

INTERMEDIATE ALGEBRA

GPS # 27

6.4 RATIONAL EQUATIONS

NAME: Pam Patel

Useful Guidelines:

- * To solve an equation with rational expressions:
 1. Determine the domain.
 2. Multiply all the terms in the equation by the least common denominator.
 3. Solve the resulting equation and check that the solution is in the domain of the equation.
- * To solve a formula for a specified variable, isolate that variable on one side of the equation.
- * To solve a motion problem, use the formula $d = rt$ or one of its equivalents, $t = \frac{d}{r}$ or $r = \frac{d}{t}$.
- * To solve a word problem:
 - (1) Assign a variable, (2) Write an equation, (3) Solve the variable, and (4) State the answer.

1. Solve each equation: $LC.D = 3x$

a) $\left(\frac{1}{x} - \frac{4}{3}\right) = \frac{2}{3x}$ $\{D = \{x | x \neq 0\}\}$

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

$$3 - 4x = 2$$

$$-4x = -1$$

$$\boxed{x = \frac{1}{4}}$$
 Sol. set $\{x | x = \frac{1}{4}\}$

b) $\left(\frac{3}{x-2} - \frac{1}{x+2}\right) = \frac{8}{x^2-4}$

$LC.D = (x-2)(x+2)$

$\{D = \{x | x \neq -2, x \neq 2\}\}$

$$3(x+2) - 1(x-2) = 8$$

$$3x + 6 - x + 2 = 8$$

$$2x + 8 = 8$$

$$2x = 0$$

$$\boxed{x = 0}$$

Sol. set $\{x | x = 0\}$

2. Solve each formula for the specified variable.

a) Solve $F = \frac{GMm}{d^2}$ for m . $LC.D = d^2$

$$F \cdot d^2 = \frac{GMm}{d^2} \cdot d^2$$

$$\frac{F \cdot d^2}{GM} = \frac{GMm}{GM}$$

$$\boxed{\frac{F \cdot d^2}{GM} = m}$$

b) Solve $\frac{PV}{T} = \frac{pv}{t}$ for V . $LC.D = T \cdot t$

$$V = \frac{TPv}{Pt}$$

3. If 20 out of 100 Americans had no dental insurance coverage. The population at that time was about 280 million. How many million had no dental insurance coverage? [Hint: Let x = the number (in millions) who had no dental insurance.]

20% of ins.

20 out of 100 $\rightarrow \frac{20}{100} = \frac{x}{280}$

$$20 \cdot 280 = 100x$$

$$5600 = 100x$$

$$\boxed{x = 56}$$
 millions

$LC.D = 1400$

$$\begin{array}{r} 10 \overline{) 280} \quad 100 \\ \underline{100} \\ 180 \\ \underline{140} \\ 400 \\ \underline{400} \\ 0 \end{array}$$

$$10 \times 2 \times 5 \times 14 = 1400$$

4. Jonathan's car uses 5 gallon of gas to travel 100 miles. He has 4 gallon of gas in the car, and he wants to know how much more gas he will need to drive 320 miles. If we assume the car continues to use gas at the same rate, how many more gallons will he need? [Hint: Let x = the additional number of gallon of gas needed.]

gal. mile
5 100
+4) 320
has

$$\frac{x + 4 \text{ gallon}}{320 \text{ miles}} = \frac{5}{100 \text{ miles}}$$

$$100(x + 4) = 5 \cdot 320$$

$$100x + 400 = 1600$$

$$100x = 1200$$

$$\boxed{x = 12} \text{ gallon}$$

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$$\begin{array}{r} 320 \\ \times 5 \\ \hline 1600 \end{array}$$