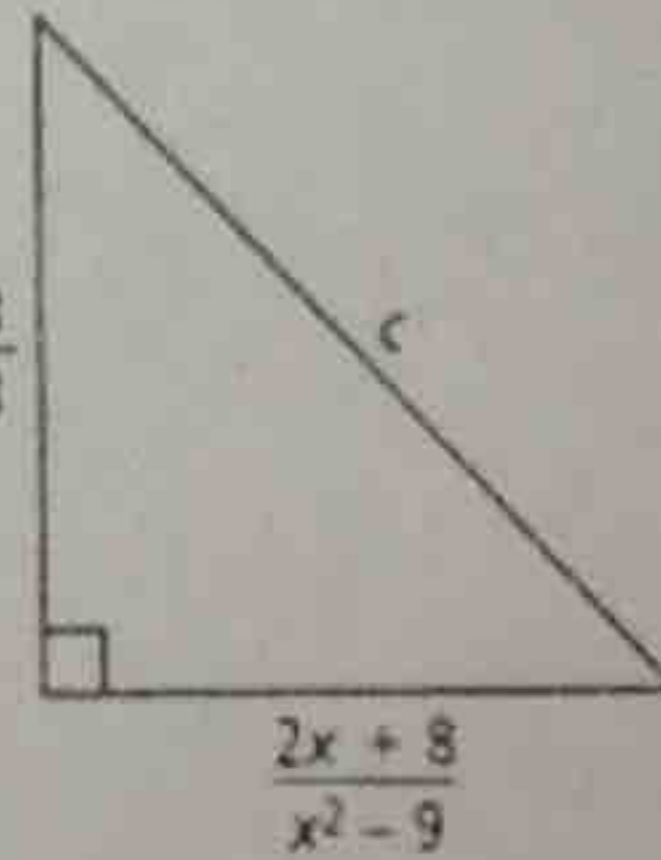
$$\frac{(x+2)(x-2)(x+3)(x-3)}{(x+3)(x+3)(x+2)(x+2)}$$

$$\frac{(x-2)(x-3)}{(x+2)(x+3)} \quad x \neq \pm 3, -2$$

19. What is the area of the triangle shown at the right?

- (F) $\frac{2x+8}{x^2-6x+9}$
- (G) $\frac{x^2+6x+9}{x+4}$

- (H) $\frac{x+4}{x^2-6x+9}$
- (I) $\frac{2x^2+12x+18}{x+4}$



$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2} \cdot \frac{2(x+4)}{(x+3)(x-3)} \cdot \frac{(x+3)}{(x-3)} = \frac{(x+4)}{(x-3)(x-3)} = \frac{x+4}{x^2-6x+9}$$

20. What is the quotient $\frac{y+2}{2y^2-3y-2} \div \frac{y^2-4}{y^2+y-6}$ expressed in simplest form? State any restrictions on the variable.

$$\frac{(y+2)(y+3)(y-2)}{(2y+1)(y-2)(y+2)(y-2)}$$

$$\frac{y+3}{(2y+1)(y-2)} \quad y \neq -\frac{1}{2}, \pm 2, -3$$

$$\frac{(2y^2-4y)(y-2)}{2y(y-2)(y-2)} = \frac{-4}{-3} = \frac{4}{3}$$