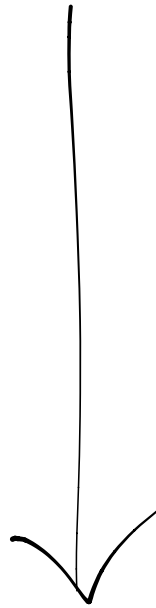


6.3 Graphing RATIONAL Functions Practice



REVIEW SKILLZ

Directions: Simplify. Use only positive exponents.

1) $5x^{-4}(6x^{-3})$

2) $\frac{15y^7}{20y^{14}}$

3) $(4h^{-5})^3$

4) $\left(\frac{3n^{13} \cdot 4m^{-8}n^{-5}}{(m^3n^{-3})^2}\right)^{-3}$

6.3 Graphing Rational Functions

PRACTICE

Directions: Find any holes or vertical asymptotes.

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

VA @ $x = -2, 8$

$x-8=0 \quad x+2=0$
 $x=8 \quad x=-2$

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

$2x^2 + 11x - 6$
 $2x(x+6) - 1(x+6)$
 $(x+6)(2x-1)$

$y = \frac{2x-1}{x-4}$

Hole @ $x = -6$

$x+6=0$
 $x=-6$

VA @ $x = 4$

$x-4=0$
 $x=4$

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

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

$y = \frac{2}{-3}$

Hole @ $x = 0, 3$

$x=0 \quad x-3=0$
 $x=3$

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

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

X-int: $0 = \frac{2x-3}{4x+5}$
 $0 = 2x-3$
 $3 = 2x$
 $\frac{3}{2} = x$

Y-int: $y = \frac{2(0)-3}{4(0)+5}$
 $y = -\frac{3}{5}$

$$5) y = \frac{6x^2+x-12}{x^2-13x-40}$$

X-int: $0 = \frac{6x^2+x-12}{x^2-13x-40}$
 $0 = 6x^2+x-12$
 $0 = (6x^2-8x)+(x-12)$
 $0 = 2x(3x-4) + 3(3x-4)$
 $0 = (3x-4)(2x+3)$
 $4 = 3x \quad \quad 0 = 2x+3$
 $\frac{4}{3} = x \quad \quad -3 = 2x$
 $\frac{4}{3} = x \quad \quad -\frac{3}{2} = x$
 $x = -\frac{3}{2}, \frac{4}{3}$

Y-int: $y = \frac{6(0)^2+(0)-12}{(0)^2-13(0)-40}$
 $y = \frac{12}{-40}$
 $y = -\frac{3}{10}$

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

X-int: $0 = \frac{(x+6)(x-5)}{(x-5)(x-3)}$
 $0 = x+6$
 $-6 = x$

Y-int: $y = \frac{(0)^2+(0)-30}{(0)^2-8(0)+15}$
 $y = \frac{-30}{15}$
 $y = -2$

Directions: Find any horizontal asymptotes.

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

None cuz $n > d$

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

$y = \frac{8}{2}$ cuz $n = d$
 $y = 4$

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

$y = 0$ cuz $n < d$

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

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

since $n = d+1$, SA: $y = 3x + \frac{17}{2}$

$$\begin{array}{r} 3x + \frac{17}{2} \\ 2x^2 - 3x + 1 \overline{) 6x^3 + 8x^2 - 7x + 0} \\ \underline{+ (-6x^3 + 9x^2 + 3x)} \\ 17x^2 - 10x + 0 \\ \underline{+ (-17x^2 + 25.5x + 7.5)} \\ \text{Remainder} \end{array}$$

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

NO SA cuz $n \neq d+1$

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

since $n = d+1$, SA: $y = \frac{1}{2}x + 4$

$$\begin{array}{r} \frac{1}{2}x + 4 \\ 2x - 4 \overline{) x^2 + 6x - 10} \\ \underline{+ (-x^2 + 2x)} \\ 8x - 10 \\ \underline{+ (-8x + 16)} \\ \text{Remainder} \end{array}$$

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

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

Hole/Vertical Asymptotes:

Holes cancel: none
 VA stays: $x^2+1=0$
 $x^2=-1$
 $x = \pm i$, so NO VA

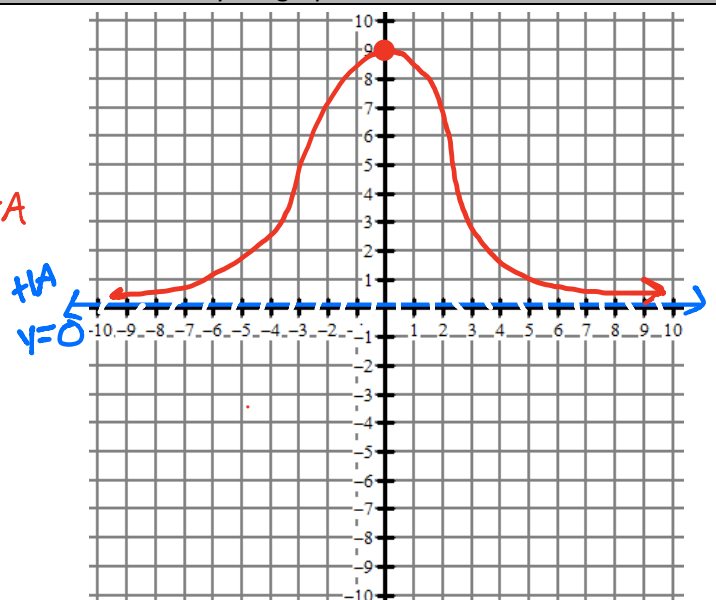
Y-Int: 9

X-int: None

$$y = \frac{9}{(0)^2+1} = \frac{9}{1} = 9$$

Horizontal/Slant Asymptote:

HA @ $y = 0$ cuz $n < d$ NO SA cuz $n \neq d+1$



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

Hole/Vertical Asymptotes:

Holes cancel

None

VA stay @ $x = -1, 3$

$$\begin{array}{l} x-3=0 \quad x+1=0 \\ x=3 \quad \quad x=-1 \end{array}$$

Y-Int: 0

X-int: -4, 0, 5

$$y = \frac{(0)^3 - (0)^2 - 20(0)}{(0)^2 - 2(0) - 3} = \frac{0}{-3} = 0$$

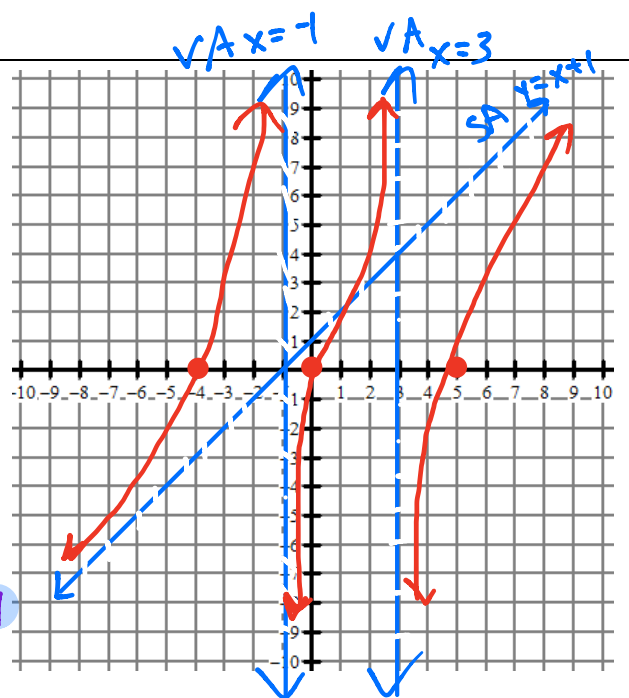
$$0 = x \quad \left. \begin{array}{l} 0 = x-5 \\ 5 = x \end{array} \right\} \begin{array}{l} 0 = x+4 \\ -4 = x \end{array}$$

Horizontal/Slant Asymptote:

$n < d + 1$, so SA

$$\begin{array}{r} x+1 \\ x^2-2x-3 \overline{) x^3-x^2-20x+0} \\ \underline{+(x^3+2x^2+3x)} \\ x^2-17x+0 \end{array}$$

\therefore SA $y = x + 1$



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

Hole/Vertical Asymptotes:

Holes cancel @ $x = (-4, -\frac{1}{5})$

$$\begin{array}{l} x+4=0 \quad y = \frac{2}{(-4)-6} \\ x=-4 \quad \quad y = \frac{2}{-10} \\ \quad \quad \quad y = -\frac{1}{5} \end{array}$$

VA stay @ $x = 6$

$$\begin{array}{l} x-6=0 \\ x=6 \end{array}$$

Y-Int: $-\frac{1}{3}$

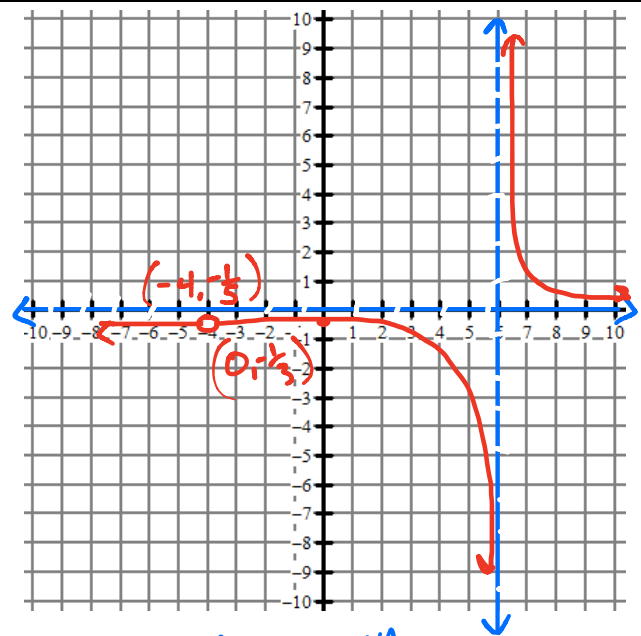
X-int: None

$$y = \frac{2}{(0)-6} = -\frac{1}{3}$$

$0 \neq 2$

Horizontal/Slant Asymptote:

HA @ $y = 0$ cuz $n < d$.



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

Hole/Vertical Asymptotes:

No Holes

VA @ $x = -1, 3$

$$\begin{array}{l} x-3=0 \quad x+1=0 \\ x=3 \quad \quad x=-1 \end{array}$$

Y-Int: $\frac{2}{3}$

X-int: 2

$$y = \frac{(0)-2}{(0)^2-2(0)-3} = \frac{-2}{-3} = \frac{2}{3}$$

$$\begin{array}{l} x-2=0 \\ x=2 \end{array}$$

Horizontal/Slant Asymptote:

$n < d$ so HA $y = 0$

