6.5 Equivalent Fractions

The fundamental Principle of Fractions

the value of a fraction is unchanged if both numerator and denominator (called terms of a fraction) are multiplied or divided by the same number, provided this number is not zero.

$\frac{15}{20} = \frac{\$.3}{\$.4}$

equivalent fractions
(write them in lowest terms)

Paul

$\frac{ax}{ay} = \frac{x}{y}$ —

If the numerator and denominator have a common factor, it may be canceled

Which situation are you allowed to simplify and why?

$\frac{5x}{5y} = \frac{x}{y}$

No. Terms

$\frac{5+x}{5+y}$ ∴

multiply the numerator and denominator of each fraction by the given factor to obtain an equivalent fraction.

	by 7	by 2x	by x - 6
$\frac{3}{4}$	$\frac{21}{28}$	$\frac{6x}{8x} = \frac{3 \cdot 2x}{4 \cdot 2x}$	$\frac{3x-18}{4x-24}$

	by 7	by 2x	by x - 6
$\frac{2x}{y}$	$\frac{14x}{7y}$	$\frac{4x^2}{2xy}$	$\frac{2x^2-12x}{xy-6y}$ $y(x-6)$ $(2x+5)(x-6)$

	by 7	by 2x	by x - 6
$\frac{6x}{(2x+5)}$	$\frac{42x}{14x+35}$	$\frac{12x^2}{4x^2+10x}$	$6x(x-6)$ $\frac{6x^2-36x}{2x^2-7x-30}$ $(2x+5)(x-6)$

Simplest Form, or the Lowest Terms, of a Fraction

$\frac{25}{65}$ $\quad \frac{5 \cdot 5}{13 \cdot 5} = \frac{5}{13}$ (common factor 5)

(common factor 3) $\quad \frac{3a}{3b} = \frac{a}{b}$

$\frac{8xy}{12x} = \frac{2y}{3}$ (2 and 3)

$\frac{x}{4x} = \frac{1 \cdot x}{4 \cdot x} = \frac{1}{4}$

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

Simplest Form, or the Lowest Terms, of a Fraction

$$\frac{56y}{77xy}$$

$$\frac{24x^2yz^3}{8xy^3z^2}$$

$$\frac{16ab^3c^2}{24ab^2c^5} = \frac{2b}{3c^3}$$

Simplify the expression through cancellation

$$\frac{x^2}{x^2-9} = \frac{x^2}{(x+3)(x-3)}$$

Prime

$$\frac{x^2(x-3)}{x^2-9} = \frac{x^2(x-3)}{(x+3)(x-3)} = \frac{x^2}{x+3}$$

$$\frac{2x^2+8x}{x+4} \qquad \frac{2*(x+4)}{x+4}$$

2X

Simplify the expression through cancellation

$$\frac{x^2 - 6x + 9}{x^2 - 9}$$

$x^2 - 6x + 9$

$-3 \times -3 = 9$, $-3 + -3 = -6$

$(x-3)(x-3)$

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

$\frac{x-3}{x+3}$

$$\frac{4x^2 + 12xy + 9y^2}{4x^2 + 6xy}$$

$(2x+3y)(2x+3y)$

$2x(2x+3y)$

$\frac{2x+3y}{2x}$

$6 \times 6 = 36$, $6 + 6 = 12$

$(4x^2 + 6xy) + (6xy + 9y^2)$

$2x(2x+3y) + 3y(2x+3y)$

$(2x+3y)(2x+3y)$

$(2x+3y)^2$

$$\frac{4a^2 - 8ab - 5b^2}{6a^2 - 17ab + 5b^2}$$

$4a^2 - 10ab + 2ab - 5b^2$

$-20 \times +2 = -40$, $-10 + -8 = -18$

$2a(2a-5b) + b(2a-5b)$

$(2a-5b)(2a+b)$

$-15 \times -2 = 30$, $-15 + -2 = -17$

$6a^2 - 15ab + 2ab + 5b^2$

$3a(2a-5b) - b(2a-5b)$

$(3a-b)(2a-5b)$

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

Factors that Differ only in Sign

$$x - y = -(y - x)$$

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

$$(1 - x)$$
$$-1(-1 + x)$$
$$-1(x - 1)$$

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

$$\frac{5a - ab}{3b - 15} = \frac{a(5-b)}{3(b-5)}$$

$$\frac{-a(b-5)}{3(b-5)} = -\frac{a}{3}$$