Today's Learning:

To revise the addition, subtraction, multiplication and division of numerical fractions.

+ - x ÷ Fractions

e.g. 1) $\frac{2}{5}+\frac{3}{4}$ $\times 5$

$\times 4$

$= \frac{8}{20}+\frac{15}{20}$

$= \frac{23}{20}$

2) $\frac{15}{7}-\frac{5}{3}$ $\times 7$

$\times 3$

$= \frac{45}{21}-\frac{35}{21}$

$= \frac{10}{21}$

3) $\frac{15}{12}\times\frac{4}{10}$

$= \frac{60}{120}$

$= \frac{1}{2}$

top x top
bottom x bottom

4) $\frac{10}{8}\div\frac{7}{10}$

$= \frac{10}{8}\times\frac{10}{7}$

$= \frac{100}{56} = \frac{50}{28}$

$= \frac{25}{14}$

Today's Learning:

To simplify fractions involving algebra.

Challenge:

Simplify these fractions as much as possible:

a) $\frac{16}{48} \begin{matrix} \div 8 \\ \div 8 \end{matrix}$

$= \frac{2}{6} \begin{matrix} \div 2 \\ \div 2 \end{matrix}$

$= \frac{1}{3}$

b) $\frac{-24t}{-12t} \begin{matrix} \div 12 \\ \div 12 \end{matrix}$

$= \frac{-2t}{-t}$

$= \frac{-2}{-1}$

$= 2$

c) $\frac{2mn}{8m^2n} \begin{matrix} \div 2 \\ \div 2 \end{matrix}$

$= \frac{mn}{4m^2n} \begin{matrix} \div mn \\ \div mn \end{matrix}$

$= \frac{1}{4m}$

Simplifying Fractions

We can cancel by dividing the top and bottom by a common factor.

➡ Keep going until the top and bottom have no common factors.

e.g. 1) $\frac{8x}{44xy}$ $\div 4x$ $\div 4x$

$= \frac{2}{11y}$

2) $\frac{6ab^2c}{16ac^2}$ $\div 2$ $\div 2$

$= \frac{3ab^2c}{8ac^2}$ $\div ac$ $\div ac^1$

$= \frac{3b^2}{8c}$

3) $\frac{qr}{4qr^2}$ $\div r$ $\div r$

$= \frac{q}{4qr}$ $\div q$ $\div q$

$= \frac{1}{4r}$

e.g. 4) $\frac{6x^2-9x}{3x}$

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

$= \frac{2x-3}{1}$

$= 2x-3$

5) $\frac{10c}{5ac+30c^3}$

$\div 5c$ $\div 5c$

$= \frac{10c}{5c(a+6c^2)}$

$= \frac{2}{a+6c^2}$

☆ Factorise before you simplify

e.g. 6) $\frac{4bc+6b}{8b^2-2ab}$

$= \frac{2b(2c+3)}{2b(4b-a)}$ $\div 2b$ $\div 2b$

$= \frac{2c+3}{4b-a}$

Challenge:

Simplify this fraction by factorising the top and bottom first:

$$\frac{3x+6}{x^2-4}$$

$$= \frac{3\cancel{(x+2)}}{(x-2)\cancel{(x+2)}} \quad \div(x+2) \quad \div(x+2)$$

$$= \frac{3}{x-2}$$

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

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

$$= \frac{2}{x-1}$$

$\frac{3}{1,3}$

8) $\frac{x^2-16}{x^2-3x-4}$

$\cancel{4}$ 2,2 4,1

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

$$= \frac{x+4}{x+1}$$

9) $\frac{2x^2-18}{2x-6}$

$$= \frac{\cancel{2}(x^2-9)}{\cancel{2}(x-3)}$$

$$= \frac{x^2-9}{x-3}$$

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

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

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Challenge:

Add these fractions:

1) $\frac{2}{6}+\frac{1}{2}$

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

$=\frac{5}{6}$

2) $\frac{3}{y}+\frac{5}{y}$

$=\frac{8}{y}$

3) $\frac{2}{m}+\frac{1}{2m}$

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

$=\frac{5}{2m}$

Adding/Subtracting Algebraic Fractions

When adding/suctracting fractions, we always need a common denominator.

e.g. 1) $\frac{8}{a}+\frac{p}{a}$

$=\frac{8+p}{a}$

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

$=\frac{x^2}{2x^3}-\frac{6x}{2x^3}$

$=\frac{x^2-6x}{2x^3}$

$=\frac{x(x-6)}{2x^3}$ $\div x$ $\div x$

$=\frac{x-6}{2x^2}$

3) $\frac{1}{4x^2}+\frac{3x}{3x^3}$ $\times 3x$ $\times 4$

$=\frac{3x}{12x^3}+\frac{12x}{12x^3}$

$=\frac{15x}{12x^3}$

$=\frac{5x}{4x^3}$

$=\frac{5}{4x^2}$

Today's Learning:

Adding and subtracting algebraic fractions using a common denominator.

Practice:

1) $\frac{4}{3x^2} - \frac{2}{x^3}$

$= \frac{4x^3}{3x^5} - \frac{6x^2}{3x^5}$

$= \frac{4x^3 - 6x^2}{3x^5}$

$= \frac{4x - 6}{3x^3}$

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

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

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

$= \frac{3x^2 + 3x - 2}{6x}$

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

Starter

1) Evaluate $16^{\frac{3}{4}}$

$\sqrt[4]{16^3} = 2^3 = \underline{\underline{8}}$

2) Simplify $h^3 \times h^4$

$= h^7$

3) Simplify $\sqrt{50}$

$= \sqrt{25 \times 2}$

$= 5\sqrt{2}$

More Algebraic Fractions

e.g. 1) $\frac{(x+1)}{2} - \frac{x}{3}$

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

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

$= \frac{3x+3-2x}{6}$

$= \frac{x+3}{6}$

2) $\frac{4}{(b+5)} + \frac{5}{(b+1)}$ $\times (b+5)$ $\times (b+1)$

$= \frac{4(b+1)}{(b+5)(b+1)} + \frac{5(b+5)}{(b+5)(b+1)}$

$= \frac{4(b+1)+5(b+5)}{(b+5)(b+1)}$

$= \frac{4b+4+5b+25}{(b+5)(b+1)}$

$= \frac{9b+29}{(b+5)(b+1)}$

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

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

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

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

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

Challenge:

Calculate: $\frac{5}{6} \times \frac{12}{5} = \frac{60}{30}$

$= \frac{2}{1}$

$= 2$

Multiplying Algebraic Fractions

e.g. 1) $\frac{3m}{4} \times \frac{2}{m}$

$= \frac{6m}{4m}$

$= \frac{3m}{2m}$

$= \frac{3}{2}$

2) $\frac{6ab^2}{y^3} \times \frac{9y}{4a^2b}$

$= \frac{54ab^2y}{4y^3a^2b}$ $\div aby$ $\div aby$

$= \frac{54b}{4y^2a}$

$= \frac{27b}{2y^2a}$

Dividing Algebraic Fractions

e.g. 1) $\frac{7}{g} \div \frac{g^2}{3}$ 2) $\frac{4T}{T^2} \div \frac{4}{T}$