

Complete the table.

Function	Horizontal Asymptote	Vertical Asymptote	Roots	y-intercepts
1. $f(x) = \frac{x+1}{x+3}$	$y=1$	$x=-3$	$(-1, 0)$	$(0, \frac{1}{3})$
2. $f(x) = \frac{2}{x^2-3x-4}$	$y=0$	$x=4$ $x=-1$	NONE.	$(0, -\frac{1}{2})$
3. $f(x) = \frac{9}{x+1} - 5$	$y=-5$	$x=-1$	$(\frac{4}{5}, 0)$	$(0, 4)$

DO WORK FOR THE FOLLOWING PROBLEMS ON NOTEBOOK PAPER!

$$\frac{5}{1} = \frac{9}{x+1} \quad 9 = 5x + 5$$

$$4 = 5x$$

4. Simplify $\frac{\frac{5}{x} + \frac{3}{2}}{\frac{2}{x+1} - \frac{4}{x}}$

Multiply/Divide.

5. $\frac{x^2-x-12}{x^2+3x} \div \frac{2x-8}{x^2-9}$

6. $\frac{x^2+5x}{x^2-1} \cdot \frac{x^2-x}{x^2+7x+10} \cdot \frac{x^2+2x+1}{x^3+x^2}$

Add/Subtract.

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

8. $\frac{x+2}{x-1} + \frac{2}{x+6} + \frac{14}{x^2+5x-6}$

Solve.

9. $\frac{x+2}{x^2-4} = \frac{3}{x}$

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

$$\left(\frac{10+3x}{2x} \right) \div \left(\frac{2x-4x-4}{x(x+1)} \right)$$

$$\frac{10+3x}{2x} \cdot \frac{x(x+1)}{-2x-4}$$

$$\frac{(x+1)(3x+10)}{2x \cdot -2(x+2)}$$

$$\frac{(x+1)(3x+10)}{-4(x+2)}$$

$$\boxed{\frac{-(x+1)(3x+10)}{4(x+2)}}$$

$x \neq 0$
 $x \neq -1$
 $x \neq -2$

$$⑤ \frac{(x-4)(x+3)}{x(x+3)} \cdot \frac{(x-3)(x+3)}{2(x-4)}$$

$$\boxed{\frac{(x-3)(x+3)}{2x}}$$

$x \neq \pm 3$
 $x \neq 0$
 $x \neq 4$

$$⑥ \frac{x(x+5)}{x(x+1)} \cdot \frac{x(x+1)}{(x+5)(x+2)} \cdot \frac{(x+1)(x+1)}{x^2(x+1)}$$

$$\frac{x^2}{x^2(x+2)}$$

$$\boxed{\frac{1}{x+2}}$$

$x \neq \pm 1$
 $x \neq -5$
 $x \neq -2$
 $x \neq 0$

$$⑧ \frac{x+2}{x-1} + \frac{2}{x+6} + \frac{14}{(x+6)(x-1)}$$

$$\frac{x^2+8x+12}{(x-1)(x+6)} + \frac{2x-2}{(x-1)(x+6)} + \frac{14}{(x-1)(x+6)}$$

$$\frac{x^2+10x+24}{(x-1)(x+6)}$$

$$\frac{(x+6)(x+4)}{(x-1)(x+6)}$$

$x \neq 1$
 $x \neq -6$

$$\boxed{\frac{x+4}{x-1}}$$

$$⑦ \frac{3}{x-3} + \frac{-x-1}{x+2}$$

$$\frac{3x+6}{(x-3)(x+2)} + \frac{-x^2+3x-1x+3}{(x-3)(x+2)}$$

$$\boxed{\frac{-x^2+5x+9}{(x-3)(x+2)}}$$

$x \neq 3$
 $x \neq -2$

$$\textcircled{9} \frac{x+2}{x^2-4} = \frac{3}{x}$$

$$3x^2 - 12 = x^2 + 2x$$

$$\frac{2x^2 - 2x - 12 = 0}{2}$$

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

$$(x-3)(x+2) = 0$$

$$x = 3 \quad x = -2$$

$$\boxed{\{3\}}$$

$x \neq 0$
 $x \neq -2$

$$\textcircled{10} \frac{10}{x(x-2)} + \frac{4}{x} = \frac{5}{x-2}$$

$$10 + 4(x-2) = 5x$$

$$10 + 4x - 8 = 5x$$

$$4x + 2 = 5x$$

$$\boxed{2 = x}$$

$\boxed{\text{NO SOL.}}$

$x \neq 0$
 $x \neq 2$

$$\textcircled{11} \frac{3x}{x+1} + \frac{6}{2x} = \frac{7}{x} \quad \text{LCD } 2x(x+1)$$

$$6x^2 + 6(x+1) = 14(x+1)$$

$$6x^2 + 6x + 6 = 14x + 14$$

$$6x^2 - 8x - 8 = 0$$

$$3x^2 - 4x - 4 = 0$$

$$3x^2 - 6x + 2x - 4 = 0$$

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

$$(x-2)(3x+2) = 0$$

$$\boxed{x = 2 \quad x = -2/3}$$

$$\begin{array}{r} -12 \\ -6 \times 2 \\ \hline -4 \end{array}$$

$x \neq -1$
 $x \neq 0$

$$\textcircled{12} \frac{(3x-1)(2x-7)}{(3x-1)(3x+1)} + \frac{(3x+1)(x-4)}{(x+7)(x-4)}$$

$$\boxed{\frac{2x-7}{x+7}}$$

$x \neq -1/3$
 $x \neq 1/3$
 $x \neq 4$
 $x \neq -7$

$$\textcircled{13} \frac{7}{(x+6)(x-2)} + \frac{x+3}{(x+6)(x-3)}$$

$$\frac{7x-21}{(x+6)(x-2)(x-3)} + \frac{x^2+x-6}{(x+6)(x-2)(x-3)}$$

$$\boxed{\frac{x^2 + 8x - 27}{(x+6)(x-2)(x-3)}}$$

$x \neq -6$
 $x \neq 2$
 $x \neq 3$