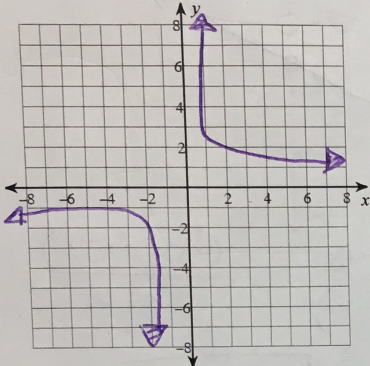


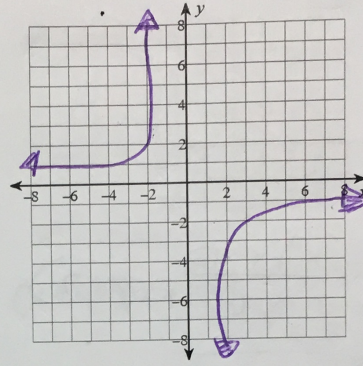
Factoring & Graphing Rational Functions - NOTES

REVIEW: Draw a quick sketch of each graph.

1) $y = \frac{1}{x}$

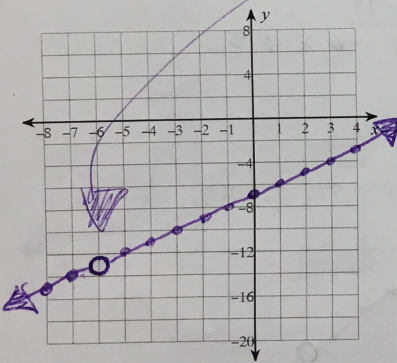


2) $y = -\frac{1}{x}$



First, state any excluded values from the domain. Then simplify each and graph.

3) $y = \frac{x^2 - x - 42}{x + 6}$ $\rightarrow x \neq -6$



FACTOR: $x^2 - x - 42$
 $(x+6)(x-7)$

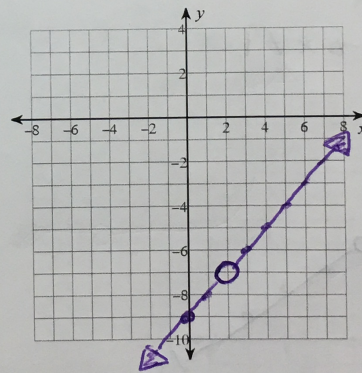
So:

$$y = \frac{x^2 - x - 42}{x + 6} = \frac{\cancel{(x+6)}(x-7)}{\cancel{x+6}} = x-7$$

$$y = x - 7$$

THIS IS
A LINE.

4) $y = \frac{x^2 - 11x + 18}{x - 2}$ $\rightarrow x \neq 2$

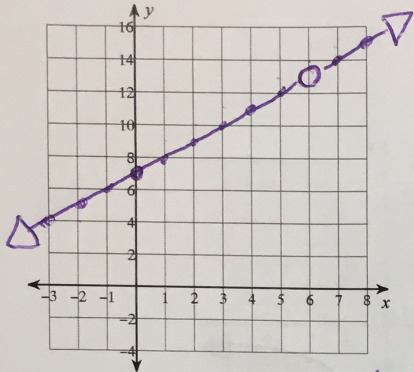


FACTOR: $x^2 - 11x + 18$
 $(x-9)(x-2)$

$$y = \frac{x^2 - 11x + 18}{x - 2} = \frac{(x-9)\cancel{(x-2)}}{\cancel{x-2}} = x-9$$

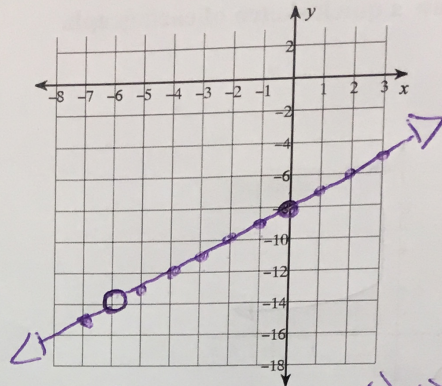
$$y = x - 9$$

$$5) y = \frac{x^2 + x - 42}{x - 6} \rightarrow x \neq 6$$



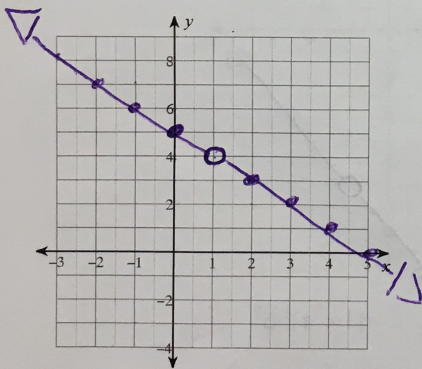
$$\begin{aligned} x^2 + x - 42 &= (x+7)(x-6) \\ \frac{(x+7)(x-6)}{x-6} &= x+7 \\ \boxed{y = x+7} \end{aligned}$$

$$6) y = \frac{x^2 - 2x - 48}{x + 6} \rightarrow x \neq -6$$



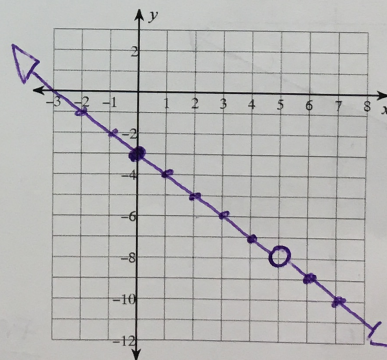
$$\begin{aligned} x^2 - 2x - 48 &= (x-8)(x+6) \\ \frac{(x-8)(x+6)}{x+6} &= x-8 \\ \boxed{y = x-8} \end{aligned}$$

$$7) y = \frac{x^2 - 6x + 5}{-x + 1} \rightarrow x \neq 1$$



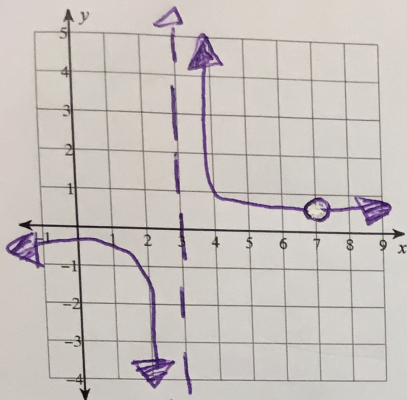
$$\begin{aligned} x^2 - 6x + 5 &= (x-5)(x-1) \\ \frac{(x-5)(x-1)}{-x+1} &= \frac{(x-5)(x-1)}{-1(x-1)} \\ &= \frac{x-5}{-1} \\ \boxed{y = -x+5} \end{aligned}$$

$$8) y = \frac{x^2 - 2x - 15}{5 - x} \rightarrow x \neq 5$$



$$\begin{aligned} x^2 - 2x - 15 &= (x+3)(x-5) \\ \frac{(x+3)(x-5)}{5-x} &= \frac{(x+3)(x-5)}{-1(-5+x)} \\ &= \frac{(x+3)(x-5)}{-1(-5+x)} \\ &= \frac{x+3}{-1} \\ \boxed{y = -x-3} \end{aligned}$$

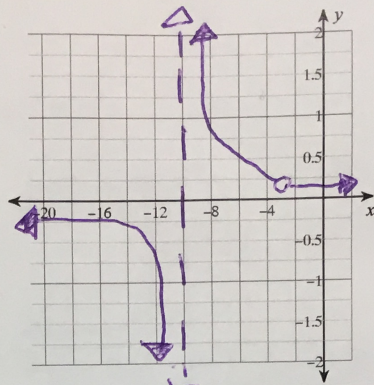
9) $y = \frac{x-7}{x^2-10x+21}$ → FACTOR FIRST



$$\frac{x^2-10x+21}{(x-7)(x-3)} \rightarrow \frac{\cancel{x}+7}{(\cancel{x}/1)(x-3)} = \frac{1}{x-3}$$

$x \neq 7, x \neq 3$
↑
ASYMPTOTE

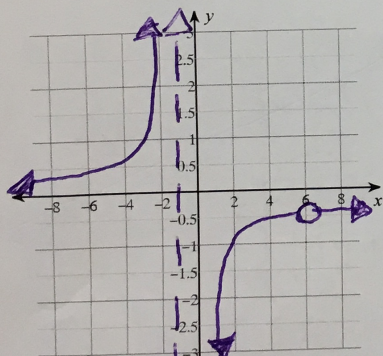
10) $y = \frac{x+3}{x^2+13x+30}$



$$\frac{x^2+13x+30}{(x+10)(x+3)} \rightarrow \frac{\cancel{x}+3}{(\cancel{x}+10)(x+3)} = \frac{1}{x+10}$$

$x \neq -10, -3$
↑
ASYMPTOTE

11) $y = \frac{-x+6}{x^2-5x-6}$

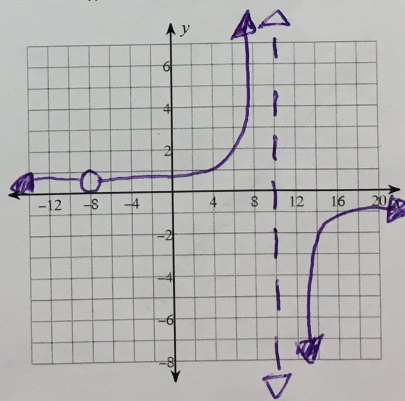


$$\frac{x^2-5x-6}{(x-6)(x+1)} \rightarrow \frac{-x+6}{(x-6)(x+1)} = \frac{-1(\cancel{x}+6)}{(\cancel{x}-6)(x+1)}$$

$x \neq 6, x \neq -1$
↑
ASYMPTOTE

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

12) $y = \frac{-x-8}{x^2-2x-80}$



$$\frac{x^2-2x-80}{(x-10)(x+8)} \rightarrow \frac{-x-8}{(x-10)(x+8)} = \frac{-1(\cancel{x}+8)}{(\cancel{x}-10)(x+8)}$$

$x \neq 10, x \neq -8$
↑
ASYMPTOTE

$= \frac{-1}{x-10}$