# **RATIONAL FUNCTIONS – ACTIVITY (A)**

#### **OBJECTIVE:**

GIVEN:	NAMES:
2 m 1	Student 1:
$f(x) = \frac{2x-1}{x-7}$	Student 2:
	Student 3:
	Student 4:
Student 1: Find the domain of the function.	Student 2: Find the range of the function.
Student 3: Find the $x - intercept$ of $f(x)$ .	Student 4: Find the $y - intercept$ of $f(x)$ .
Student 1: Graph the function.	
Student 2: Locate $x - intercept$ (P) on the	-10
graph.	5
Student 3: Identify the horizontal asymptote.	-20 -15 -10 -5 0 5 10 15 20
	-5
Student 4: Identify the vertical asymptote.	-10
	-15

# **RATIONAL FUNCTIONS – ACTIVITY (B)**

#### **OBJECTIVE:**

GIVEN:	NAMES:	
2 _	Student 1:	
$f(x) = \frac{x^2 + 5x}{x^2 + 7x + 10}$	Student 2:	
	Student 3:	
	Student 4:	
Student 1: Find the domain of the function.	Student 2: Find the range of the function.	
Student 3: Find the $x - intercept$ of $f(x)$ .	Student 4: Find the $y - intercept$ of $f(x)$ .	
Student 1: Graph the function.		
	-15	
Student 2: Locate $x - intercept$ (P) on the	10-	
graph.		
Student 3: Identify the horizontal asymptote.	-20 -15 -10 -5 0 5 10 15 20	
	-5	
Student 4: Identify the vertical asymptote.	-10	
	-15-	

# **RATIONAL FUNCTIONS – ACTIVITY (C)**

#### **OBJECTIVE:**

GIVEN:	NAMES:	
2	Student 1:	
$f(x) = \frac{x^2 - 7x + 12}{x^2 - 9}$	Student 2:	
	Student 3:	
	Student 4:	
Student 1: Find the domain of the function.	Student 2: Find the range of the function.	
Student 3: Find the $x - intercept$ of $f(x)$ .	Student 4: Find the $y - intercept$ of $f(x)$ .	
	Statent 4. That the y theor cope of $f(x)$ .	
Chudent 4. Creak the function		
Student 1: Graph the function.	15	
	10	
Student 2: Locate $x - intercept$ (P) on the graph.		
Student 3: Identify the horizontal asymptote.	-20 -15 -10 -5 0 5 10 15 20	
	-5	
Student 4: Identify the vertical asymptote.	-10	
	-15	

# **RATIONAL FUNCTIONS – ACTIVITY (D)**

#### **OBJECTIVE:**

GIVEN:	NAMES:	
	Student 1:	
$f(x) = \frac{2x^2 + 5x - 3}{x + 3}$	Student 2:	
	Student 3:	
	Student 4:	
Student 1: Find the domain of the function.	Student 2: Find the range of the function.	
Student 3: Find the $x - intercept$ of $f(x)$ .	Student 4: Find the $y - intercept$ of $f(x)$ .	
Student 1: Graph the function.		
	15	
Student 2: Locate $x - intercept$ (P) on the	10	
graph.	5	
Student 3: Identify the horizontal asymptote.	-20 -15 -10 -5 0 5 10 15 20	)
	-5	
Student 4: Identify the vertical asymptote.	-10	
	-15	

# **RATIONAL FUNCTIONS – ACTIVITY (E)**

#### **OBJECTIVE:**

GIVEN:	NAMES:
	Student 1:
$f(x) = \frac{x+5}{x^2+8x+15}$	Student 2:
	Student 3:
	Student 4:
Student 1: Find the domain of the function.	Student 2: Find the range of the function.
Student 3: Find the $x - intercept$ of $f(x)$ .	Student 4: Find the $y - intercept$ of $f(x)$ .
Student 1: Graph the function.	
	-15
Student 2: Locate $y - intercept$ (P) on the	10
graph.	
Student 3: Identify the horizontal asymptote.	-20 -15 -10 -5 0 5 10 15 20
Student S. Identify the horizontal asymptote.	-5
Student 4. Identify the vertical commutate	-10
Student 4: Identify the vertical asymptote.	
	15

# **RATIONAL FUNCTIONS – ACTIVITY (A)**

### **OBJECTIVE:**

In this activity, students will work cooperatively in a group of four persons each (a quartet), to analyze the given rational function. Students will factor the rational functions, find their x and y intercepts and horizontal and vertical asymptotes, all also graph the function.

### Answers

Student 1:	
$f(x) = \frac{2x-1}{x-7}$ Student 2:	
Student 3:	
Student 4:	
Student 1: Find the domain of the function. Student 2: Find the range of the function.	
<b>Solution:</b> Domain = $R$ – zero of the denominator <b>Solution:</b> Range = $R - f(x = 7)$	
Zero of denominator: $x - 7 = 0 \rightarrow x = 7$ $f(x = 7) = \lim_{x \to \infty} \frac{2 - \frac{1}{x}}{1 - \frac{7}{x}} = \frac{2 - \frac{1}{\infty}}{1 - \frac{7}{\infty}} = \frac{2 - 0}{1 - 0} = 2$	
Domain = $R - \{7\}$ Range = $R - \{2\}$	
Student 3: Find the $x - intercept$ of $f(x)$ . Student 4: Find the $y - intercept$ of $f(x)$ .	
<b>Solution:</b> Set $f(x) = 0$ <b>Solution:</b> Set $x = 0$	
$ \rightarrow \frac{2x-1}{x-7} = 0 \ \rightarrow 2x - 1 = 0 \ \rightarrow x = \frac{1}{2} \qquad \qquad \rightarrow f(0) = \frac{2(0)-1}{0-7} = \frac{-1}{-7} = \frac{1}{7} $	
$x - intercept = \left(\frac{1}{2}, 0\right) \qquad \qquad$	
Student 1: Graph the function.	
Student 2: Locate <i>x</i> – <i>intercept</i> (P) on the graph.	
Student 3: Identify the horizontal asymptote. Horizontal Asymptote: $x = 2$	
Chudant A. Idantifu the wortical examplete	20
-5	
-10 -10	7
-15	

## **RATIONAL FUNCTIONS – ACTIVITY (B)**

### **OBJECTIVE:**

In this activity, students will work cooperatively in a group of four persons each (a quartet), to analyze the given rational function. Students will factor the rational functions, find their x and y intercepts and horizontal and vertical asymptotes, all also graph the function.

GIVEN:	NAMES:
2	Student 1:
$f(x) = \frac{x^2 + 5x}{x^2 + 7x + 10}$	Student 2:
	Student 3:
	Student 4:
Student 1: Find the domain of the function.	Student 2: Find the range of the function.
<b>Solution:</b> Domain = R — zeros of the denominator	<b>Solution:</b> Range = $R - \{f(x = -5), f(x = -2)\}$
Zeros of denominator: $x^2 + 5x + 2x + 10 = 0$	$f(x) = \frac{x(x+5)}{(x+5)(x+2)} \to f(x) = \frac{x}{x+2} \to f(-5) = \frac{5}{3}$
$\rightarrow (x+5)(x+2) = 0 \rightarrow x = -2; x = -5$	$f(-2) = \lim_{x \to \infty} \frac{1 + \frac{5}{x}}{1 + \frac{7}{x} + \frac{10}{x^2}} = \frac{1 + \frac{1}{\infty}}{1 + \frac{7}{\infty} + \frac{10}{\infty}} = \frac{1 + 0}{1 + 0 + 0} = 1$
Domain = $R - \{-2, -5\}$ Student 3: Find the $x - intercept$ of $f(x)$ .	Range = $R - \{1, 5/3\}$ Student 4: Find the $y - intercept$ of $f(x)$ .
Solution: Set $f(x) = 0$ $\rightarrow \frac{x^2+5x}{x^2+7x+10} = 0 \rightarrow x(x+5) = 0 \rightarrow x = 0,-5$ Since $f(0) = 0$ and $f(-5) = \infty$	Solution: Set $x = 0$ $\rightarrow f(0) = \frac{0^2 + 5(0)}{0^2 + 7(0) + 10} = \frac{0}{0 + 0 + 10} = 0$ y - intercept = (0, 0)
x - intercept = (0, 0)	
Student 1: Graph the function.	-15-
Student 2: Locate $x - intercept$ (P) on the graph.	Vertical asymptote: $x = -2$
Student 3: Identify the horizontal asymptote.	Horizontal asymptote: $y = 1$
Student 4: Identify the vertical asymptote.	-20 -15 -10 -5 0 P(0,0) 5 10 15 20
	-5
	-10-
	-15-

## **RATIONAL FUNCTIONS – ACTIVITY (C)**

#### **OBJECTIVE:**

In this activity, students will work cooperatively in a group of four persons each (a quartet), to analyze the given rational function. Students will factor the rational functions, find their x and y intercepts and horizontal and vertical asymptotes, all also graph the function.

GIVEN:	NAMES:
	Student 1:
$f(x) = \frac{x^2 - 7x + 12}{x^2 - 9}$	Student 2:
	Student 3:
	Student 4:
Student 1: Find the domain of the function.	Student 2: Find the range of the function.
<b>Solution:</b> Domain = R — zeros of the denominator	<b>Solution:</b> Range = $R - \{f(x = 3), f(x = -3)\}$
Zeros of denominator: $x^2 - 9 = 0$	$f(x) = \frac{(x-3)(x-4)}{(x-3)(x+3)} \to f(x) = \frac{x-4}{x+3} \to f(3) = -\frac{1}{6}$
$\rightarrow (x+3)(x-3) = 0 \rightarrow x = -3; x = 3$	$f(-3) = \lim_{x \to \infty} \frac{1 - \frac{7}{x} + \frac{12}{x^2}}{1 - \frac{9}{x^2}} = \frac{1 - \frac{7}{\infty} + \frac{12}{\infty}}{1 - \frac{9}{\infty}} = \frac{1 - 0 + 0}{1 - 0} = 1$
Domain = $R - \{-3, 3\}$	Range = $R - \{-\frac{1}{6}, 1\}$
Student 3: Find the $x - intercept$ of $f(x)$ .	Student 4: Find the $y - intercept$ of $f(x)$ .
Solution: Set $f(x) = 0$ $\rightarrow \frac{x^2 - 7x + 12}{x^2 - 9} = 0 \rightarrow (x - 3)(x - 4) = 0$ $\rightarrow x = 3, 4$	Solution: Set $x = 0$ $\rightarrow f(0) = \frac{0^2 - 7(0) + 12}{0^2 - 9} = \frac{12}{-9} = -\frac{4}{3}$
Since $f(4) = 0$ and $f(3) = \infty$	$y - intercept = \left(0, -\frac{4}{3}\right)$
x - intercept = (4, 0)	
Student 1: Graph the function.	15
Student 2: Locate $x - intercept$ (P) on the graph.	10 Vertical asymptote: $x = -3$
Student 3: Identify the horizontal asymptote.	Horizontal asymptote: <i>y</i> = 1
Student 4: Identify the vertical asymptote.	-20 $-15$ $-10$ $-5$ $0$ $P(4,0)$ $15$ $20$
	-5
	-10

## **RATIONAL FUNCTIONS – ACTIVITY (D)**

#### **OBJECTIVE:**

In this activity, students will work cooperatively in a group of four persons each (a quartet), to analyze the given rational function. Students will factor the rational functions, find their x and y intercepts and horizontal and vertical asymptotes, all also graph the function.

GIVEN:	NAMES:
	Student 1:
$f(x) = \frac{2x^2 + 5x - 3}{x + 3}$	Student 2:
	Student 3:
	Student 4:
Student 1: Find the domain of the function.	Student 2: Find the range of the function.
<b>Solution:</b> Domain = R – zeros of the denominator	<b>Solution:</b> Range = $R - \{f(x = -3)\}$
Zeros of denominator: $x + 3 = 0 \rightarrow x =$	$f(x) = \frac{(2x-1)(x+3)}{(x+3)} \to f(x) = 2x - 1 \to f(-3) = -7$
-3	Range = $R - \{-7\}$
Domain = $R - \{-3\}$	
Student 3: Find the $x$ – <i>intercept</i> of $f(x)$ .	Student 4: Find the $y - intercept$ of $f(x)$ .
Solution: Set $f(x) = 0$ $\rightarrow \frac{2x^2 + 5x - 3}{x + 3} = 0 \rightarrow (2x - 1)(x + 3) = 0$ $\rightarrow x = -3, \frac{1}{2}$	Solution: Set $x = 0$ $\rightarrow f(0) = \frac{2(0)^2 + 5(0) - 3}{0 + 3} = \frac{-3}{3} = -1$
Since $f\left(\frac{1}{2}\right) = 0$ and $f(-3) = \infty$ $x - intercept = \left(\frac{1}{2}, 0\right)$	y - intercept = (0, -1)
Student 1: Graph the function.	
Student 1: Graph the function. Student 2: Locate $x - intercept$ (P) on the graph.	10 5 No horizontal/vertical asymptote
Student 3: Identify the horizontal asymptote.	
Student 4: Identify the vertical asymptote.	$-15$ $-10$ $-5$ $0$ $P\left(\frac{1}{2},0\right)$ $5$ $10$ $15$
	-10

## **RATIONAL FUNCTIONS – ACTIVITY (E)**

#### **OBJECTIVE:**

In this activity, students will work cooperatively in a group of four persons each (a quartet), to analyze the given rational function. Students will factor the rational functions, find their x and y intercepts and horizontal and vertical asymptotes, all also graph the function.

GIVEN:	NAMES:
	Student 1:
$f(x) = \frac{x+5}{x^2+8x+15}$	Student 2:
	Student 3:
	Student 4:
Student 1: Find the domain of the function.	Student 2: Find the range of the function.
<b>Solution:</b> Domain = R — zeros of the denominator	<b>Solution:</b> Range = $R - \{f(x = -3), f(x = -5)\}$
Zeros of denominator: $x^2 + 8x + 15 = 0$	$f(x) = \frac{(x+5)}{(x+5)(x+3)} \to f(x) = \frac{1}{x+3} \to f(-5) = -\frac{1}{2}$
$\rightarrow (x+3)(x+5) = 0 \rightarrow x = -3, -5$	$f(-3) = \lim_{x \to \infty} \frac{\frac{1}{x} + \frac{5}{x^2}}{1 + \frac{8}{x} + \frac{15}{x^2}} = \frac{\frac{1}{\infty} + \frac{5}{\infty}}{1 + \frac{8}{x} + \frac{15}{x^2}} = \frac{0 + 0}{1 + 0 + 0} = 0$
Domain = <i>R</i> - {-3, -5}	Range = $\mathbf{R} - \left\{-\frac{1}{2}, 0\right\}$
Student 3: Find the $x - intercept$ of $f(x)$ .	Student 4: Find the $y$ – <i>intercept</i> of $f(x)$ .
<b>Solution:</b> Set $f(x) = 0$	<b>Solution:</b> Set $x = 0$
$ \rightarrow \frac{x+5}{x^2+8x+15} = 0  \rightarrow  (x+5) = 0 $ $ \rightarrow  x = -5 $	$\rightarrow f(0) = \frac{0+5}{0^2+8(0)+15} = \frac{5}{15} = \frac{1}{3}$
Since $f(-5) = \infty$ x - intercept = does not exist	$y - intercept = \left(0, \frac{1}{3}\right)$
•	
Student 1: Graph the function.	15
Student 2: Locate $y - intercept$ (P) on the graph.	Vertical asymptote: $x = -3$
Student 3: Identify the horizontal asymptote.	$P\left(\frac{1}{2},0\right)$
Student 4: Identify the vertical asymptote.	-15 -10 = 0 $-15 -10 = 0$ $-15 -10 = 15$ $-10 = 15$ Horizontal asymptote: $y = 0$
	-5
	-10-
	-15-