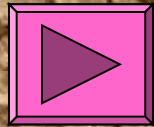
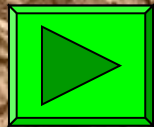


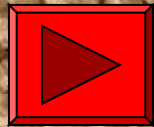
Fractions



Equivalent and Simplifying



Fractions
Multiplying Fractions



Dividing Fractions



Adding Fractions



Subtracting Fractions

Starter Questions

1. True or false $5\frac{3}{4} + 2\frac{1}{8} = 7\frac{1}{8}$

2. If $z=4$, $q=3$ and $r=2$.

Find $2q^2z + r^2$

3. Factorise $24y - 16y^2$

Algebraic Fractions

Learning Intention

1. To explain how to simplify algebraic fractions.

Success Criteria

1. Understand term Highest Common Factor.
2. Simplify algebraic fractions by identifying HCF.

Multiply top and bottom by any number

Equivalent Fractions

Multiply top and bottom by any number or letter

We already know how to create an equivalent fraction for numerical fractions.

The exact same process is used for algebraic fractions.

Numerical Fraction

$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6}$$

$$\frac{5}{7} = \frac{10}{14} = \frac{50}{70}$$

Algebraic Fraction

$$\frac{1}{x} = \frac{2}{2x} = \frac{y}{xy}$$

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

Equivalent Fractions

Common Denominator for 2 fractions

Numerical Fraction

$$\frac{1}{2} + \frac{1}{3} = \frac{\quad}{6}$$

$$\frac{5}{7} + \frac{1}{2} = \frac{\quad}{14}$$

Algebraic Fraction

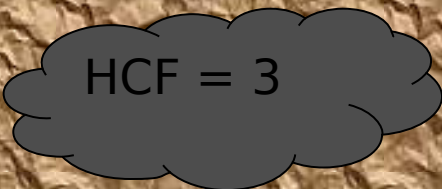
$$\frac{1}{x} + \frac{1}{y} = \frac{\quad}{xy}$$

$$\frac{3}{(x+1)} + \frac{6}{2y} = \frac{\quad}{2y(x+1)}$$

Algebraic Fractions

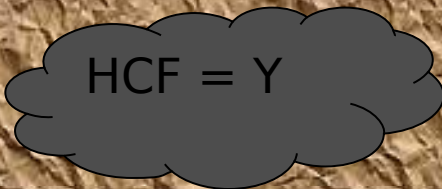
We can sometimes reduce fractions to a simpler form if the numerator and denominator have a number or letter in common.

Examples



HCF = 3

$$\frac{12}{15} = \frac{\cancel{3} \times 4}{\cancel{3} \times 5} = \frac{4}{5}$$



HCF = Y

$$\frac{y^2}{y} = \frac{\cancel{y} \times y}{\cancel{y}} = \frac{y}{1} = y$$

What Goes In The Box ?

$$\frac{6w^2}{2w}$$

$$3w$$

$$\frac{4y}{32y^3}$$

$$\frac{1}{8y^2}$$

$$\frac{(f-2)^3}{2(f-2)^6}$$

$$\frac{1}{2(f-2)^3}$$

$$\frac{w + (x+1)}{(x+1)^2}$$

$$\frac{w + (x+1)}{(x+1)^2}$$

$$\frac{ay + a}{ay^3}$$

$$\frac{y+1}{y^3}$$

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

$$x+1$$

Algebraic Fractions

Multiplication

Learning Intention

1. To explain how to multiply algebraic fractions.

Success Criteria

1. Know rules for multiplication simple fractions.
2. Apply knowledge to algebraic fractions.

Algebraic Fractions

Multiplication

Numerical fraction

$$\begin{aligned} & \frac{3}{8} \times \frac{4}{5} \\ & = \frac{12}{40} \\ & = \frac{\cancel{12}^3}{\cancel{40}_{10}} \\ & = \frac{3}{10} \end{aligned}$$

Algebraic Fraction

$$\begin{aligned} & \frac{5a}{6} \times \frac{3}{a^2} \\ & = \frac{15a}{6a^2} \\ & = \frac{\cancel{15a}^5 \cancel{1}}{\cancel{6a^2}_2 \cancel{1}} \\ & = \frac{5}{2a} \end{aligned}$$

Algebraic Fractions

Division

Learning Intention

1. To explain how to divide algebraic fractions.

Success Criteria

1. Know rules for division of simple fractions.
2. Apply knowledge to algebraic fractions.

Algebraic Fractions

Division

Numerical Fraction

$$\begin{aligned}\frac{4}{9} \div \frac{5}{6} \\&= \frac{4}{9} \times \frac{6}{5} \\&= \frac{\cancel{24}^8}{\cancel{45}_5} \\&= \frac{8}{15}\end{aligned}$$

Algebraic Fraction

$$\begin{aligned}\frac{2xy}{3} \div \frac{5x}{y} \\&= \frac{2xy}{3} \times \frac{y}{5x} \\&= \frac{\cancel{2x}^1 y^2}{15 \cancel{x}_1} \\&= \frac{2y^2}{15}\end{aligned}$$

Algebraic Fractions

Division

Example 2

$$\frac{2}{3} \div \frac{3}{y}$$

$$= \frac{2}{3} \times \frac{y}{3}$$

$$= \frac{2y}{9}$$

Example 3

$$\frac{2x + 4}{5} \div \frac{3x + 9}{10}$$

$$= \frac{2x + 4}{5} \times \frac{10}{3x + 9}$$

$$= \frac{\overset{4}{\cancel{20}}(x + 2)}{\underset{3}{\cancel{15}}(x + 3)}$$

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

Algebraic Fractions

Division

Example 4 $\frac{x^2 + x - 2}{x^2 + 4x + 3} \div \frac{x^2 + 6x + 8}{x^2 + 7x + 12}$

$$= \frac{x^2 + x - 2}{x^2 + 4x + 3} \times \frac{x^2 + 7x + 12}{x^2 + 6x + 8}$$

$$= \frac{(x + 2)(x - 1)}{(x + 3)(x + 1)} \times \frac{(x + 4)(x + 3)}{(x + 4)(x + 2)}$$

$$= \frac{(x - 1) \cancel{(x + 2)} \cancel{(x + 3)} \cancel{(x + 4)}}{(x + 1) \cancel{(x + 2)} \cancel{(x + 3)} \cancel{(x + 4)}} = \frac{(x - 1)}{(x + 1)}$$

Algebraic Fractions

Addition

Example 1a

$$\frac{1}{2} + \frac{1}{4}$$

$$\frac{4 + 2}{8}$$

$$= \frac{6}{8} \div 2$$

$$= \frac{3}{4}$$



Example 1b

$$\frac{3}{d} + \frac{1}{d}$$

$$\frac{3d + d}{d^2}$$

$$\frac{4d \div d}{d^2 \div d}$$

$$= \frac{4}{d}$$

Algebraic Fractions

Addition

Example 2

$$\frac{3}{x} + \frac{x}{4}$$

$$\frac{12 + x^2}{4x}$$



Example 3

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

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

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

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

Algebraic Fractions

Subtraction

Learning Intention

1. To explain how to subtract algebraic fractions.

Success Criteria

1. Know how to subtract simple fractions
2. Apply same knowledge to subtract algebraic fractions.

Algebraic Fractions

Subtraction

Example 1a

$$\frac{3}{4} - \frac{2}{5}$$

$$\begin{array}{r} 15 - 8 \\ \hline 20 \end{array}$$

$$= \frac{7}{20}$$



Example 1b

$$\frac{3}{p} - \frac{1}{m}$$

$$\begin{array}{r} 3m - p \\ \hline pm \end{array}$$

$$= \frac{3m - p}{pm}$$

Algebraic Fractions

Subtraction

Example 2

$$\frac{3}{g} - \frac{f}{5}$$

$$\frac{15 - fg}{5g}$$



Example 3

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

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

$$\frac{3x + 15 - x}{x(x+5)}$$

$$\frac{2x + 15}{x(x+5)}$$