ALGEBRAIC FRACTIONS

Note Title 02/11/2011

Cancelling

Terms can only be cancelled if they are being MULTIPLIED together.

① $$\frac{\cancel{24}^{\,4}\,\cancel{x^3}^{\,x^2}\,\cancel{y}^{\,1}\,\cancel{z^2}^{\,1}}{\cancel{18}_{\,3}\,\cancel{x}_{\,1}\,\cancel{y^2}_{\,y}\,\cancel{z^2}_{\,1}} = \frac{4x^2}{3y} \qquad \left(\frac{\cancel{24}^{\,4} \times \cancel{x} \times x \times x \times \cancel{y} \times \cancel{z} \times \cancel{z}}{\cancel{18}_{\,3} \times \cancel{x} \times y \times \cancel{y} \times \cancel{z} \times \cancel{z}} \right)$$

② $$\frac{6x + 8y}{2x + 4y}$$ (note: we CANNOT cancel $6x$ with $2x$ because of the + signs)

If we FACTORISE the top and bottom we make terms which are being multiplied:–

$$= \frac{\cancel{2}^{\,1}(3x+4y)}{\cancel{2}_{\,1}(x+2y)}$$

$$= \frac{3x+4y}{x+2y}$$ (No more cancelling is possible)

③ $$\frac{x^2 + 2xy}{3x + 6y}$$

$$= \frac{x\,\cancel{(x+2y)}^{\,1}}{3\,\cancel{(x+2y)}_{\,1}}$$ We can cancel a whole bracket even if it contains a + sign.

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

Multiplying terms

We can cross-cancel where possible.

① $$\frac{\cancel{10}^{\,2}\,x\,\cancel{y^2}^{\,y}}{3\,\cancel{z}_{\,1}} \times \frac{4\,x\,\cancel{z}^{\,1}}{\cancel{5}_{\,1}\,\cancel{y}_{\,1}} = \frac{8x^2y}{3}$$

② $$\frac{x(\cancel{x+2y})}{y\cancel{z^2}_{z}} \times \frac{x\cancel{z}^{1}}{\cancel{x+2y}}$$

We can cancel a whole bracket as one object

$$= \frac{x^2}{yz}$$

Dividing terms

- Turn the second fraction upside down and multiply.

① $$\frac{6x^2y}{5z} \div \frac{10xz}{3y}$$

⊘ No cancelling until we are multiplying

$$= \frac{\cancel{6}^{3}\cancel{x^2}^{x}y}{5z} \times \frac{3y}{\cancel{10}_{5}\cancel{x}_{1}z}$$

$$= \frac{9xy^2}{25z^2}$$

② $$\frac{(2x)^2y}{3(xy)^2} \div 4xy$$

$$= \frac{\cancel{4}^{1}\cancel{x^2}^{1}\cancel{y}^{1}}{3\cancel{x^2}_{1}y^2} \times \frac{1}{\cancel{4}_{1}x\cancel{y}_{1}}$$

$$\frac{4\cancel{x^2}^{x}y}{3x^2y^2} \times \frac{1}{4\cancel{x}_{1}y}$$

$$= \frac{1}{3xy^2}$$

Adding and Subtracting Fractions

- Need to put fractions over a common denominator (with a single long line)
- The lowest common denominator is not the product of all factors, it is the union of the factors

e.g for $\frac{}{10} + \frac{}{15} = \frac{}{2\times 5} + \frac{}{3\times 5} = \frac{}{2\times 3\times 5} = \frac{}{30}$

Examples

(1) $$\frac{3a}{x} - \frac{2b}{y} = \frac{3ay - 2bx}{xy}$$

(2) $$\frac{4a}{xy} + \frac{5a}{yz} = \frac{4az + 5ax}{xyz}$$

(3) $$\frac{8}{p} - \frac{3}{pq} = \frac{8q - 3}{pq}$$

(4) $$\frac{7}{x^2} + \frac{3}{x^3} = \frac{7x + 3}{x^3}$$

(5) $$\frac{2a}{x^2yz} - \frac{3b}{xy^3z} = \frac{2ay^2 - 3bx}{x^2y^3z}$$

(6) $$\frac{x+3}{6} - \frac{x-2}{8} = \frac{4(x+3) - 3(x-2)}{24}$$

$$= \frac{4x + 12 - 3x + 6}{24}$$

$$= \underline{\underline{\frac{x+18}{24}}}$$

(7) $$\frac{6}{x+3} - \frac{8}{x-2} = \frac{6(x-2) - 8(x+3)}{(x+3)(x-2)}$$

[Best NOT to multiply these bracket out]

$$= \frac{6x - 12 - 8x - 24}{(x+3)(x-2)}$$

$$= \underline{\underline{\frac{-2x-36}{(x+3)(x-2)}}}$$