Section 6.6 – (The Lowest Common Denominator)

When adding and subtracting fractions we must have a common denominator. For example:

$$\frac{2}{3}+\frac{5}{3}=\frac{2+5}{3}=\frac{7}{3}$$

So algebraic fractions will be added in the same way. For example:

$$\frac{2}{5x}+\frac{7}{5x}=\frac{2+7}{5x}=\frac{9}{5x}$$

If we are going to successfully add and subtract algebraic fractions that don't have the same denominator then we must learn how to find that algebraic denominator so….

The objective for this section is to:

- Correctly determine the least common denominator

Let's add the following two fractions and see how you get their common denominator:

$$\frac{5}{16}+\frac{7}{24}$$

Let's find the least common denominator for several sets of fractions:

1. $\frac{x}{2};\ \frac{3x}{7}$

2. $\frac{7}{15x};\ \frac{8}{25x}$

3. $\frac{11}{56t^3}; \frac{17}{196t^2}$

4. $\frac{5}{8rst}; \frac{9b}{20st}$

5. $\frac{8}{27abc^5}; \frac{7x}{3a^2bc^4}$

6. $\frac{5}{4x-4}; \frac{3}{8x}$

7. $\frac{5}{3a^2x-9ax}; \frac{7x}{6a^2-18a}$

8. $\frac{x-6}{4x^2-36}; \frac{x+11}{3x^2+18x+27}$

Section 6.7 – (Addition and Subtraction of Algebraic Fractions)

The objective for this section is to:

- Write equivalent algebraic fractions
- Add and Subtract algebraic fractions

If a common denominator already exists…. You're golden!

9. $\frac{3}{2y}+\frac{5}{2y}$
10. $\frac{x-3y}{x+y}+\frac{x+5y}{x+y}$
11. $\frac{2}{a}+\frac{5}{-a}$
12. $\frac{3x+1}{x-3}-\frac{2x-5}{3-x}$

If a common denominator does not exist….. use the following rules:

1st – Factor the denominators if necessary
2nd – Find the least common denominator
3rd – Write an equivalent fraction with the LCD (multiply by 1 in order to do this)
4th – Add/Subtract the numerators ONLY, leave the common denominator
5th – Simplify the results if possible

Combine the given fractions, expressing all results in simplest form.

1. $\frac{3x}{16}+\frac{7x^2}{24}$

2. $\frac{5}{3x^2}+\frac{7}{12x}$

3. $\frac{8}{ab^5}+\frac{5}{a^3b^2}$

6. $\frac{5}{a-6}+\frac{7}{a+4}$

4. $\frac{13}{18x}+\frac{7}{24x}$

7. $\frac{4x}{6x-30}+\frac{3x}{4x-20}$

5. $\frac{1}{6pq}+\frac{7}{3p}-\frac{9}{2p}$

8. $\frac{3x}{x^2-25}-\frac{4x}{x-5}$

9. $\frac{7}{a-5}-\frac{a-2}{a+4}$

11. $\frac{7}{3y^2+y-4}+\frac{9y+2}{3y^2-2y-8}$

10. $\frac{3}{2x-2}+\frac{5}{x+1}-\frac{x}{x^2-1}$

12. $\frac{x}{x^2+11x+30}-\frac{5}{x^2+9x+20}$

13. Airplanes must be equipped with emergency locator transmitters that give a radio signal in the event of a crash. A value describing a characteristic of the transmittal signal is found from the expression $1-\frac{x^2}{2}+\frac{x^4}{24}-\frac{x^6}{120}$. Combine these fractions.

14. In a parallel circuit, the total resistance is described by $\frac{1}{R}=\frac{1}{R_1}+\frac{1}{R_2}$ Combine the two fractions on the right side of the equation into one fraction.

15. In determination of the reliability of medical screening tests a statistic called the **false positive rate**, which is a quotient of fractional expressions, is calculated. In one study the formula for the false positive rate was: $F_+=\dfrac{1-\frac{1}{y}}{1+\frac{10a-n}{ny}}$, rewrite this formula by simplifying the right-hand side of the equation.

16. Medical screening tests also have false negative rates. A formula for one such rate is given next. Simplify the expression on the right side of the formula. $F_-=\dfrac{\frac{10-an}{ny}}{9-\frac{10a-9n}{ny}}$