

Name _____

Date _____ Period _____

Find the characteristics listed for each rational function. Graph using an x/y table.

1) $f(x) = \frac{1}{x-1} + 3$

$x+1$	$y+3$
-1	2.5
0	2
.5	1.5
1.5	1
2	4
3	3.5

Vertical Asymptote: $x=1$

Horizontal Asymptote: $y=3$

Domain: $x \neq 1$

Range: $y \neq 3$

2) $f(x) = \frac{1}{x+2}$

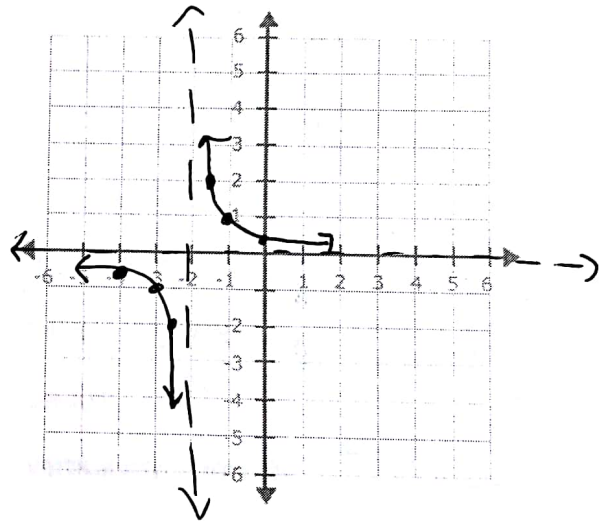
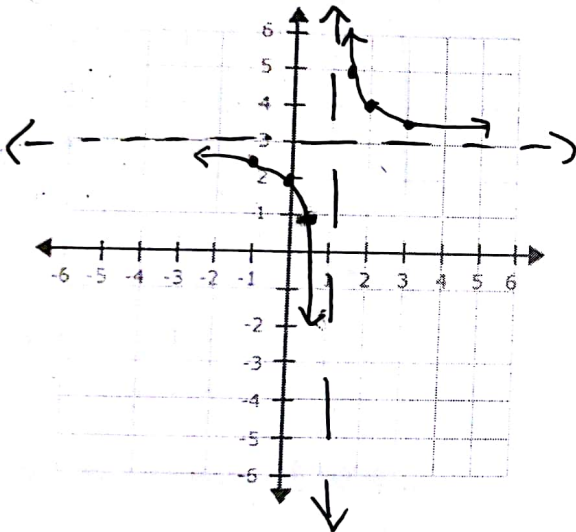
$x-2$	y
-4	-1/2
-3	-1
-2.5	-2
-1.5	2
-1	1
0	1/2

Vertical Asymptote: $x=-2$

Horizontal Asymptote: $y=0$

Domain: $x \neq -2$

Range: $y \neq 0$



For problems 3-5, write a rational function given the characteristics.

3) zeros at -1 & 3, vertical asymptote at $x=0$ & $x=2$

$$f(x) = \frac{(x+1)(x-3)}{x(x-2)}$$

4) zeros at 0 & 7, vertical asymptote at $x=-2$

$$f(x) = \frac{x(x-7)}{x+2}$$

5) zero at -3, vertical asymptote at $x=1$, hole at $x=9$

$$f(x) = \frac{(x+3)(x-9)}{(x-1)(x-9)}$$

Find the characteristics listed for each rational function. Graph using a graphing calculator.

$$6) f(x) = \frac{4x+12}{x^2-3x-18} = \frac{4(x+3)}{(x-6)(x+3)}$$

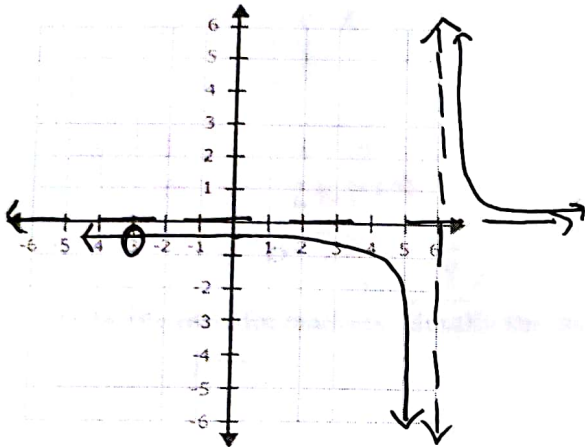
Hole(s): $x = -3$

Zero(s): none

Vertical Asymptote(s): $x = 6$

Horizontal Asymptote: $y = 0$

Slant Asymptote: None



$$7) f(x) = \frac{2(x^2+x-6)}{x^2-9} = \frac{2(x+3)(x-2)}{(x+3)(x-3)}$$

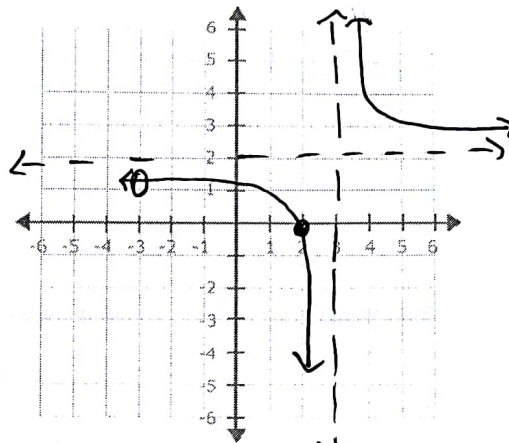
Hole(s): $x = -3$

Zero(s): $x = 2$

Vertical Asymptote(s): $x = 3$

Horizontal Asymptote: $y = 2$

Slant Asymptote: None



$$8) f(x) = \frac{x^2-3x-4}{x-4} = \frac{(x-4)(x+1)}{x-4}$$

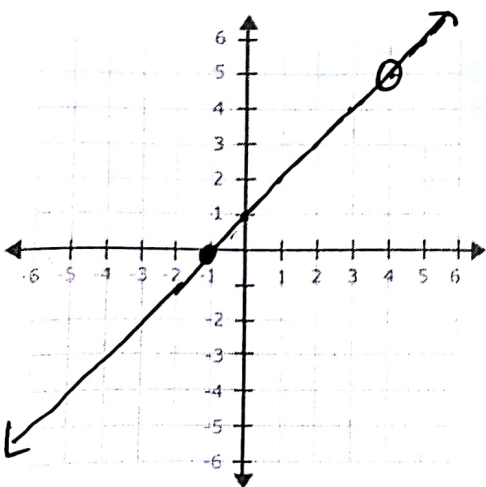
Hole(s): $x = 4$

Zero(s): $x = -1$

Vertical Asymptote(s): None

Horizontal Asymptote: None

Slant Asymptote: None



$$9) f(x) = \frac{x^2+2x-8}{x-1} = \frac{(x+4)(x-2)}{x-1}$$

Hole(s): None

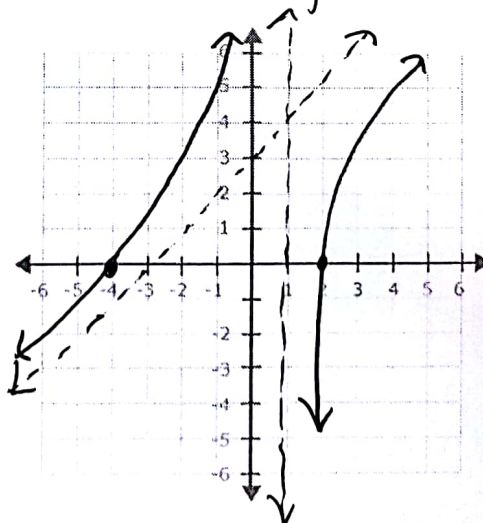
Zero(s): $x = -4, 2$

Vertical Asymptote(s): $x = 1$

Horizontal Asymptote: None

Slant Asymptote: $y = x + 3$

$$\begin{array}{r} 1 \mid 1 \quad 2 \quad -8 \\ \downarrow \quad 1 \\ 1 \quad 3 \end{array}$$



Spring Benchmark 1 Review 2

Solve each equation. Remember to check for extraneous solutions.

1) $10 + \sqrt{7-k} = 11$ $\sqrt{7-k} = 1$
 $7-k = 1$
 $-k = -6$
 $k = 6$

2) $14 = 5 + \sqrt{r-4}$
 $9 = \sqrt{r-4}$
 $81 = r-4$ $r = 85$

3) $\sqrt{11-2x} = \sqrt{7-x}$
 $11-2x = 7-x$
 $4 = x$

4) $\sqrt{x+1} = \sqrt{9-x}$
 $x+1 = 9-x$
 $2x = 8$ $x = 4$

5) $\sqrt{-5-k} = \sqrt{2k+19}$
 $-5-k = 2k+19$
 $-24 = 3k$
 $k = -8$

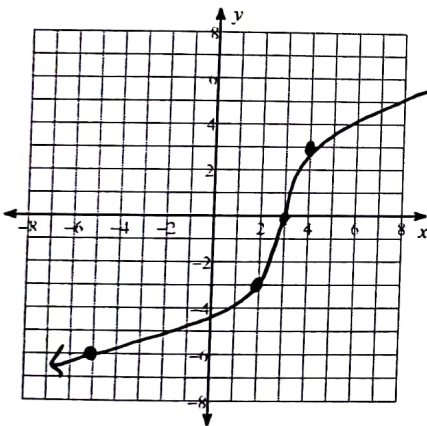
6) $4 = -5 + \sqrt{81a}$
 $9 = \sqrt{81a^2}$
 $81 = 81a$
 $a = 1$

List the transformations, identify the domain and range of each, and sketch the graph.

7) $y = 3\sqrt[3]{x-3}$

v. Stretch by 3

right 3



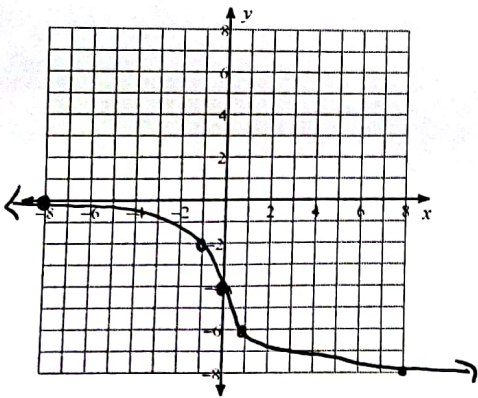
x	y
-8	-6
-1	-3
0	0
1	3
4	6

x+3	3y
-5	-6
2	-3
3	0
4	3
11	6

D: \mathbb{R}

R: \mathbb{R}

8) $y = -2\sqrt[3]{x} - 4$



X	Y
-8	-2
-1	-1
0	0
1	1
8	2



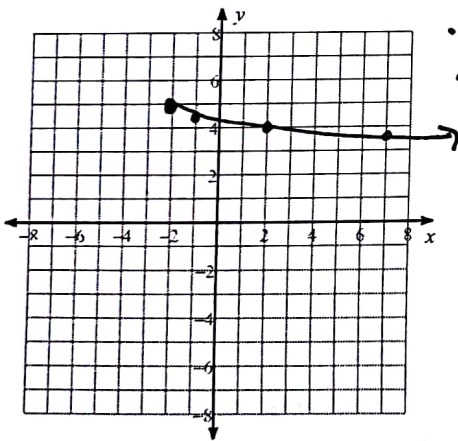
X	-2y-4
-8	0
-1	-2
0	-4
1	-6
8	-8

D: \mathbb{R}
R: \mathbb{R}

reflect over x-axis
V. stretch by 2
down 4

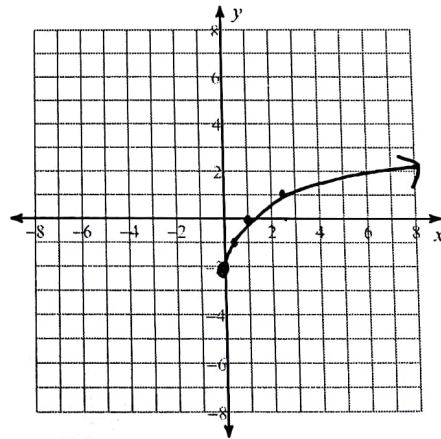
9) $y = -\frac{1}{2}\sqrt{x+2} + 5$

- reflect over x-axis
- v. shrink by 1/2
- left 2
- up 5



10) $y = \sqrt{4x} - 2$

- h. shrink by 1/4
- down 2



D: $x \geq -2$
R: $y \leq 5$

1/4x	y-2
0	-2
1/4	-1
1	0
9/4	1

D: $x \geq 0$
R: $y \geq -2$

X	Y
0	0
1	1
4	2
9	3

X-2	-1/2y+5
-2	5
-1	4.5
2	4
7	3.5