Objectives:
   1. Introduction to Partial Fractions
   2. Partial fractions worksheet

Partial Fractions Decomposition

Objective: Decompose $\dfrac{5x-4}{x^2-x-2}$ into partial fractions

step 1: $\dfrac{5x-4}{x^2-x-2} = \dfrac{5x-4}{(x-2)(x+1)}$ factor denominator

step 2: $\dfrac{5x-4}{(x-2)(x+1)} = \dfrac{A}{x-2} + \dfrac{B}{x+1}$ write partial fractions with constant A & B.

step 3.
$$5x-4 = A(x+1) + B(x-2)$$ multiply both sides by $(x-2)(x+1)$

step 4: Find A & B.
    Substituting the roots, or "zeros" of $(x-2)(x+1)$.

    Root for $(x+1)$ is $x=-1$:

$$5(-1)-4 = A(-1+1) + B(-1-2)$$
$$-9 = 0 + B(-3)$$
$$B = 3$$

    Root for $(x-2)$ is $x=2$:

$$5(2)-4 = A(2+1) + B(2-2)$$
$$6 = A3 + 0$$
$$A = 2$$

$$6 = A3 + 0$$
$$A = 2$$

Step 5: $\dfrac{5x-4}{x^2-x-2} = \dfrac{2}{x-2} + \dfrac{3}{x+1}$

<u>Integration by Partial Fractions</u>

- $\displaystyle\int \dfrac{5x-4}{x^2-x-2}\, dx = \int \left(\dfrac{2}{x-2} + \dfrac{3}{x+1}\right) dx$

Partial fractions decomposition

$\displaystyle\qquad\qquad = \int \dfrac{2}{x-2}\, dx + \int \dfrac{3}{x+1}\, dx$

$\displaystyle\qquad\qquad = 2\ln(x-2) + 3\ln(x+1) + C$

Group Activity:

Partial Fractions Worksheet.