

Starter

Rationalise the denominator:

$$1) \frac{2}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$$

$$2) \frac{1}{4\sqrt{3}} \times \frac{4\sqrt{3}}{4\sqrt{3}} = \frac{4\sqrt{3}}{16 \times 3} = \frac{4\sqrt{3}}{48} = \frac{\sqrt{3}}{12}$$

$$3) \frac{1}{(3-\sqrt{2})} \times \frac{(3+\sqrt{2})}{(3+\sqrt{2})} = \frac{3+\sqrt{2}}{9-\sqrt{4}} = \frac{3+\sqrt{2}}{9-2} = \frac{3+\sqrt{2}}{7}$$

$$4) \frac{2}{(\sqrt{6}+\sqrt{3})} \times \frac{(\sqrt{6}-\sqrt{3})}{(\sqrt{6}-\sqrt{3})} = \frac{2\sqrt{6}-2\sqrt{3}}{\sqrt{36}-\sqrt{18}+\sqrt{18}-\sqrt{9}} = \frac{2\sqrt{6}-2\sqrt{3}}{6-3} = \frac{2\sqrt{6}-2\sqrt{3}}{3}$$

Today's Learning:

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

$$\frac{2}{5} + \frac{5}{6} = \frac{12}{30} + \frac{25}{30} = \frac{37}{30}$$

$$\frac{1}{4} - \frac{3}{8} = \frac{2}{8} - \frac{3}{8} = -\frac{1}{8}$$

Fraction Calculations

$$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$$

$$\frac{1}{2} \div \frac{4}{5} = \frac{1}{2} \times \frac{5}{4} = \frac{5}{8}$$

+ - x ÷ Fractions

e.g. 1) $\frac{2}{5} + \frac{3}{4} = \frac{8}{20} + \frac{15}{20} = \frac{23}{20}$

2) $1\frac{5}{7} - \frac{5}{3} = \frac{12}{7} - \frac{5}{3} = \frac{36}{21} - \frac{35}{21} = \frac{1}{21}$

3) $\frac{15}{12} \times \frac{4}{10} = \frac{60}{120} = \frac{6}{12} = \frac{3}{6} = \frac{1}{2}$

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) $\frac{16}{48} = \frac{8}{24} = \frac{2}{6} = \frac{1}{3}$

b) $\frac{-24t}{-12t} = \frac{-2t}{-t} = \frac{-2}{-1} = 2$

c) $\frac{2mn}{8m^2n} = \frac{m\cancel{n}}{4m^2\cancel{n}} = \frac{\cancel{n}}{4m\cancel{n}} = \frac{1}{4m}$

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) $\frac{8x}{44xy} = \frac{2x}{11xy} = \frac{2}{11y}$

2) $\frac{6ab^2c}{16ac^2} = \frac{6b^2c}{16c^2} = \frac{3b^2c}{8c^2} = \frac{3b^2}{8c}$

3) $\frac{qr}{4qr^2} = \frac{r}{4r^2} = \frac{1}{4r}$

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

5) $\frac{10c}{5ac + 30c^2} = \frac{10c}{5c(a + 6c)} = \frac{2}{a + 6c}$

e.g. 6) $\frac{4bc + 6b}{8b^2 - 2ab} = \frac{2b(2c+3)}{2b(4b-a)} = \frac{2c+3}{4b-a}$

Starter

1) Factorise by taking out a common factor:

a) $6mn^2 + 8n$
 $= n(6mn + 8)$
 $= 2n(3mn + 4)$

b) $12g^2 - 24gh$
 $g(12g - 24h)$
 $12g(g - 2h)$

2) Factorise using difference of two squares:

a) $m^2 - 9$
 $(m - 3)(m + 3)$

b) $16g^2 - 4m^2$
 $(4g + 2m)(4g - 2m)$

3) Factorise the trinomials:

a) $y^2 - 8y + 12$
 $(y - 6)(y - 2)$

b) $j^2 + j - 20$
 $(j + 5)(j - 4)$

Simplify the fractions by taking common factors:

1) $\frac{21a^2b}{14ab^2 - 7ab}$ 2) $\frac{20xy + 30x}{15xy^2 + 10x}$ 3) $\frac{80a^2 + 25a}{20a}$ 4) $\frac{24m + 36}{6m + 12n}$

$$\frac{12(2m + 3)}{6(m + 2n)}$$

$$= \frac{2(2m + 3)}{m + 2n}$$

Challenge:

Simplify this fraction by factorising the top and bottom first:

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

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

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

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

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

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

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

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

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

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

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

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

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

$$= x + 3$$

Challenge:

Add these fractions:

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

$$= \frac{4}{12} + \frac{6}{12}$$

$$= \frac{10}{12} = \frac{5}{6}$$

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

$$= \frac{8}{y}$$

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

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

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

Adding Algebraic Fractions

When adding fractions, we always need a common denominator.

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

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

3) $\frac{1}{4x^2} + \frac{3x}{3x^3}$
 $= \frac{3x}{12x^3} + \frac{12x}{12x^3}$
 $= \frac{15x}{12x^3}$
 $= \frac{5x}{4x^3}$
 $= \frac{5}{4x^2}$

Subtracting Algebraic Fractions

e.g. 1) $\frac{5}{3m} - \frac{2}{n}$
 $= \frac{5n}{3mn} - \frac{6m}{3mn}$
 $= \frac{5n-6m}{3mn}$

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

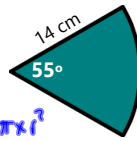
3) $\frac{3}{(x-1)(x+2)} - \frac{1}{(x-1)}$
 $= \frac{3(x+2)}{(x-1)(x+2)} - \frac{(x-1)}{(x-1)(x+2)}$
 $= \frac{3(x+2) - (x-1)}{(x-1)(x+2)}$
 $= \frac{3x+6-x+1}{(x-1)(x+2)}$
 $= \frac{2x+7}{(x-1)(x+2)}$

Today's Learning:

Adding and subtracting algebraic fractions using a common denominator.

Starter

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- 1) Find the area of the sector:

2) Calculate $\frac{5}{x^3} + \frac{1}{2x^2}$

$$-\frac{10}{2x^3} + \frac{x}{2x^3}$$

$$= \frac{10+x}{2x^3}$$

$$\text{Area} = \frac{\theta}{360} \times \pi r^2$$

$$= \frac{55}{360} \times \pi \times 14^2$$

- 3) Write in completed square form:
- $x^2 + 6x - 10$

$$(x+3)^2 - 19$$

4) Simplify $\sqrt{72}$

$$= \sqrt{9 \times 8} = 3\sqrt{8} = 3\sqrt{4 \times 2}$$

$$= 3 \times 2 \times \sqrt{2}$$

$$= 6\sqrt{2}$$

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

Today's Learning:

To multiply and divide algebraic fractions.

Challenge:

Calculate: $\frac{5}{6} \times \frac{12}{5} = \frac{2}{1} = 2$

$$\frac{5}{6} \times \frac{12}{5} = \frac{60}{30} = \frac{2}{1} = 2$$

x ÷ Algebraic Fractions

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

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

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

2) $\frac{4T}{T^2} \div \frac{4}{T}$

$$= \frac{4T}{T^2} \times \frac{T}{4}$$

$$= \frac{T}{T} = 1$$

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

$$= \frac{27b}{2ax^2}$$