

### Graphing Rational Functions Part 1 - Transformations

$f(x) = \frac{1}{x-5} - 3$

x-intercepts:	$(5.\bar{3}, 0)$
Vertical Asymptotes:	$x=5$
Horizontal Asymptotes:	$y=-3$
Holes:	NONE
y-Intercept(s):	$(0, -3.2)$
Domain:	$(-\infty, 5) \cup (5, \infty)$
Range	$(-\infty, -3) \cup (-3, \infty)$

parent  
↳ shift right 5 and down 3

x-int  
 $0 = \frac{1}{x-5} - 3$   
 $(x-5)3 = \frac{1}{x-5}(x-5)$

$3x-15=1$   
 $x = \frac{16}{3} \approx 5.\bar{3}$

$f(x) = \frac{2}{x+7}$

x-intercepts:	None
Vertical Asymptotes:	$x = -7$
Horizontal Asymptotes:	$y = 0$
Holes:	NONE
y-Intercept(s):	$(0, 2/7)$
Domain:	$(-\infty, -7) \cup (-7, \infty)$
Range:	$(-\infty, 0) \cup (0, \infty)$

parent  
 ↳ mult y's by 2  
 ↳ then shift left 7

X-int  
 ~~~~~  
 $0 = \frac{2}{x+7} \rightarrow 0 = 2 \text{ No sol} \rightarrow \text{No x-int}$

$f(x) = \frac{-3}{x} + 4$

|                        |                                 |
|------------------------|---------------------------------|
| x-intercepts:          | $(-3/4, 0)$                     |
| Vertical Asymptotes:   | $x=0$                           |
| Horizontal Asymptotes: | $y=4$                           |
| Holes:                 | NONE                            |
| y-Intercept(s):        | None                            |
| Domain:                | $(-\infty, 0) \cup (0, \infty)$ |
| Range                  | $(-\infty, 4) \cup (4, \infty)$ |

x-int  
 $0 = \frac{-3}{x} - 4$   
 $4 = \frac{-3}{x}$   
 $x = -3/4$

Parent  
 mult "y" values by -3  
 ↳ then shift up 4

y-int  
 $f(0) = \frac{-3}{0} + 4$  undefined  
 so no "y"-int.

$f(x) = \frac{-1}{(x+5)} - 3$

|                        |                                   |
|------------------------|-----------------------------------|
| x-intercepts:          | $(-16/3, 0)$                      |
| Vertical Asymptotes:   | $x = -5$                          |
| Horizontal Asymptotes: | $y = -3$                          |
| Holes:                 | NONE                              |
| y-Intercept(s):        | $(0, -3.2)$                       |
| Domain:                | $(-\infty, -5) \cup (-5, \infty)$ |
| Range                  | $(-\infty, -3) \cup (-3, \infty)$ |

x-int  
 $0 = \frac{-1}{x+5} - 3$   
 $3 = \frac{-1}{x+5}$   
 $3x+15 = -1$   
 $x = -16/3$

parent  
 mult "y"-vals by -1  
 ↳ shift left 5 down -3  
 $f(0) = -3.2$

