C11 - 6.3 - Multiplying Dividing Rationals Notes

$\frac{1}{2}\times\frac{1}{3}=\frac{1}{6}$

Multiply Tops
Multiply Bottoms

$\frac{a}{2}\div\frac{1}{3}=$
$\frac{a}{2}\times\frac{3}{1}=\frac{3a}{2}$

Flip and multiply

$\frac{3}{8}\times\frac{4}{9}=\frac{3\times4}{8\times9}=\frac{3\times2\times2}{2\times2\times2\times3\times3}=\frac{1}{6}$

$\frac{3}{8}\times\frac{4}{9}=\frac{\cancel{3}^{1}}{\cancel{8}_{2}}\times\frac{\cancel{4}^{1}}{\cancel{9}_{3}}=\frac{1}{6}$

$\frac{1}{\cancel{x+2}}\times\cancel{(x+2)}=1$ $\quad x+2\neq0$ $\quad x\neq-2$ Restrictions

$\frac{x+2}{x+3}\times\frac{2}{x+2}=$
$\frac{2\cancel{(x+2)}}{(x+3)\cancel{(x+2)}}=\frac{2}{x+3}$ $\quad x+2\neq0$ $\quad x\neq-2$ $\quad x+3\neq0$ $\quad x\neq-3$

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

$x+2\neq0$ $\quad x\neq-2$ $\quad x+3\neq0$ $\quad x\neq-3$

$\frac{2}{x+1}\times(x+1)(x+2)=$ $\quad x+1\neq0$ $\quad x\neq-1$

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

Think what cancels and what are you left with

$\frac{x+1}{x^2-5x+6}\times\frac{x-2}{x^2+5x+4}=$ $\quad x-2\neq0$ $\quad x\neq2$ $\quad x+1\neq0$ $\quad x\neq-1$ $\quad x-3\neq0$ $\quad x\neq3$ $\quad x+4\neq0$ $\quad x\neq-4$

$\frac{x+1}{(x-3)(x-2)}\times\frac{x-2}{(x+4)(x+1)}=$ Factor
$\frac{\cancel{(x-2)}\cancel{(x+1)}}{(x-3)\cancel{(x-2)}(x+4)\cancel{(x+1)}}=\frac{1}{(x-3)(x+4)}$

$x\neq2,-1,3,-4$

$\frac{x-4}{x+5}\div\frac{x-4}{x-3}=$
$\frac{x-4}{x+5}\times\frac{x-3}{x-4}=$
$\frac{(x-4)(x-3)}{(x+5)(x-4)}=\frac{x-3}{x+5}$

Flip and multiply

$x+5\neq0$ $\quad x\neq-5$ $\quad x-3\neq0$ $\quad x\neq3$ $\quad x-4\neq0$ $\quad x\neq4$

$x\neq3,-5,4$

$\frac{x-7}{x+4}\div\frac{x^2-2x-15}{x^2-x-20}$
$\frac{x-7}{x+4}\div\frac{(x-5)(x+3)}{(x-5)(x+4)}=$
$\frac{x-7}{x+4}\times\frac{(x-5)(x+4)}{(x-5)(x+3)}=$
$\frac{(x-7)\cancel{(x-5)}\cancel{(x+4)}}{\cancel{(x+4)}\cancel{(x-5)}(x+3)}=\frac{x-7}{x+3}$

Factor 1st

$x+4\neq0$ $\quad x\neq-4$ $\quad x-5\neq0$ $\quad x\neq5$ $\quad x+3\neq0$ $\quad x\neq-3$

$x\neq-4,-3,5$