

6.3 Graphing Rational Functions

Write your questions here!



Rational Equations:

Sketch some of them!

Find the Domain

Removable (Holes)

Vertical Asymptote(s)

$y = \frac{x - 4}{2x^2 - 8x}$	$y = \frac{6x^2 + 7x - 3}{x^2 + 4}$	$y = \frac{x^2 + 5}{x + 1}$
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Find the x- and y-intercept(s)

Y-intercept (x = 0)

X-intercept (y = 0)

$y = \frac{x - 4}{2x^2 - 8x}$	$y = \frac{6x^2 + 7x - 3}{x^2 + 4}$	$y = \frac{x^2 + 5}{x + 1}$
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Horizontal Asymptotes

Degree in the numerator is bigger:

Degree in the denominator is bigger:

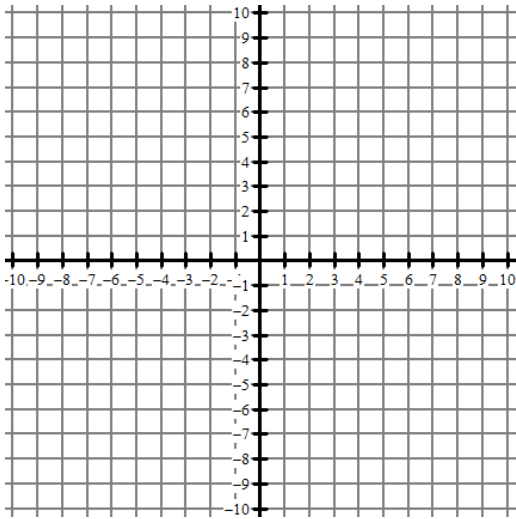
Degrees are the same:

$y = \frac{x - 4}{2x^2 - 8x}$	$y = \frac{6x^2 + 7x - 3}{x^2 + 4}$	$y = \frac{x^2 + 5}{x + 1}$
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Slant (Oblique) Asymptotes

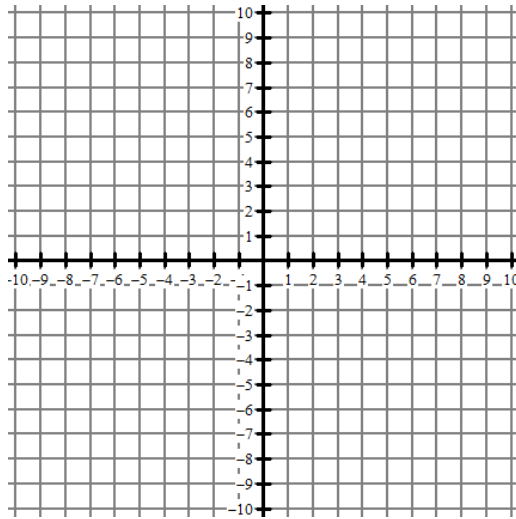
$$y = \frac{x^2 + 5}{x + 1}$$

$$y = \frac{x-4}{2x^2-8x}$$

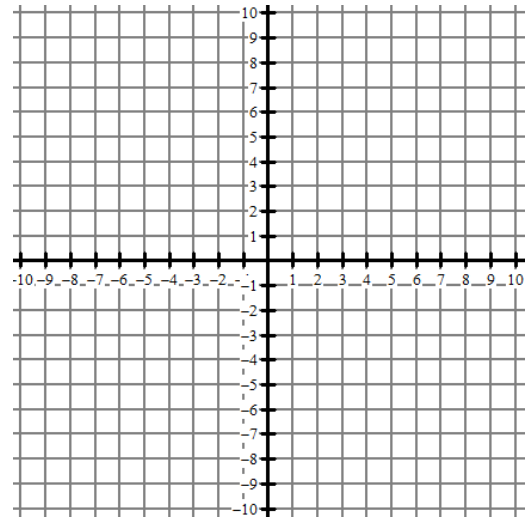


Put it all together

$$y = \frac{6x^2+7x-3}{x^2+4}$$



$$y = \frac{x^2+5}{x+1}$$



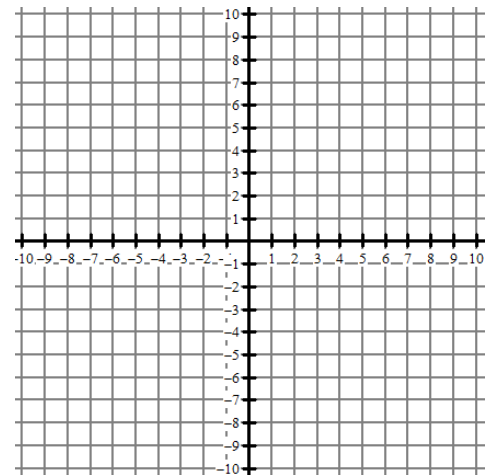
$$y = \frac{2x^3 - x^2 - x}{x^2 + 2x + 1}$$

Hole/Vertical Asymptotes:

Y-int:

X-int:

Horizontal/Slant Asymptote:



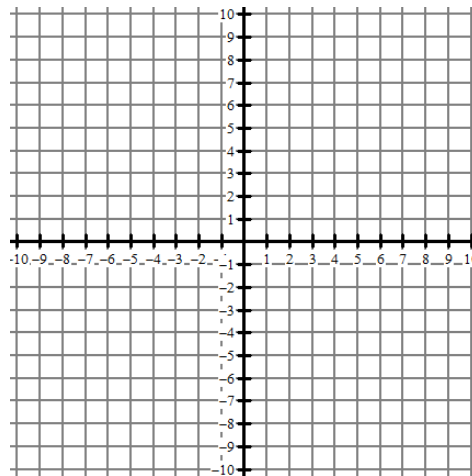
You try!

$$y = \frac{x^2 - 4x - 12}{x^2 + 5x + 6}$$

Hole/Vertical Asymptotes:

Y-int: X-int:

Horizontal/Slant Asymptote:



SUMMARY:

Now,
summarize
your notes
here!

REVIEW SKILLZ

Directions: Simplify. Use only positive exponents.

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

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

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

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

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PRACTICE

Directions: Find any holes or vertical asymptotes.

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

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

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

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

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

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

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

Directions: Find any horizontal asymptotes.

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

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

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

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

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

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

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

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

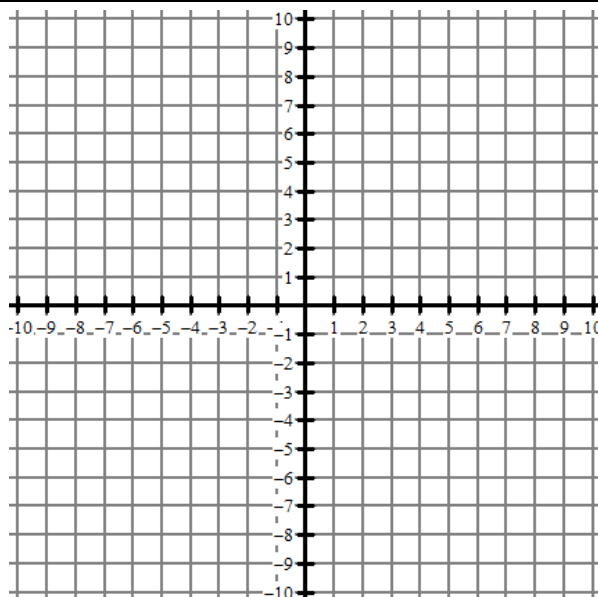
$$13) y = \frac{9}{x^2+1}$$

Hole/Vertical Asymptotes:

Y-Int:

X-int:

Horizontal/Slant Asymptote:



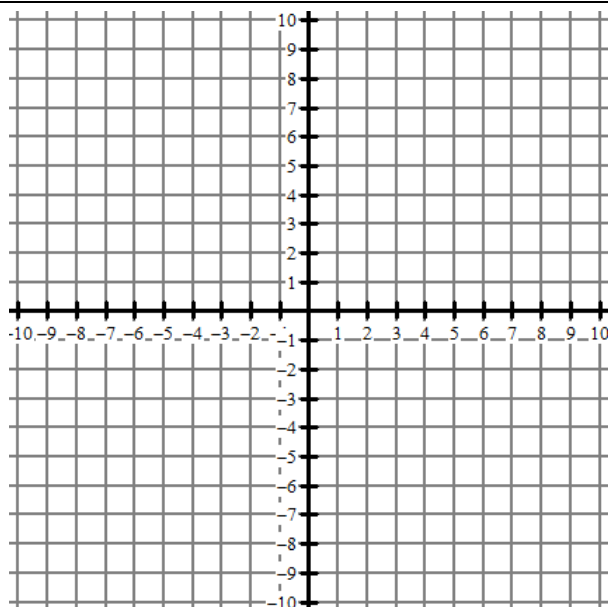
$$14) y = \frac{x^3 - x^2 - 20x}{x^2 - 2x - 3}$$

Hole/Vertical Asymptotes:

Y-Int:

X-int:

Horizontal/Slant Asymptote:



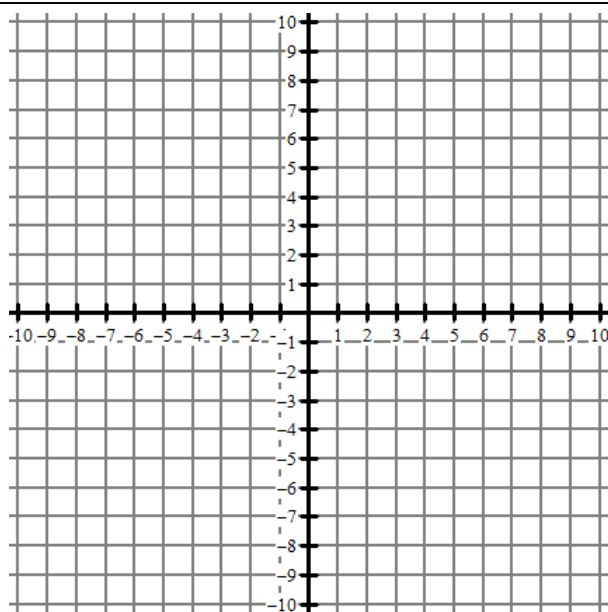
$$15) y = \frac{2x+8}{x^2-2x-24}$$

Hole/Vertical Asymptotes:

Y-Int:

X-int:

Horizontal/Slant Asymptote:



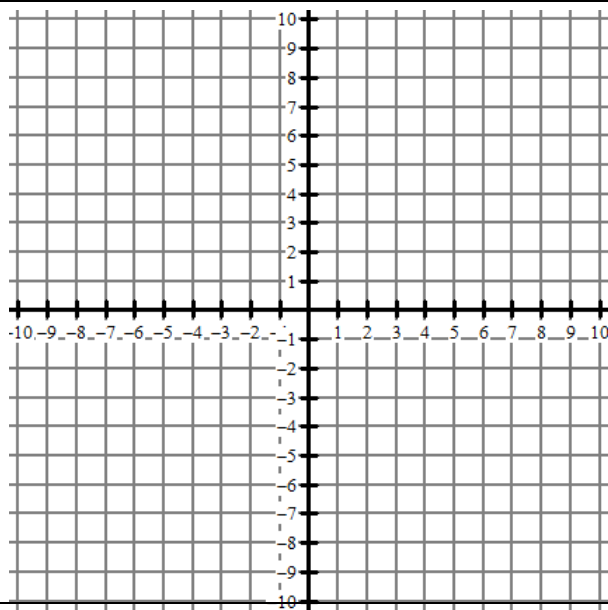
$$16) y = \frac{x-2}{x^2-2x-3}$$

Hole/Vertical Asymptotes:

Y-Int:

X-int:

Horizontal/Slant Asymptote:



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APPLICATION

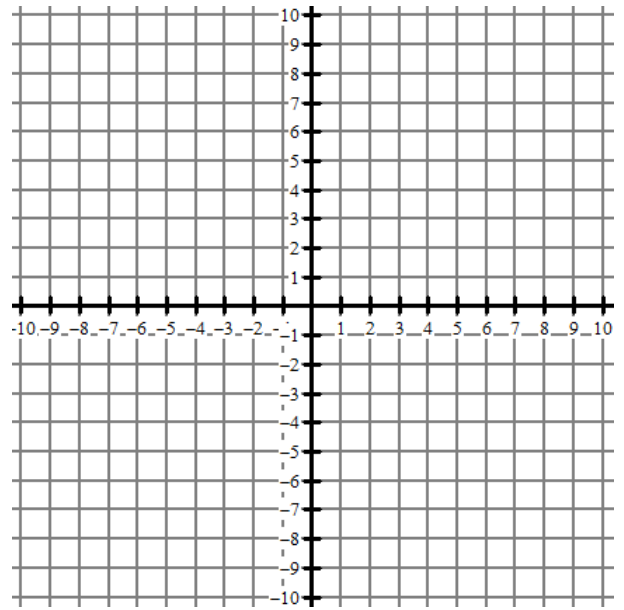
$$1) y = \frac{4x+5}{x+1}$$

Hole/Vertical Asymptotes:

Y-Int:

X-int:

Horizontal/Slant Asymptote:

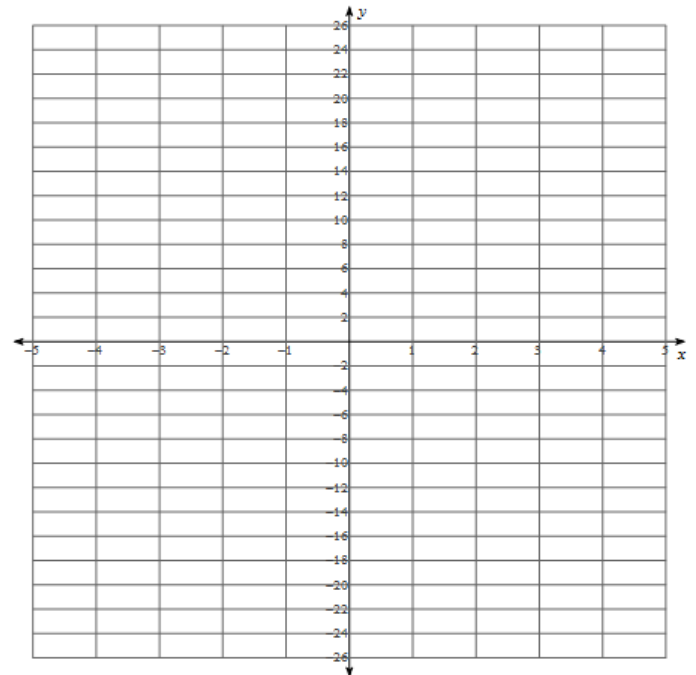


$$2) \text{ Consider the rational function: } y = \frac{x^4 - 4x^2 + 1}{x^2 - 1}$$

Find any holes or vertical asymptotes:

What is the y-intercept?

What are the x-intercepts?



Since the degree of the numerator is greater than the degree of the denominator there are no horizontal asymptotes. Perform polynomial long division to find the asymptote. (Remember to eliminate the remainder)

What is the equation of the asymptote? Is it linear? What shape would you describe it as? Draw this on the graph.

Finish sketching the graph. Use the window that shows the domain of $[-5, 5]$ and range of $[-25, 25]$