

10.1 Equations with Rational Expressions

ex1 p264

$$\frac{-3a}{a^2-4a-32} = \frac{2}{a-8} + \frac{3}{a+4}$$

$$\left[\frac{-3a}{(a-8)(a+4)} = \frac{2}{a-8} + \frac{3}{a+4} \right] (a+4)(a-8)$$

$$\frac{-3a \cancel{(a+4)(a-8)}}{\cancel{(a-8)(a+4)}} = \frac{2 \cancel{(a+4)(a-8)}}{a-8} + \frac{3 \cancel{(a+4)(a-8)}}{a+4}$$

$$-3a = 2(a+4) + 3(a-8)$$

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$$-3a = 2(a+4) + 3(a-8)$$

$$-3a = 2a + 8 + 3a - 24$$

$$-5a = -16$$

$$a = 2$$

$$\frac{-6}{4-8-32} = \frac{2}{-6} + \frac{3}{6}$$

$$\frac{-6}{-36} = \frac{-2+3}{6}$$

$$\frac{1}{6} = \frac{1}{6}$$

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$$\frac{3x}{x^2-5x+4} = \frac{2}{x-4} + \frac{3}{x-1}$$

$$\left[\frac{3x}{(x-4)(x-1)} = \frac{2}{x-4} + \frac{3}{x-1} \right] (x-4)(x-1)$$

$$\frac{3x \cancel{(x-4)(x-1)}}{\cancel{(x-4)(x-1)}} = \frac{2 \cancel{(x-4)(x-1)}}{x-4} + \frac{3 \cancel{(x-4)(x-1)}}{x-1}$$

$$3x = 2(x-1) + 3(x-4)$$

$$3x = 2x - 2 + 3x - 12$$

$$-2x = -14$$

$$x = 7$$

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ex 2 pg 265

$$\left[\frac{-20}{(x-9)(x+5)} = \frac{(x+3)}{(x+5)} + \frac{+2}{(x-9)} \right] (x-9)(x+5)$$

$$\frac{-20 \cancel{(x-9)(x+5)}}{\cancel{(x-9)(x+5)}} = \frac{(x+3) \cancel{(x-9)(x+5)}}{x+5} + \frac{2 \cancel{(x-9)(x+5)}}{x-9}$$

$$-20 = x^2 - 9x + 3x - 27 + 2x + 10$$

$$-70 = x^2 - 4x - 17$$

$$0 = x^2 - 4x + 3$$

$$0 = (x-3)(x-1)$$

$$x-3=0 \quad x-1=0$$

$$x=3 \quad x=1$$

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ex 3 pg 266

$$\left[\frac{x+5}{x-4} = \frac{3}{x} + \frac{36}{x(x-4)} \right] (x-4)(x)$$

$$\frac{x+5 \cancel{(x-4)(x)}}{x-4} = \frac{3 \cancel{(x-4)(x)}}{x} + \frac{36 \cancel{(x-4)(x)}}{x(x-4)}$$

$$x^2 + 5x = 3x - 12 + 36$$

$$x^2 + 2x - 24 = 0$$

$$(x+6)(x-4) = 0$$

$$x = -6 \quad x = 4 \text{ extraneous}$$

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$$\left[\frac{6}{a+2} + \frac{3}{(a+2)(a-2)} = \frac{2a-7}{a-2} \right] (a+2)(a-2)$$

$$\frac{6 \cancel{(a+2)(a-2)}}{(a+2)} + \frac{3 \cancel{(a+2)(a-2)}}{(a+2)(a-2)} = \frac{2a-7 \cancel{(a+2)(a-2)}}{a-2}$$

$$6a - 12 + 3 = (2a-7)(a+2)$$

$$6a - 9 = 2a^2 + 4a - 7a - 14$$

$$0 = 2a^2 - 9a - 5$$

$$0 = (2a+1)(a-5)$$

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$$0 = (2a + 1)(a - 5)$$

$$2a + 1 = 0 \quad a - 5 = 0$$

$$2a = -1 \quad a = 5$$

$$a = -\frac{1}{2}$$

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$$x - \frac{4x}{x-6} = \frac{24}{6-x}$$

$$\frac{x}{1} - \frac{4x}{x-6} = \frac{-24}{x-6}$$

$$\left[\frac{x}{1} - \frac{4x}{x-6} = \frac{-24}{x-6} \right] (x-6)$$

$$x(x-6) - 4x = -24$$

$$x^2 - 6x - 4x + 24 = 0$$

$x^2 - 10x + 24 = 0$
 $(x-6)(x-4) = 0$
 $x = 6, 4$
 $x = 4$

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10.2 Work Problems

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10.3 Complex Rational Expressions

$$\frac{\frac{2}{5}}{\frac{1}{3}}$$

$$\frac{2}{5} \div \frac{1}{3}$$

$$\frac{2}{5} \cdot \frac{3}{1}$$

$$\frac{6}{5}$$

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$$\frac{2a + \frac{1}{6}}{\frac{a}{6} + \frac{2}{3}} \Rightarrow \frac{\frac{2a}{1} + \frac{1}{3 \cdot 2}}{\frac{a}{3 \cdot 2} + \frac{2}{3}} \quad \begin{matrix} (3 \cdot 2) \\ (3 \cdot 2) \end{matrix}$$

$$\frac{12a + 1}{a + 4}$$

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$$\frac{\frac{3}{5} - \frac{2}{a}}{\frac{1}{10a} + \frac{1}{2a^2}} \Rightarrow \frac{\frac{3}{5} - \frac{2}{a}}{\frac{1}{2 \cdot 5 \cdot a} + \frac{1}{2 \cdot a \cdot a}} \quad \begin{matrix} (5 \cdot a \cdot 2 \cdot a) \\ (5 \cdot a \cdot 2 \cdot a) \end{matrix}$$

$$\frac{6a^2 - 20a}{a + 5}$$

$$\frac{2a(3a - 10)}{a + 5}$$

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$$\frac{\frac{7}{2} - \frac{3}{b}}{\frac{5}{b^2} + \frac{11}{14}} \Rightarrow \frac{\frac{7}{2} - \frac{3}{b}}{\frac{5}{b \cdot b} + \frac{11}{2 \cdot 7}} \quad \begin{matrix} (2 \cdot b \cdot b \cdot 7) \\ (2 \cdot b \cdot b \cdot 7) \end{matrix}$$

$$\frac{49b^2 - 42b}{70 + 11b^2}$$

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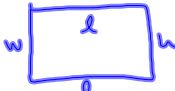
10.4 Complex Rational Expressions with polynomial denominators

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10.5 Formulas and Literal Equations

$$\begin{array}{r} 6x + 7 = 8 \\ -7 \quad -7 \\ \hline 6x = 1 \\ \frac{6x}{6} = \frac{1}{6} \\ \boxed{x = \frac{1}{6}} \end{array} \quad \begin{array}{r} ax + b = c \\ -b \quad -b \\ \hline ax = c - b \\ \frac{ax}{a} = \frac{c - b}{a} \\ x = \frac{c - b}{a} \end{array}$$

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$$\begin{array}{r} p = 2l + 2w \\ -2w \quad -2w \\ \hline p - 2w = 2l \\ \frac{p - 2w}{2} = \frac{2l}{2} \\ \frac{p - 2w}{2} = l \end{array}$$


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$$\begin{array}{r} a = prt + p \\ -p \quad -p \\ \hline a - p = prt \\ \frac{a - p}{pt} = \frac{prt}{pt} \\ \frac{a - p}{pt} = r \end{array}$$

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$$\begin{array}{r} k = \frac{3}{7}m + 20 \\ \left[k - 20 = \frac{3}{7}m \right] \frac{3}{7} \\ \frac{3}{7}k - \frac{3(20)}{7} = m \\ \frac{3}{7}k - \frac{60}{7} = m \Rightarrow \frac{3k - 60}{7} = m \\ (k=62) \quad \frac{3(62) - 60}{7} = m \\ \frac{126 - 60}{7} = m \\ \frac{66}{7} = m \\ \boxed{18 = m} \end{array}$$

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$$\begin{aligned}
 ax &= m - 4x \\
 +4x & \quad +4x \\
 ax + 4x &= m \\
 \frac{(a+4)x}{(a+4)} &= \frac{m}{(a+4)} \\
 x &= \frac{m}{a+4}
 \end{aligned}
 \qquad
 \frac{x}{6} = \frac{12}{6}$$

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$$\begin{aligned}
 nx &= r + px \\
 -px & \quad -px \\
 nx - px &= r \\
 \frac{x(n-p)}{n-p} &= \frac{r}{n-p} \\
 x &= \frac{r}{n-p}
 \end{aligned}$$

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10.6 Distance Problems

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