Unit 2: Rational Expressions

4-2: Simplifying Rational Expressions

Rational Expressions: - fractions with polynomials as numerator and / or denominator.

To Simplify (Reduce) Rational Expressions: (Factor all polynomials and reduce)

Example 1: Simplify the followings.

a. $\dfrac{9x^2-2x}{9x-2}$

$$=\frac{x(9x-2)}{(9x-2)}$$

$$=\frac{x\cancel{(9x-2)}}{\cancel{(9x-2)}}$$

$$=x$$

NPV:

$9x-2=0$

$9x=2$

$x=\dfrac{2}{9}$

b. $\dfrac{3x}{x^2+6x}$

$$=\frac{3x}{x(x+6)}$$

$$=\frac{3\cancel{x}}{\cancel{x}(x+6)}$$

$$=\frac{3}{x+6}$$

NPV:

$x\,(x+6)=0$

$x=0 \quad x+6=0$

$x=-6$

$x=0$ and -6

c. $\dfrac{6x^2y+12xy}{8x^2-8x}$

$$=\frac{6xy(x+2)}{8x(x-1)}$$

$$=\frac{6\cancel{xy}(x+2)}{8\cancel{x}(x-1)}$$

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

NPV:

$8x\,(x-1)=0$

$8x=0 \quad x-1=0$

$x=0 \qquad x=1$

$x=0$ and 1

d. $\dfrac{x^2-9}{x^2-6x+9}$

$$=\frac{(x-3)(x+3)}{(x-3)(x-3)}$$

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

$$=\frac{(x+3)}{(x-3)}$$

NPV:

$(x-3)^2=0$

$x-3=0$

$x=3$

e. $\dfrac{2y^2-7y+3}{y^2-5y+6}$

$= \dfrac{(y-3)(2y-1)}{(y-2)(y-3)}$

$= \dfrac{\cancel{(y-3)}(2y-1)}{(y-2)\cancel{(y-3)}}$

$= \dfrac{(2y-1)}{(y-2)}$

NPV:

$(y-2)(y-3)=0$

$y-2=0 \quad y-3=0$

$y=2 \quad y=3$

$y = 2$ and 3

f. $\dfrac{x-2}{x+2}$

Cannot Simplify!

NPV:

$(x+2)=0$

$x=-2$

g. $\dfrac{x-2}{2-x}$

$= \dfrac{-(x-2)}{-(2-x)}$

$= \dfrac{-(x-2)}{(x-2)}$

$= \dfrac{-\cancel{(x-2)}}{\cancel{(x-2)}}$

$= -1$

Multiply Both Sides by – 1

NPV:

$2-x=0$

$-x=-2$

$x=2$

4-2 Homework Assignments

Regular: pg. 158-159 #1 to 49 (odd), 50, 51 (a to e), 53

AP: pg. 158-159 #2 to 48 (even), 50 to 55

4-3: Multiplying and Dividing Rational Expressions

Multiplying Rational Expressions

$$\frac{3}{5}\times\frac{10}{21}$$

$$\frac{\cancel{3}^{1}}{\cancel{5}_{1}}\times\frac{\cancel{10}^{2}}{\cancel{21}_{7}}=\frac{2}{7}$$

Reduce then Multiply!

Example 1: Simplify $\dfrac{x^2-1}{x^2+x-6}\times\dfrac{2x^2+7x+3}{2x^2-x-1}$

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

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

$$=\frac{x+1}{x-2}$$

NPV:

$(x-2)(x+3)=0$ $\quad$ $(2x+1)(x-1)=0$

$x-2=0$ $\quad$ $x-3=0$ $\quad$ $2x+1=0$ $\quad$ $x-1=0$

$x=2$ $\quad$ $x=3$ $\quad$ $2x=-1$ $\quad$ $x=1$

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

$x=-\frac{1}{2}$, 1, 2, and 3

Dividing Rational Expressions

$$\frac{9}{4}\div\frac{15}{20}=\frac{9}{4}\times\frac{20}{15}$$

$$\frac{\cancel{9}^{3}}{\cancel{4}_{1}}\times\frac{\cancel{20}^{\cancel{5}}}{\cancel{15}_{\cancel{5}}}=3$$

Reciprocal, then Reduce and Multiply!

Example 2: Simplify $\dfrac{x^2+6x+9}{3x^2-4x-4}\div\dfrac{x^2-9}{3x^2+8x+4}$

NPV is taken from the numerator and denominator of the fraction after the ÷ sign

$$=\frac{x^2+6x+9}{3x^2-4x-4}\times\frac{3x^2+8x+4}{x^2-9}$$

$$=\frac{(x+3)(x+3)}{(3x+2)(x-2)}\times\frac{(3x+2)(x+2)}{(x-3)(x+3)}$$

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

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

NPV:

$(3x+2)(x-2)=0$ $\quad$ $(3x+2)(x+2)=0$ $\quad$ $(x-3)(x+3)=0$

$3x+2=0$ $\quad$ $x-2=0$ $\quad$ $3x+2=0$ $\quad$ $x-2=0$ $\quad$ $x-3=0$ $\quad$ $x+3=0$

$3x=-2$ $\quad$ $x=2$ $\quad$ $3x=-2$ $\quad$ $x=2$ $\quad$ $x=3$ $\quad$ $x=-3$

$x=-\frac{2}{3}$ $\quad$ $x=-\frac{2}{3}$

$x=-3,-\frac{2}{3}$, 2, and 3

Example 3: Simplify $\dfrac{\frac{21}{4}}{\frac{7}{16}}$

$$= \frac{\left(\frac{21}{4}\right)}{\left(\frac{7}{16}\right)} = \frac{21}{4} \div \frac{7}{16}$$

$$= \frac{21}{4} \times \frac{16}{7}$$

$$= \frac{\cancel{21}^{3}}{\cancel{4}_{1}} \times \frac{\cancel{16}^{4}}{\cancel{7}_{1}} = 12$$

Example 4: Simplify $\dfrac{\frac{4y^2-9}{y+4}}{\frac{6y+9}{2y^2+5y-12}}$

$$= \frac{4y^2-9}{y+4} \div \frac{6y+9}{2y^2+5y-12}$$

$$= \frac{4y^2-9}{y+4} \times \frac{2y^2+5y-12}{6y+9}$$

$$= \frac{(2y+3)(2y-3)}{(y+4)} \times \frac{(2y-3)(y+4)}{3(2y+3)}$$

$$= \frac{\cancel{(2y+3)}(2y-3)}{\cancel{(y+4)}} \times \frac{(2y-3)\cancel{(y+4)}}{3\cancel{(2y+3)}}$$

$$= \frac{(2y-3)^2}{3}$$

NPV is taken from the numerator and denominator of the fraction after the ÷ sign

NPV:

$y + 4 = 0$ $\quad$ $(2y - 3)(y + 4) = 0$ $\quad$ $2y + 3 = 0$

$y = -4$ $\quad$ $2y - 3 = 0$ $\quad$ $y - 4 = 0$ $\quad$ $2y = -3$

$y = \frac{3}{2}$ $\quad$ $y = 4$ $\quad$ $y = -\frac{3}{2}$

$y = -4, -\frac{3}{2}, \frac{3}{2}$ and 4

4-3 Homework Assignments

Regular: pg. 163-164 #1 to 47 (odd), 49 to 54, 55 (a, b, c), 56, 58

AP: pg. 163-164 #2 to 48 (even), 49 to 54, 55 (a, b, c), 56 to 59

4-4: Adding and Subtracting Rational Expressions (Part 1)

To Add and Subtract Rational Expressions

1. **Find Common Denominator.**
2. **Obtain Equivalent Fractions.**
3. **Add or Subtract Numerators.**
4. **Reduce if Possible.**

$$\frac{3}{4}+\frac{5}{6} = \frac{3(3)+2(5)}{12} = \frac{9+10}{12} = \frac{19}{12}$$

LCM and Equivalent Fractions

Example 1: Simplify the followings.

a. $\frac{6}{x}+\frac{2}{x}-\frac{9}{x}$

$= \frac{6+2-9}{x}$ LCM = x

$= -\frac{1}{x}$

NPV: $x = 0$

b. $\frac{7x}{x+1}-\frac{4}{x+1}-\frac{9x+2}{x+1}$

Subtract the entire fraction. We will need brackets!

$= \frac{7x-4-(9x+2)}{x+1}$ LCM = $x + 1$

$= \frac{7x-4-9x-2}{x+1}$

$= \frac{-2x-6}{x+1}$

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

NPV: $x + 1 = 0$

$x = -1$

c. $\frac{5x}{3}+\frac{9x}{2}-\frac{7x}{4}+1$

$= \frac{4(5x)+6(9x)-3(7x)+12}{12}$ LCM = 12

$= \frac{20x+54x-21x+12}{12}$

$= \frac{53x+12}{12}$

d. $\frac{3x-2}{6}+\frac{x+5}{4}-\frac{2x-3}{3}$

$= \frac{2(3x-2)+3(x+5)-4(2x-3)}{12}$ LCM = 12

$= \frac{6x-4+3x+15-8x+12}{12}$

$= \frac{x+23}{12}$

Example 2: A rectangle has a dimensions $\frac{3x+1}{2}$ and $\frac{2x-3}{5}$. Find its perimeter.

$Width = \frac{2x-3}{5}$

$Length = \frac{3x+1}{2}$

Perimeter $= 2l + 2w$

$$P = 2\left(\frac{3x+1}{2}\right) + 2\left(\frac{2x-3}{5}\right)$$

$$P = (3x+1) + \frac{4x-6}{5}$$

$$P = \frac{5(3x+1)+(4x-6)}{5}$$

$$P = \frac{15x+5+4x-6}{5}$$

$$P = \frac{19x-1}{5}$$

4-4 Homework Assignments

Regular: pg. 167 #1 to 25 (odd), 26, 27, 29a

AP: pg. 167 #2 to 24 (even), 26 to 28, 29a, 30

4-5: Adding and Subtracting Rational Expressions (Part 2)

LCM of Monomial: - LCM of monomial coefficient, and the variable(s) with its / their **highest exponent(s)**.

Example 1: LCM of $3a^2$, $5a$, $6a^3$

LCM of 3, 5, 6 = 30 Variable with Highest Exponent = a^3

LCM = $30a^3$

Example 2: LCM of $3x^2y$, $21x^3y^2$, $7xy^3$

LCM of 3, 21, 7 = 21 Variables with Highest Exponents = x^3y^3

LCM = $21x^3y^3$

LCM of Polynomial: - common factor(s) (written once) along with any uncommon (leftover) factor(s).

Example 3: LCM of $x^2 - 2x - 3$ and $x^2 - x - 2$

Factors of $x^2 - 2x - 3 = (x - 3)(x + 1)$ and Factors of $x^2 - x - 2 = (x + 1)(x - 2)$

Common Factor Leftover Factors

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

Example 4: Simplify the followings.

a. $\frac{4}{3x^2} - \frac{5}{2x} + 3$

$= \frac{2(4) - 3x(5) + 6x^2(3)}{6x^2}$

$= \frac{8 - 15x + 18x^2}{6x^2}$

$= \frac{18x^2 - 15x + 8}{6x^2}$

LCM = $6x^2$

NPV:

$6x^2 = 0$

$x^2 = 0$

$x = 0$

b. $\frac{4}{a^2b} + \frac{3}{ab^2} - \frac{2}{a^2b^3}$

$= \frac{b^2(4) + ab(3) - (2)}{a^2b^3}$

$= \frac{4b^2 + 3ab - 2}{a^2b^3}$

LCM = a^2b^3

NPV:

$a^2b^3 = 0$

$a^2 = 0$ $b^3 = 0$

$a = 0$ and $b = 0$

c. $\dfrac{5}{x+2}+\dfrac{3x+1}{3x+6}$

$= \dfrac{5}{x+2}+\dfrac{3x+1}{3(x+2)}$ LCM = $3(x+2)$

$= \dfrac{3(5)+(3x+1)}{3(x+2)}$

$= \dfrac{15+3x+1}{3(x+2)}$

$= \dfrac{3x+16}{3(x+2)}$

NPV:
$3(x+2)=0$
$x+2=0$
$x=-2$

d. $\dfrac{2x}{9x^2-4}-\dfrac{3x}{9x^2-12x+4}$

LCM = $(3x-2)(3x-2)(3x+2)$

Common Factor | Leftovers

$= \dfrac{2x}{(3x-2)(3x+2)}-\dfrac{3x}{(3x-2)(3x-2)}$

$= \dfrac{(3x-2)(2x)-(3x+2)(3x)}{(3x-2)(3x-2)(3x+2)}$

$= \dfrac{6x^2-4x-9x^2-6x}{(3x-2)^2(3x+2)}$

$= \dfrac{-3x^2-10x}{(3x-2)^2(3x+2)}$

$= \dfrac{-x(3x+10)}{(3x-2)^2(3x+2)}$

NPV:
$(3x-2)=0$ $(3x+2)=0$
$3x=2$ $3x=-2$
$x=\dfrac{2}{3}$ $x=-\dfrac{2}{3}$
$x=\pm\dfrac{2}{3}$

e. $\dfrac{y^2+\dfrac{y-3}{2}}{y^2-\dfrac{5y-2}{3}}$

$= \dfrac{\dfrac{2(y^2)+y-3}{2}}{\dfrac{3(y^2)-(5y-2)}{3}}$ LCM = 2

LCM = 3

$= \dfrac{\dfrac{2y^2+y-3}{2}}{\dfrac{3y^2-5y+2}{3}}$ Switch Signs!

$= \dfrac{\dfrac{(2y+3)(y-1)}{2}}{\dfrac{(3y-2)(y-1)}{3}}$

$= \dfrac{(2y+3)(y-1)}{2}\times\dfrac{3}{(3y-2)(y-1)} = \dfrac{(2y+3)\cancel{(y-1)}}{2}\times\dfrac{3}{(3y-2)\cancel{(y-1)}}$

$= \dfrac{3(2y+3)}{2(3y-2)}$

NPV:
$(3y-2)(y-1)=0$
$(3y-2)=0$ $(y-1)=0$
$3y=2$
$y=\dfrac{2}{3}$ $y=1$

Example 5: Car A takes x hours to travel 100 km while car B takes 1 hour less than car A to travel 100 km.

a. Write an algebraic expression for each car A and car B that represent the speed at which they travel in terms of x.
b. Write an algebraic expression for their difference in speed.

For questions involving Distance, Speed and Time, make a table to organize any data & expressions.

Recall that: $\boldsymbol{speed = \dfrac{distance}{time}}$

a.

	Distance (km)	Speed (km/hr)	Time (hr)
Car A	100	$\frac{100}{x}$	x
Car B	100	$\frac{100}{x-1}$	$x-1$

b. Difference in Speed (Car B is faster) = Speed of Car B – Speed of Car A

$$= \frac{100}{x-1} - \frac{100}{x}$$

$$= \frac{100x - 100(x-1)}{x(x-1)} \qquad \text{LCM} = x(x-1)$$

$$= \frac{100x - 100x + 100}{x(x-1)}$$

$$= \frac{100}{x(x-1)} \text{ km/hr}$$

NPV:
$x(x-1) = 0$
$x = 0 \quad (x-1) = 0$
$x = 1$
In reality, x, the time it takes for Car A has to be greater than 1.

4-5 Homework Assignments

Regular: pg. 172 - 173 #5 to 61 (odd), 64 to 67

AP: pg. 172 - 173 #6 to 62 (even), 64 to 67

4-6: Review of Solving Linear Equations

When Solving Linear Equations:

1. **Expand and Simplify each side.**
2. **Make Sure you LINE UP the Equal signs as you work downward.**
3. **Collect Like-Terms with the Unknown terms on the Left Hand Side.**
4. **When Moving Terms to the other side of the Equal sign, do Reverse Order of Operation (SAMDEB) and Reverse Operations.**
5. **Solve for the solution by isolating the variable.**

Example 1: Solve the following equations.

a. $3x + 2 = x - 8$

$3x - x = -8 - 2$

$2x = -10$

$x = \frac{-10}{2}$

$x = -5$

Collect Like Terms and Reverse Operations

b. $9(x - 4) = 2(x + 17)$

$9x - 36 = 2x + 34$

$9x - 2x = 34 + 36$

$7x = 70$

$x = \frac{70}{7}$

$x = 10$

Collect Like Terms and Reverse Operations

c. $3(2x + 1) - (2 - 3x) + 7 = 5x - 6$

$6x + 3 - 2 + 3x + 7 = 5x - 6$

Expand and Simplify each side

$9x + 8 = 5x - 6$

$9x - 5x = -6 - 8$

Collect Like Terms and Reverse Operations

$4x = -14$

$x = \frac{-14}{4}$

$x = \frac{-7}{2}$

4-6 Homework Assignments

Regular: pg. 179 - 180 #1 to 37 (odd), 39 to 47

AP: pg. 179 - 180 #2 to 38 (even), 39 to 48

4-7: Solving Rational Equations

When solving rational equations, there are two methods you can use.

Method 1: Multiply Both Sides with LCM

- doing so will eliminate all denominators
- solve the remaining equation

Method 2: Cross-Multiplication

- only do so when there is a single fraction equals to another single fraction.
- solve the remaining equation.

Example 1: Solve the following equations.

a. $\frac{3x}{2} - 5 = 4$

Method 1: Multiply Both Sides with LCM

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

$$2\left(\frac{3x}{2} - 5\right) = 2(4)$$ **Multiply Both Sides by the LCM**

$$3x - 10 = 8$$

$$3x = 8 + 10$$

$$3x = 18$$

$$x = 6$$

Method 2: Cross-Multiplication

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

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

$$\frac{3x}{2} = \frac{9}{1}$$ **Cross Multiply after Rearrangement**

$$(1)(3x) = (2)(9)$$

$$3x = 18$$

$$x = 6$$

b. $\frac{3}{x}+4=\frac{3}{2x}$

Method 1: Multiply Both Sides with LCM

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

$2x\left(\frac{3}{x}+4\right)=2x\left(\frac{9}{2x}\right)$ Multiply Both Sides by the LCM

$6+8x=9$

$8x=9-6$

$8x=3$

$x=\frac{3}{8}$

NPV

$x=0 \quad 2x=0$

$x=0$

Method 2: Cross-Multiplication

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

Obtain LCM and Equivalent Fraction

$\frac{3+4x}{x}=\frac{9}{2x}$ x in the denominator can cancel on both sides

$\frac{3+4x}{1}=\frac{9}{2}$ Cross Multiply

$2(3+4x)=9$

$6+8x=9$

$8x=9-6$

$8x=3$

$x=\frac{3}{8}$

c. $\frac{5}{x+2}=\frac{2}{x-3}$

Method 1: Multiply Both Sides with LCM

Multiply Both Sides by the LCM

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

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

Reduce when possible.

$5(x-3)=2(x+2)$

$5x-15=2x+4$

$5x-2x=4+15$

$3x=19$

$x=\frac{19}{3}$

NPV

$x+2=0 \quad x-3=0$

$x=-2 \quad x=3$

Method 2: Cross-Multiplication

Cross Multiply

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

$5(x-3)=2(x+2)$

$5x-15=2x+4$

$5x-2x=4+15$

$3x=19$

$x=\frac{19}{3}$

d. $\frac{6}{3x-2}-3=\frac{4}{3x-2}$

Method 1: Multiply Both Sides with LCM

$\frac{6}{3x-2}-3=\frac{4}{3x-2}$ Multiply Both Sides by the LCM

$(3x-2)\left(\frac{6}{3x-2}-3\right)=(3x-2)\left(\frac{4}{3x-2}\right)$ Reduce when possible

$6-3(3x-2)=4$

$6-9x+6=4$

$-9x+12=4$

$-9x=4-12$

$-9x=-8$

$x=\frac{-8}{-9}$

$x=\frac{8}{9}$

NPV

$3x-2=0$

$3x=2$

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

Method 2: Cross-Multiplication

$\frac{6}{3x-2}-3=\frac{4}{3x-2}$

Obtain LCM and Equivalent Fraction $\frac{6-3(3x-2)}{(3x-2)}=\frac{4}{(3x-2)}$

$(3x-2)$ in the denominator can cancel on both sides

$6-9x+6=4$

$-9x+12=4$

$-9x=4-12$

$-9x=-8$

$x=\frac{-8}{-9}$

$x=\frac{8}{9}$

4-7 Homework Assignments

Regular: pg. 185 - 186 #1 to 69 (odd), 70 to 78

AP: pg. 185 - 186 #2 to 68 (even), 70 to 78

4-8: Problem Solving with Equations

When Solving Word Problems:

1. **Decide what the variable represents (usually the unknown or the smaller item).**
2. **Set up an equation by reading the questions bit by bit, or organize the information on a table.**
3. **Solve and Verify.**
4. **Write out a final statement indicating the solution(s).**

Example 1: Find three consecutive odd integers that have a sum of –51.

Let x = smallest integer
$(x + 2)$ = next odd integer
$(x + 4)$ = largest odd integer

$$x + (x + 2) + (x + 4) = -51$$
$$3x + 6 = -51$$
$$3x = -51 - 6$$
$$3x = -57$$
$$x = \frac{-57}{3}$$
$$x = -19$$

Therefore, the three integers are – 19, –17 and – 15

Example 2: Mary has $7.85 in quarters and dimes. If she has 50 coins, how many coins of each type does she have?

Let x = number of quarters
$(50 - x)$ = number of dimes

Each Quarter is worth 25 cents
Each Dime is worth 10 cents

$$25x + 10(50 - x) = 785$$
$$25x + 500 - 25x = 785$$
$$15x + 500 = 785$$
$$15x = 785 - 500$$
$$15x = 285$$
$$x = \frac{285}{15}$$
$$x = 19$$

Mary has 19 quarters and (50 – 19) dimes.

Mary has 19 quarters and 31 dimes.
$(19 \times \$0.25 + 31 \times \$0.10 = \$7.85)$

Example 3: John went for a 199 km mountain biking trip for two days. On day 1, he biked 3 km/h faster than day 2. If he biked for 9 hours on day 1 while on day 2 he biked for 11 hours, how fast was he travelling on each day?

With questions involving speed, distance, and time, we have to set up a table!

Recall that: $speed = \frac{distance}{time}$ or $speed = distance \times time$

	Distance (km)	Speed (km/hr)	Time (hr)
Day 1	$9(x + 3)$	$x + 3$	9
Day 2	$11x$	x	11
TOTAL	199		

$$9(x + 3) + 11x = 199$$

$$9x + 27 + 11x = 199$$

$$20x + 27 = 199$$

$$20x = 199 - 27$$

$$20x = 172$$

$$x = 8.6$$

John would have biked 11.6 km/h on day 1, and 8.6 km/h on day 2.

4-8 Homework Assignments

Regular: pg. 190 - 191 #1 to 11 (odd), 13 to 18, 20 to 30

(AP) Example 4: Mary and Jane each left Calgary and Edmonton respectively at the same time, and drove towards Red Deer 150 km away. If Mary drove 10 km/h faster than Jane and she had to wait 10 minutes before Jane arrived at Red Deer, how fast were both of them driving?

	Distance (km)	Speed (km/hr)	Time (hr)
Mary	150	$x + 10$	$\frac{150}{x+10}$ (Faster – Less Time)
Jane	150	x	$\frac{150}{x}$ (Slower – More Time)
DIFFERENCE			**10 minutes** = $\frac{1}{6}hr$

$$\frac{150}{x}-\frac{150}{x+10}=\frac{1}{6}$$

$$\frac{150(x+10)-150x}{x(x+10)}=\frac{1}{6}$$

$$\frac{150x+1500-150x}{x(x+10)}=\frac{1}{6}$$

$$\frac{1500}{x(x+10)}=\frac{1}{6}$$

$$(6)(1500)=x(x+10)$$

$$9000=x^2+10x$$

To Solve Quadratic Equations, bring everything to one side and Factor!

$$0=x^2+10x-9000$$

$$0=(x-90)(x+100)$$

$x + 100 = 0$ or $x - 90 = 100$

Speed cannot be Negative!

$x = -100$

$x = 90$

Jane drove at 90 km/h, while Mary drove at 100 km/h

4-8 Homework Assignments

AP: pg. 190 - 191 #2 to 10 (even), 13 to 31

4-9: Equations with Literal Coefficients

Literal Coefficient: - the variable part of a monomial.

Formula: - an equation where the variables represent certain measurements or constant.

Example 1: For $d = st$, solve for s and t.

$$\frac{d}{t} = \frac{st}{t}$$

$$\frac{d}{t} = s$$

$$\frac{d}{s} = \frac{st}{s}$$

$$\frac{d}{s} = t$$

When manipulating (rearranging) formulas, follow the rule of Reverse Order of Operation (SAMDEB) and Reverse Operations.

Example 2: Given the formulas below, solve for the variables indicated.

a. $V = \frac{lwH}{3}$ Solve for H

$$3V = lwH$$

$$\frac{3V}{lw} = H$$

b. $A = \pi r^2$ Solve for r

$$\frac{A}{\pi} = r^2$$

$$\sqrt{\frac{A}{\pi}} = \sqrt{r^2}$$

$$\sqrt{\frac{A}{\pi}} = r$$

c. $V = \frac{4}{3}\pi r^3$ Solve for r

$$\frac{3V}{4\pi} = r^3$$

$$\sqrt[3]{\frac{3V}{4\pi}} = \sqrt[3]{r^3}$$

$$\sqrt[3]{\frac{3V}{4\pi}} = r$$

d. $SA = 2\pi r\,(r + H)$ Solve for H

$$\frac{SA}{2\pi r} = r + H$$

$$\frac{SA}{2\pi r} - r = H$$

Example 3: Use the formula, $C = \frac{5}{9}(F - 32)$, where C is temperature in degree Celsius and F is temperature in Fahrenheit, to find the equivalent of 25°C in Fahrenheit.

First, we have to manipulate (rearrange) the formula to solve for *F*.

$$C = \frac{5}{9}(F - 32)$$

$$\frac{9C}{5} = F - 32$$

$$\frac{9C}{5} + 32 = F$$

For 25°C, $C = 25$ and $F = ?$

$$F = \frac{9(25)}{5} + 32$$

$$F = 77$$

4-9 Homework Assignments

Regular: pg. 193 #1 to 16

AP: pg. 193 #1 to 16