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Algebraic Fractions

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Can cancelling be used to simplify these expressions? **USQ**

$$\frac{2xy}{x^2}$$

$$\frac{2x+2}{2}$$

$$\frac{x^3+x^2+x}{x^2+5x}$$

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

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

$$\frac{x^2+x+1}{x+5}$$

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

What is cancelling? **USQ**

Cancelling fractions is also called simplifying fractions.

Cancelling is only possible if common factors are present.

$$\frac{6}{10}, \quad \text{can this be re-written as a multiplicaion?}$$

$$= \frac{2 \times 3}{2 \times 5}, \quad \text{we now have a common factor}$$

$$= \frac{\cancel{2} \times 3}{\cancel{2} \times 5}, \quad \text{cancelling the common factor of 2}$$

$$= \frac{3}{5}.$$

Example 1 USQ

$$\frac{2xy}{x^2},\qquad \text{there is already multiplication on the top and bottom,}$$

$$=\frac{2\times x\times y}{x\times x},\qquad \text{cancel common factors,}$$

$$=\frac{2\times \cancel{x}\times y}{\cancel{x}\times x},$$

$$=\frac{2y}{x}.$$

Example 2 USQ

Can the numerator and denominator be written as multiplications?

Consider this fraction first:

$$\frac{2x+2}{2}$$

$$=\frac{2\times x+2\times 1}{2\times 1},$$

$$=\frac{2\times(x+1)}{2\times 1},$$

$$=\frac{\cancel{2}\times(x+1)}{\cancel{2}\times 1},$$

$$=x+1.$$

Now consider this fraction:

$$\frac{2x+1}{2}.$$

There are no common factors in the numerator, thus,

No Cancellation Possible

Therefore,

$$\frac{2x+1}{2}\quad\text{is not equal to}\quad x+1$$

Example 3 USQ

Consider this fraction:

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

$$=\frac{3\times x\times x+2\times x}{x\times 1}$$

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

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

$$=3x+2.$$

Therefore,

Cancellation possible.

Now consider this fraction:

$$\frac{3x^2+2}{x}.$$

There is no common factors, thus,

No Cancellation Possible

Therefore,

$$\frac{3x^2+2}{x}\quad\text{is not equal to}\quad 3x+2$$

Example 4 USQ

$$\frac{x^3+x^2+x}{x^2+5x}$$

$$=\frac{x\times x^2+x\times x+x\times 1}{x\times x+5\times x}$$

$$=\frac{x(x^2+x+1)}{x(x+5)}$$

$$=\frac{\cancel{x}(x^2+x+1)}{\cancel{x}(x+5)}$$

$$=\frac{x^2+x+1}{x+5}.$$

Therefore,

Cancellation possible.

Now consider:

$$\frac{x^2+x+1}{x+5}.$$

There is no common factors, thus,

No Cancellation Possible

Therefore,

$$\frac{x^2+x+1}{x+5}\quad\text{is not equal to}\quad\frac{x^2+1}{5}.$$

Further help

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