

Performing Operations with Rational Expressions

Addition and/or Subtraction:

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

In addition and subtraction, it is necessary to have common denominators, therefore we must re-write each fraction with a common denominator of 6.

$$\frac{2x}{3} + \frac{3}{2} = \frac{2x \cdot 2}{3 \cdot 2} + \frac{3 \cdot 3}{2 \cdot 3} = \frac{4x}{6} + \frac{9}{6} = \frac{4x + 9}{6}$$

To confirm, place each side of the equation in the graphing calculator as a separate equation. View a table to see that the set of table values are the same.

$$\frac{2x}{3} + \frac{3}{2} = \frac{4x + 9}{6}$$

X	Y1	Y2
0	1.5	1.5
1	2.1667	2.1667
2	2.8333	2.8333
3	3.5	3.5
4	4.1667	4.1667
5	4.8333	4.8333
6	5.5	5.5

X=0

Multiplication and/or Division:

$$\frac{8 \cdot 6x^3}{x \cdot 12} =$$

Remember that with multiplication, numerators are multiplied together and denominators are multiplied. Then the answer is simplified.

$$\frac{8 \cdot 6x^3}{x \cdot 12} = \frac{8 \cdot 6 \cdot x^3}{12 \cdot x} = \frac{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot x}{2 \cdot 2 \cdot 3 \cdot x} = 4x^2 (x \neq 0)$$

To confirm, place each side of the equation in the graphing calculator as a separate equation. View a table to see that the set of table values are the same.

$$\frac{2x^3}{3} \div \frac{8x^5}{15} =$$

Remember with division you must re-write it as multiplication by the reciprocal.

$$\frac{2x^3}{3} \div \frac{8x^5}{15} = \frac{2x^3}{3} \cdot \frac{15}{8x^5} = \frac{2x^3 \cdot 15}{3 \cdot 8x^5} = \frac{2 \cdot 3 \cdot 5 \cdot x \cdot x \cdot x}{2 \cdot 3 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot x \cdot x} = \frac{5}{4x^2}$$

To confirm, place each side of the equation in the graphing calculator as a separate equation. View a table to see that the set of table values are the same.

X	Y1	Y2
0	ERROR	0
1	4	4
2	16	16
3	36	36
4	64	64
5	100	100
6	144	144

X=0

X	Y1	Y2
0	ERROR	ERROR
1	1.25	1.25
2	.3125	.3125
3	.13889	.13889
4	.07813	.07813
5	.05	.05
6	.03472	.03472

X=0

Simplify each exercise:

1. $\frac{2x}{5} + \frac{4x}{3}$

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

3. $\frac{4x^4}{3y} \cdot \frac{2y}{5x^2}$

4. $\frac{2(x-2)}{3(x-3)} \cdot \frac{9(x-3)^3}{8(x-2)^4}$

5. $\frac{2x^4}{4y} \div \frac{3x^8}{12y}$