SET

Topic: Predicting and sketching rational functions

Find the asymptote(s) and intercepts. Then sketch the graph. (Do not use technology to get the graph. The max and mins do not need to be accurate.)

5.

$$y = \frac{(x+4)}{(-2x-6)} = \frac{x+4}{-2(x+3)}$$

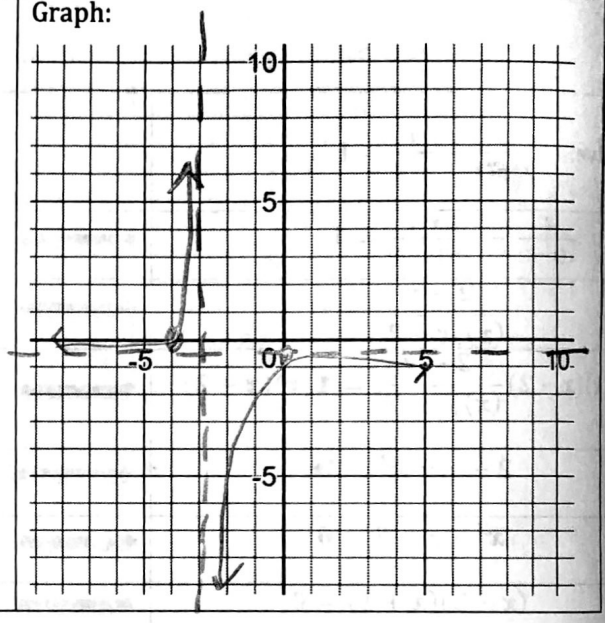
Asymptote(s): $x = -3$

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

Intercepts: $(0, -\frac{2}{3})$

$(-4, 0)$

Graph:



6.

$$y = \frac{3x}{(x-3)} \cdot \frac{(x-4)}{(x+1)}$$

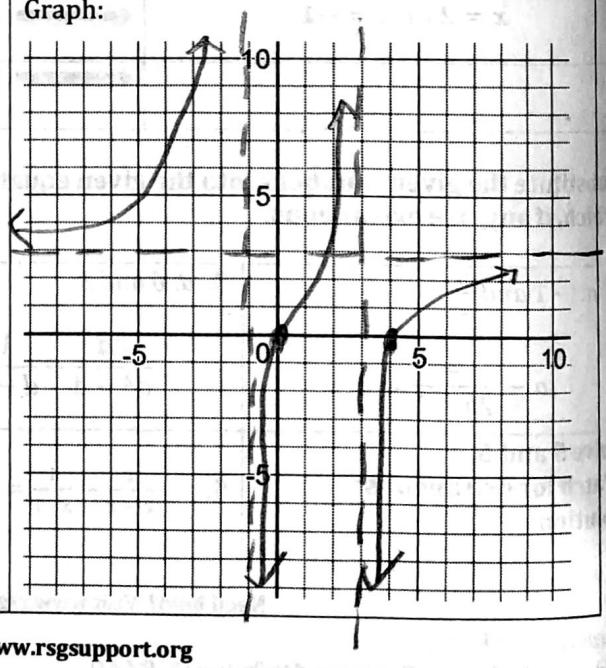
Asymptote(s): $x = 3, x = -1$

$y = 3$

Intercepts: $(0, 0)$

$(4, 0)$

Graph:



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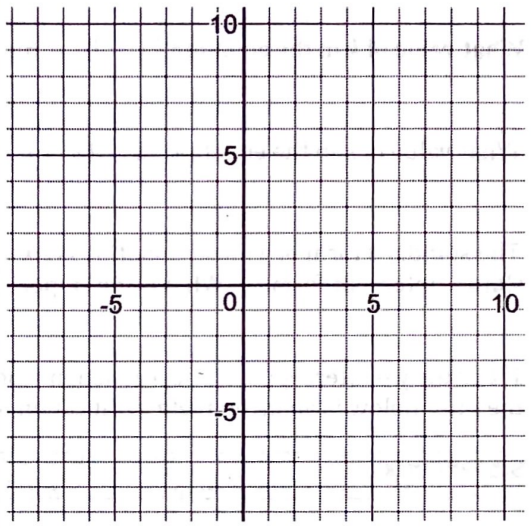
7H

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

Asymptote(s):

Intercepts:

Graph:



$\frac{x^2-8x+21}{(x-3)^2}$

8H.

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

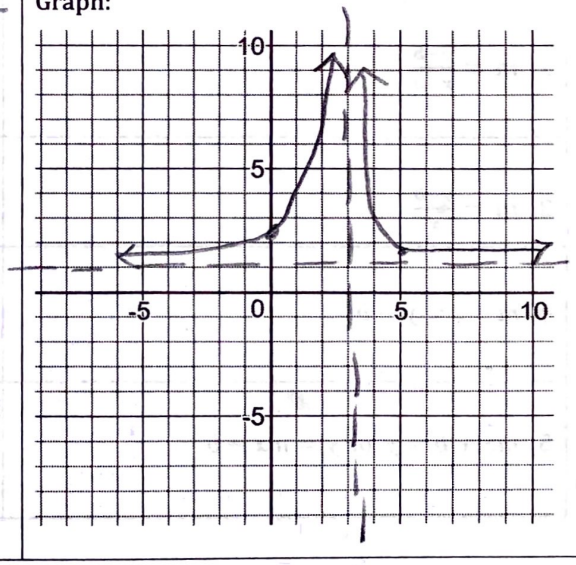
Asymptote(s): $x = 3$

$y = 1$

Intercepts: $(0, \frac{7}{3})$

D $\{x | x \neq 3\}$

Graph:



4. Explain why your answer(s) makes sense in this situation.

This story and the problem it represents provides an opportunity to model a situation that requires a rational equation. Rational equations can take many forms, but they are solved using principles we have worked with before. Try applying some of the strategies for working with rational expressions that we have used in this module to solve these equations.

$x=\cancel{12},2$

5. $\left(\frac{2}{x+4}-\frac{1}{x}=\frac{2}{3x}\right)\frac{3x(x+4)}{1}$

$x\neq -4,0$

$6x-3(x+4)=2(x+4)$

$6x-3x-12=2x+8$

$3x-12=2x+8$

$x=20$

$x=0,14$

6. $\frac{2x-3}{x+1}=\frac{x+6}{x-2}$

$x\neq -1,2$

$2x^2-7x+6=x^2+7x+6$

$x^2-14x=0$

$x(x-14)=0$

$x=0,14$

$x=3$

$x\neq 4$

7. $\left(\frac{x}{1}+\frac{20}{x-4}=\frac{5x}{x-4}-\frac{2}{1}\right)\frac{x-4}{1}$

$x^2-4x+20=5x-2x+8$

$x^2-7x+12=0$

$(x-3)(x-4)=0$

$x=3,\cancel{4}$

$x=-1$

$x\neq 2,-3$

8. $\left(\frac{x}{x+3}-\frac{4}{x-2}=\frac{-5x^2}{x^2+x-6}\right)$

$x(x-2)-4(x+3)=-5x^2$

$x^2-2x-4x-12=-5x^2$

$6x^2-6x-12=0$

$x^2-x-2=0$

$(x+1)(x-2)=0$

$x=-1,\cancel{2}$

SET
Topic: Solving rational equations

$2x^2+3x+1=0$
$(2x+1)(x+1)=0$
$x=-1,-\frac{1}{2}$

Solve each equation. Identify extraneous solutions.

E.V. $x\neq -2$

7. $\left(\frac{x}{1}+\frac{2}{x}=\frac{3}{1}\right)x$, $x\neq 0$
$x^2+2=3x$
$x^2-3x+2=(x-2)(x-1)$
$x=2,1$

8. $\left(\frac{x}{2}-\frac{1}{3x}=\frac{1}{6}\right)\frac{6x}{1}$, $x\neq 0$
$3x^2-2=x$
$3x^2-x-2=0$
$(3x+2)(x-1)=0$
$x=1,-\frac{2}{3}$

9. $\left(\frac{2x}{1}+\frac{3}{x+2}=\frac{1}{1}\right)^{x+2}$
$2x(x+2)+3=x+2$
$2x^2+4x+3=x+2$

10. $\frac{2}{x^2-2x}-\frac{1}{x-2}=1$, $x\neq 0,2$
$\frac{x(x-2)}{1}$, $x(x-2)$
$2-x=x^2-2x$
$x^2-x-2=0$
$(x+1)(x-2)=0$
$x=-1$

11. $3x-\frac{1}{2x-1}=4$
$x=\frac{1}{3},\frac{3}{2}$

12. $\frac{2x}{x^2+3x}-\frac{2}{x+3}=\frac{2}{x}$, $x\neq -3$
$x=-3$
no solution

Topic: Using work and rate relationships to solve problems

work rate × tog. time = job done

13. Channing takes twice as long as Dakota to complete a school project. It takes them 15 hours to complete the project together. How long would it take each student to complete the project if he works alone?

$\frac{1}{x}\cdot 15+\frac{1}{2x}\cdot 15=1$
$\frac{2x}{1}\left(\frac{15}{x}+\frac{15}{2x}=1\right)$
$30+15=2x$
$45=2x$
$x=22.5$ hours for Dakota
45 hours for Channing

14. A print shop can print the MVP math book in 24 minutes if both of their print machines are working together to do the job. If a print machine is working alone, the job takes longer. Machine A can print the book 20 minutes faster than machine B. How long does it take each machine to print the book?

$\frac{1}{x}\cdot 24+\frac{1}{x-20}\cdot 24=1$
B A

$\left(\frac{24}{x}+\frac{24}{x-20}=1\right)\frac{x(x-20)}{1}$
$24(x-20)+24x=x^2-20x$
$24x-480+24x=x^2-20x$
$x^2-68x+480=0$
$(x-8)(x-60)=0$
$x=8,60$
Machine B 60 minutes
Machine A 40 minutes