

Simplifying Rational Functions

$$\frac{24x^3}{15x}$$

First expand the exponential expression in both the numerator and denominator:

$$\frac{24x^3}{15x} = \frac{2 \cdot 2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot x}{3 \cdot 5 \cdot x} = \frac{2 \cdot 2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot x}{3 \cdot 5 \cdot x} = \frac{8x^2}{5} \quad (x \neq 0)$$

Confirm that $\frac{24x^3}{15x} = \frac{8x^2}{5}$ ($x \neq 0$) by placing each side as an equation

in your graphing calculator and then view an associated table for those equations. Notice from the table that the two expressions are equal except at $x = 0$. This confirms your simplification.

X	Y1	Y2
0	ERROR	0
1	1.6	1.6
2	6.4	6.4
3	14.4	14.4
4	25.6	25.6
5	40	40
6	57.6	57.6

X=0

$$\frac{5x^3 - 50x}{10x}$$

Rewrite the numerator and denominators in factored form and then simplify:

$$\frac{5x^3 - 50x}{10x} = \frac{5 \cdot x \cdot (x^2 - 10)}{2 \cdot 5 \cdot x} = \frac{5 \cdot x \cdot (x^2 - 10)}{2 \cdot 5 \cdot x} = \frac{x^2 - 10}{2} \quad (x \neq 0)$$

Confirm that $\frac{5x^3 - 50x}{10x} = \frac{x^2 - 10}{2}$ ($x \neq 0$) by placing each side as an

equation in your graphing calculator and then view an associated table for those equations. Notice from the table that the two expressions are equal except at $x = 0$. This confirms your simplification.

X	Y1	Y2
0	ERROR	-5
1	-4.5	-4.5
2	-3	-3
3	-1.5	-1.5
4	0	0
5	1.5	1.5
6	3	3

X=0

Simplify the following rational expressions. Confirm the simplified expressions by using the graphing calculator to view table values. Remember to list all x values that can be used in the simplified expression.

1. $\frac{60x^8}{24x^3}$

4. $\frac{14 + 28x}{7x}$

2. $\frac{(4x^4)(20x^3)}{48x^5}$

5. $\frac{25x^3 - 35x^2}{5x^2}$

3. $\frac{12x^3(x-3)^4}{8(x-3)}$