

Get out your books and look over what you have completed for lesson 4.3. We will go over questions shortly and move on.

4.3 What Does it Mean to Be Rational?

A Solidify Understanding Task

Part I: Comparing rational numbers and rational fractions.

1. In your own words, define *rational number*.

Circle the numbers below that are rational and refine your definition, if needed.

3 -5 $\frac{2}{3}$ $\frac{20}{3}$ 14 2.7 $\sqrt{5}$ 2^3 3^{-3} $\log_2 8$ $\frac{7}{0}$

2. The definition of a *rational function* is as follows:

A function $f(x)$ is called a rational function if and only if it can be written in the form $f(x) = \frac{P(x)}{Q(x)}$ where P and Q are polynomials in x and Q is not the zero polynomial.

Interpret this meaning in your own words and then write three examples of rational functions.

3. How are rational numbers and rational functions similar? Different?

Part II: Arithmetic of Rational Expressions: making connections between rational numbers and rational expressions. Solve problems in the first column and then use the same process to simplify the rational expressions in the second column.

Arithmetic of rational numbers	Arithmetic of rational expressions
$\frac{4\cancel{2}^2}{7} \cdot \frac{\cancel{2}^2}{3} + \frac{4}{7} \cdot \frac{\cancel{2}^2}{3} =$ $\frac{14}{21} + \frac{12}{21} =$ $\frac{14+12}{21} = \frac{26}{21}$	<p>LCD: $(x+1)(x-1)$</p> $\frac{(x-1) \cdot \frac{3}{(x+1)} + \frac{4}{(x-1)} \cdot \frac{(x+1)}{(x+1)} =$ $\frac{3(x-1)}{(x-1)(x+1)} + \frac{4(x+1)}{(x-1)(x+1)} =$ $\frac{3x-3+4x+4}{(x-1)(x+1)} = \frac{7x+1}{(x-1)(x+1)}$

<p>5a. $\frac{3}{8} + \frac{5}{6}$</p>	<p>LCD: $(x-1)(x+3)$</p> $\frac{3(x+3)}{(x-1)(x+3)} + \frac{5(x-1)}{(x-1)(x+3)} =$ $\frac{3x+9+5x-5}{(x-1)(x+3)} =$ $\frac{8x+4}{(x-1)(x+3)} =$ $\frac{2x^2-2x+4x}{(x-1)(x+3)} =$ $\frac{2x^2+2x}{(x-1)(x+3)} = \frac{2x(x+1)}{(x-1)(x+3)}$
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<p>6a. $\frac{7}{8} - \frac{1}{6}$</p>	<p>LCD: $(x+3)(x-1)$</p> $\frac{7(x-1)}{(x-1)(x+3)} - \frac{1(x+3)}{(x-1)(x+3)} =$ $\frac{7x-7-1x-3}{(x-1)(x+3)} =$ $\frac{6x-10}{(x-1)(x+3)} =$ $\frac{2(x^2-3x-6)}{(x-1)(x+3)}$
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<p>7a. $\frac{3}{8} \times \frac{5}{6}$</p>	<p>7b. $\frac{(x+1)(x-2)}{(x+2)} \times \frac{(x+5)}{(x-2)(x+2)} =$</p> $\frac{(x+1)(x+5)}{(x+2)^2} \text{ or}$ $\frac{(x+1)(x+5)}{(x+2)(x+2)}$
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<p>8a. $\frac{3}{8} \div \frac{5}{6}$</p>	<p>8b. $\frac{(x+1)(x-2)}{(x+2)} \div \frac{(x+5)}{(x-2)(x+2)} =$</p> $\frac{(x+1)(x-2)}{(x+2)} \cdot \frac{(x-2)(x+2)}{(x+5)}$ $\frac{(x+1)(x-2)(x-2)}{(x+5)} \text{ or}$ $\frac{(x+1)(x-2)^2}{(x+5)}$
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4.3 HW
#12

$$\frac{x^2 + 6x + 8}{x^2 - 5x + 4} \cdot \frac{x^2 + 3x - 4}{x^2 + 4x + 4} =$$

$$\frac{(x+4)\cancel{(x+2)}}{(x-4)\cancel{(x-1)}} \cdot \frac{(x+4)\cancel{(x-1)}}{\cancel{(x+2)}(x+2)} =$$

$$\frac{(x+4)^2}{(x-4)(x+2)}$$

9. To summarize, explain how you would perform the following arithmetic operations on rational expressions:

Adding:

Subtracting:

Multiplying:

Dividing:

State the excluded values for each. Excluded values are the value for the given variable that make the denominator equal to zero.

$$\frac{6b + 16}{14b - 20} = \frac{\cancel{2}(3b+8)}{\cancel{2}(7b-10)} = \boxed{\frac{3b+8}{7b-10}} \quad \begin{array}{l} \text{E.V.} \\ b = \frac{10}{7} \end{array}$$

$$\begin{array}{l} 7b-10=0 \\ 7b=10 \\ b=\frac{10}{7} \end{array}$$

Simplify each expression.

$$\frac{m-5}{2m-4} + \frac{6}{2m}$$

$$\frac{5x}{2} - \frac{5}{3x^2+9x}$$

$$\frac{7r^2}{49r^3+49r^2} \div \frac{r+5}{21r+21}$$

$$\frac{45k+54}{k+3} \cdot \frac{10}{45k+54}$$

Homework/Classwork

4.3b Worksheet

4.3 b WKS

$$\textcircled{1} \frac{10x-60}{-7x^2+51x-54} = \frac{10(x-6)}{-1(7x^2-51x+54)}$$

$$= \frac{10(x-6)}{-1(7x-9)(x-6)} = \frac{10}{-(7x-9)}$$

E.V: $x = 6, \frac{9}{7}$

a.c
7 · 54
378

$$-\frac{9}{7x} - \frac{42}{7x} = -\frac{6}{x}$$

b

$$378 = 2 \cdot 3 \cdot 3 \cdot 3 \cdot 7$$

$$2 \cdot 189$$

$$\rightarrow 9 \cdot 42$$

$$7x^2 - 51x + 54$$

a.c
7 · 54
378

$$(7x^2 - 42x)(-9x + 54)$$

-9 -42
-51

b

$$\frac{7x(x-6) \cdot -9(x-6)}{(x-6)(7x-9)}$$

$$7x^2 - 51x + 54$$

$$(7x-54)(x-1)$$

$$-7x - 54x \neq -51x$$

$$(7x-1)(x-54)$$

$$7 \cdot 54x - 1x \neq -51x$$

$$(7x-9)(x-6)$$

$$-42x - 9x = -51x$$

$$\textcircled{4} \frac{3(v^2-v-2)}{7v(v+1)} =$$

$$\frac{3(v-2)\cancel{(v+1)}}{7v\cancel{(v+1)}} = \frac{3(v-2)}{7v}$$