

# 6.3 Graphing Rational Functions

# PRACTICE

Directions: Find any holes or vertical asymptotes.

$$1) y = \frac{1}{x^2 - 6x - 16} = \frac{1}{(x-8)(x+2)}$$

Vert. asympt @  
 $x=8$  and  $x=-2$

$$2) y = \frac{2x^2 + 11x - 6}{x^2 + 2x - 24} = \frac{(2x+6)(x-1)}{(x+6)(x-4)}$$

Hole @  $x=-6$   
 Vert Asym @  $x=4$

$$3) y = \frac{2x^2 - 6x}{9x - 3x^2} = \frac{2x(x-3)}{-3x(x-3)}$$

Hole @  $x=0$   
 and  $x=3$

Directions: Find the x- and y-intercept(s)

$$4) y = \frac{2x-3}{4x+5}$$

X-INT  
 $0 = \frac{2x-3}{4x+5}$   
 $0 = 2x-3$   
 $3 = 2x$   
 $\frac{3}{2} = x$   
 $(\frac{3}{2}, 0)$

Y-INT  
 $y = \frac{0-3}{0+5}$   
 $y = -\frac{3}{5}$   
 $(0, -\frac{3}{5})$

$$5) y = \frac{6x^2 + x - 12}{x^2 - 13x - 40} = \frac{(6x-8)(x+3)}{(x-16)(x+4)}$$

Y-INT  
 $y = \frac{0+0-12}{0-0-40} = \frac{3}{10}$   
 $(0, \frac{3}{10})$

X-INT  
 $0 = (3x-4)(x+3)$   
 $0 = 3x-4$  or  $0 = x+3$   
 $\frac{4}{3} = x$  or  $-3 = x$   
 $(\frac{4}{3}, 0)$  or  $(-3, 0)$

$$6) y = \frac{x^2 + x - 30}{x^2 - 8x + 15} = \frac{(x+6)(x-5)}{(x-5)(x-3)}$$

Y-INT  
 $y = \frac{0+0-30}{0-0+15} = -2$   
 $(0, -2)$

X-INT  
 $0 = \frac{x+6}{x-3}$   
 $0 = x+6$   
 $-6 = x$   
 $(-6, 0)$

Directions: Find any horizontal asymptotes.

$$7) y = \frac{4x^3 + 7x - 12}{2x - 7}$$

NO Horiz.  
 Asym.

$$8) y = \frac{8x-3}{2x+9}$$

$y = \frac{8}{2}$   
 $y = 4$

$$9) y = \frac{3x^2 - 4x + 9}{4x^3 + 8x^2 - 10x + 1}$$

$y = 0$

Directions: Find the slant asymptote (if it exists).

$$10) y = \frac{6x^3 + 8x^2 - 7x}{2x^2 - 3x + 1}$$

$3x + 8.5$   
 $2x^2 - 3x + 1 \overline{) 6x^3 + 8x^2 - 7x + 0}$   
 $6x^3 - 9x^2 + 3x$   
 $17x^2 - 10x + 0$   
 $17x^2 - 25.5x + 8.5$   
 $15.5x + 8.5$   
 $y = 3x + 8.5$

$$11) y = \frac{2x^2 + 11x - 6}{x^2 + 2x - 24}$$

NO  
 SLANT  
 Asymp

$$12) y = \frac{x^2 + 6x - 10}{2x - 4}$$

$\frac{1}{2}x + 4$   
 $2x - 4 \overline{) x^2 + 6x - 10}$   
 $x^2 - 2x$   
 $8x - 10$   
 $8x - 16$   
 $6$   
 $y = \frac{1}{2}x + 4$

Directions: Find the information need and sketch. Include all relevant information on your graph.

13)  $y = \frac{9}{x^2+1}$

Hole/Vertical Asymptotes:

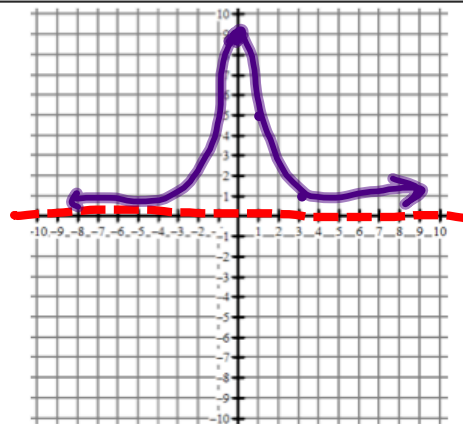
NONE

Y-int:  $y = \frac{9}{0+1}$   
 $y = 9$  (0, 9)

X-int:  $0 = \frac{9}{x^2+1}$   
 $0 = 9$  NONE

Horizontal/Slant Asymptote:

$y = 0$



14)  $y = \frac{x^3-x^2-20x}{x^2-2x-3}$   $y = \frac{x(x-5)(x+4)}{(x-3)(x+1)}$

Hole/Vertical Asymptotes:

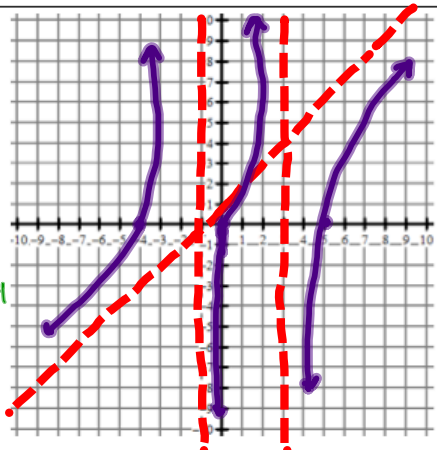
Vert Asym @  $x=3$  and  $x=-1$

Y-int:  $y = \frac{0-0-0}{0-0-3}$   
 $y = 0$

X-int:  $0 = \frac{x(x-5)(x+4)}{(x-3)(x+1)}$   
 $0 = x(x-5)(x+4)$   
 $0 = x$   $x=5$   $x=-4$

Horizontal/Slant Asymptote:

$\frac{x+1}{x^2-2x-3} \overline{) x^3-x^2-20x+0}$   
 $x^3-2x^2-3x$   
 $x^2-17x+0$   
 $x^2-2x-3$



15)  $y = \frac{2x+8}{x^2-2x-24}$   $\frac{2(x+4)}{(x-6)(x+4)}$

Hole/Vertical Asymptotes:

hole:  $x = -4$

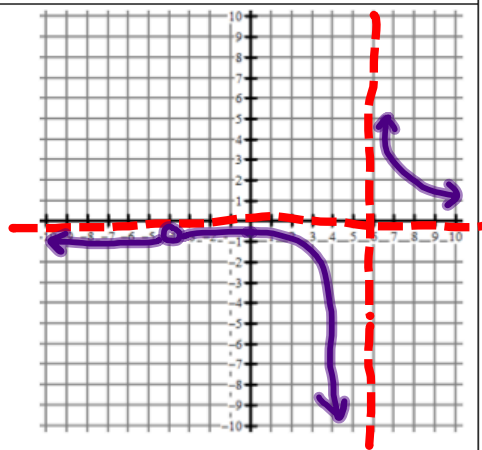
Vert Asym:  $x = 6$

Y-int:  $y = \frac{0+8}{0-24} = -\frac{1}{3}$   
 $(0, -\frac{1}{3})$

X-int:  $0 = \frac{2}{x-6}$   
 $0 = 2$  NONE

Horizontal/Slant Asymptote:

$y = 0$



16)  $y = \frac{x-2}{x^2-2x-3}$   $\frac{x-2}{(x-3)(x+1)}$

Hole/Vertical Asymptotes:

Vert Asym:  $x=3$   
 $x=-1$

Y-int:  $\frac{0-2}{0-0-3} = \frac{2}{3}$   
 $(0, \frac{2}{3})$

X-int:  $0 = \frac{x-2}{x^2-2x-3}$   
 $0 = x-2$   
 $2 = x$  (2, 0)

Horizontal/Slant Asymptote:

$y = 0$

