

RADICAL AND RATIONAL FUNCTIONS REVIEW

Name: _____

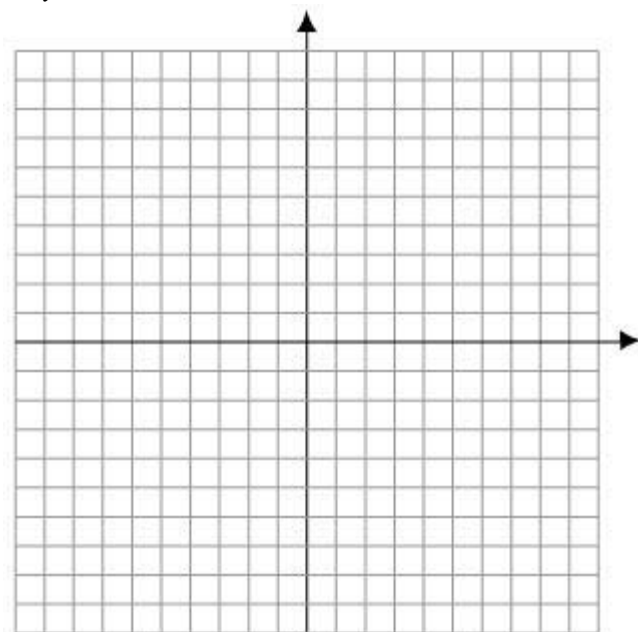
Block: _____

Date: _____

Total _____ = _____ %
112

1. Sketch the graph of the following functions. State the domain and range.

$$y = 2\sqrt{x+3}$$



2 marks

Domain: _____
1 mark

Range: _____
1 mark

2. Identify the transformations for each of the following from $y = \sqrt{x}$

a. $y = \sqrt{9(x-3)}$

2 marks

b. $y = -\sqrt{4x+8} - 1$

2 marks

c. $y+3 = \frac{1}{3}\sqrt{-x-1}$

2 marks

3. Write the equation of the radical function that results from the following transformations on the graph of $y = \sqrt{x}$ in the order presented.

a. Horizontal expansion by a factor of 5 and a vertical translation down 3 units.

a. _____
2 marks

b. Vertical compression by a factor of one third, reflection in the y axis, horizontal translation 4 units left.

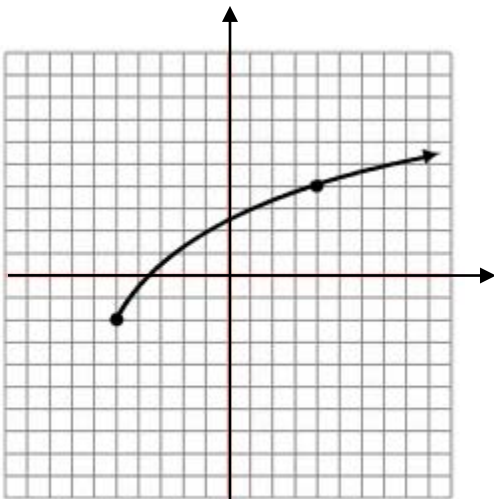
b. _____
2 marks

c. Vertical expansion by a factor of four, reflection in the x axis, horizontal compression by a factor of one-sixth and a translation 5 units left and 1 unit up.

c. _____
2 marks

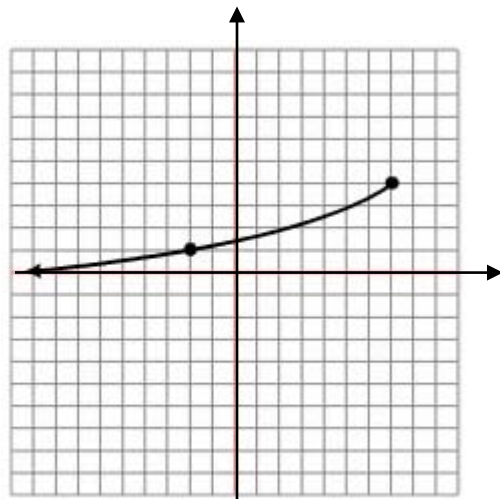
4. Write the equation of each of the following. Use the form $y = a\sqrt{b(x-h)} + k$

a.



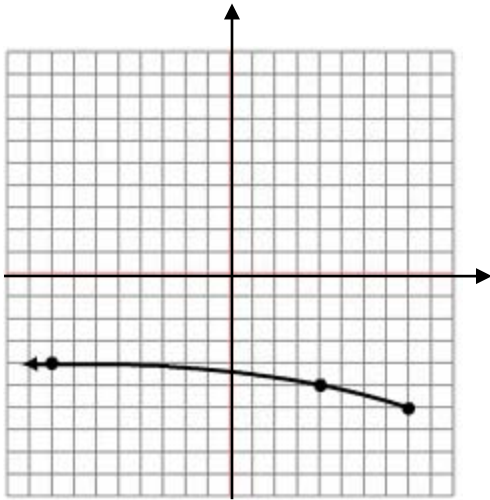
Equation: _____
2 marks

b.



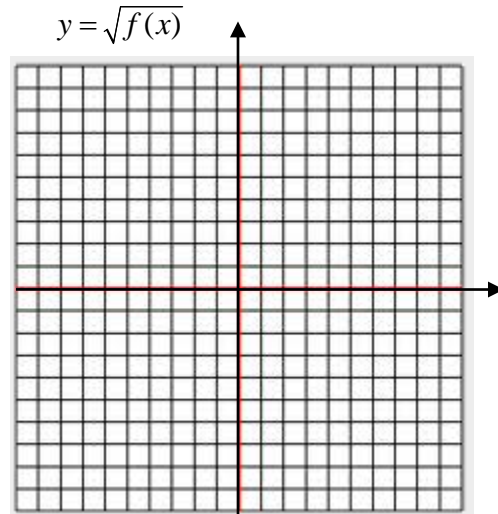
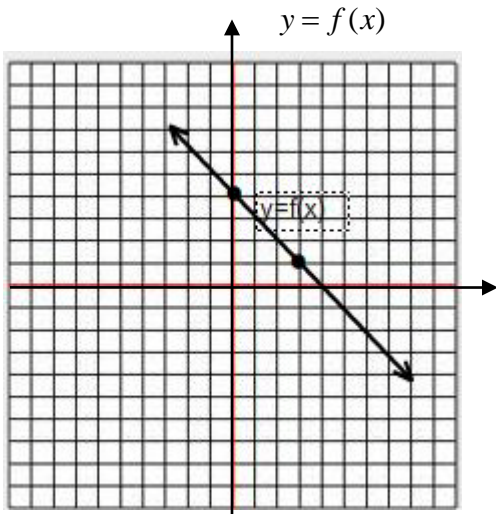
Equation: _____
2 marks

c.



Equation: _____
2 marks

5. Given the graph of $y = f(x)$ graph the function that would represent $y = \sqrt{f(x)}$
List the domain and range of each graph, list the **EXACT VALUES** of any invariant points.



2 marks

Domain $f(x)$: _____
1 mark

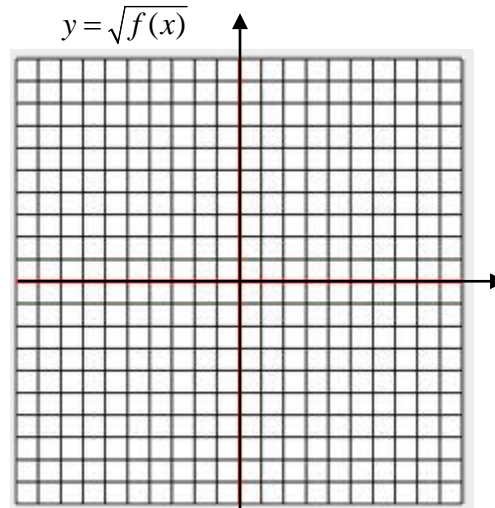
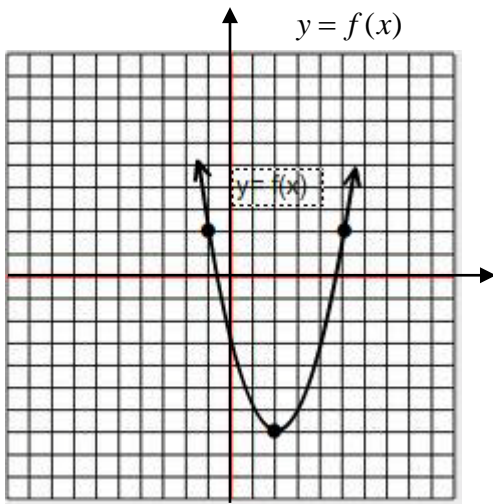
Domain $\sqrt{f(x)}$: _____
1 mark

Range $f(x)$: _____
1 mark

Range $\sqrt{f(x)}$: _____
1 mark

5. Invariant Points: _____
2 marks

6. Given the graph of $y = f(x)$ on the left, and $f(x) = (x-2)^2 - 7$ graph the function that would represent $y = \sqrt{f(x)}$. List the domain and range of each graph, list the **EXACT VALUES** of any invariant points.



2 marks

Domain $f(x)$: _____
1 mark

Domain $\sqrt{f(x)}$: _____
1 mark

Range $f(x)$: _____
1 mark

Range $\sqrt{f(x)}$: _____
1 mark

6. Invariant Points: _____
2 marks

7. Compare the domains and ranges of the following two functions. Using graphing calculator. (1 mark each)

a. $f(x) = 8 - 2x^2$ and $f(x) = \sqrt{8 - 2x^2}$

Domain $f(x)$: _____

Domain $\sqrt{f(x)}$: _____

Range $f(x)$: _____

Range $\sqrt{f(x)}$: _____

8. Solve each of the following algebraically for their exact values.

a. $\sqrt{3x - 5} = 3$

a. _____
2 marks

b. $\frac{1}{3}\sqrt{x + 5} - 3 = 1$

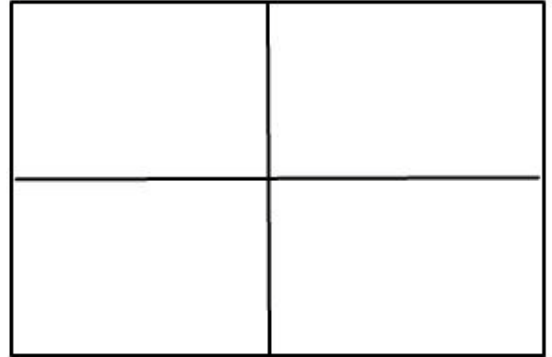
b. _____
2 marks

c. $\sqrt{-12 - 13x} - 2 = x$

c. _____
3 marks

9. ***Bonus: Graphing Calculator question! Solve the following graphically for a decimal approximation to the nearest 100th.

$$2\sqrt{3x^2 - 4} = 1 - x$$



9. _____
3 marks

10. Sketch the graphs of the following functions and show all asymptotes with a dotted line. (3 marks for graph)

a $y = \frac{3x}{x+4} - 5$.

i) Equation of any vertical asymptote(s)

_____ 1 mark

ii) State any restrictions or non-permissible value(s)

_____ 1 mark

iii) Determine coordinates of any intercept(s). (algebraically)

_____ 2 marks

iv) Describe the behavior of the function as it approaches and leaves vertical asymptotes and/or point of discontinuity.

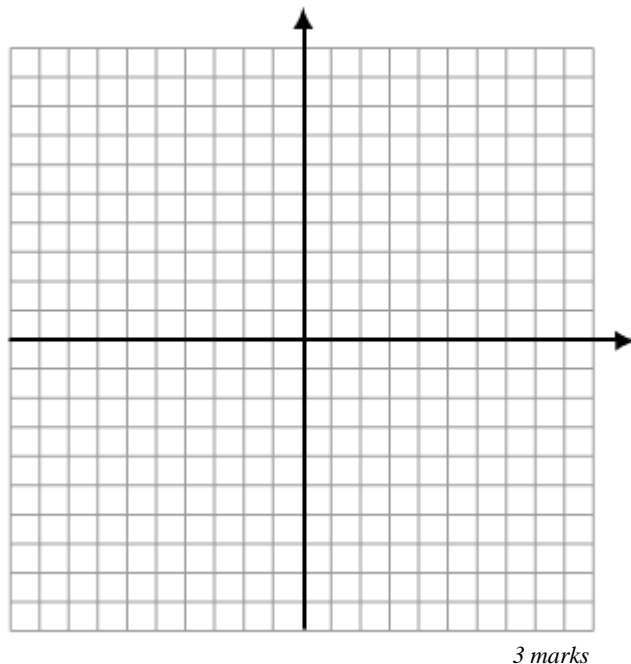
 _____ 1 mark

v) State the horizontal asymptote.

_____ 1 mark

vi) State the Domain and Range

 _____ 1 mark



3 marks

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

i) Equation of any vertical asymptote(s)

_____ *1 mark*

ii) State any restrictions or non-permissible value(s)

_____ *1 mark*

iii) Determine coordinates of any intercept(s). (*algebraically*)

_____ *2 marks*

iv) Describe the behavior of the function as it approaches and leaves vertical asymptotes and/or point of discontinuity.

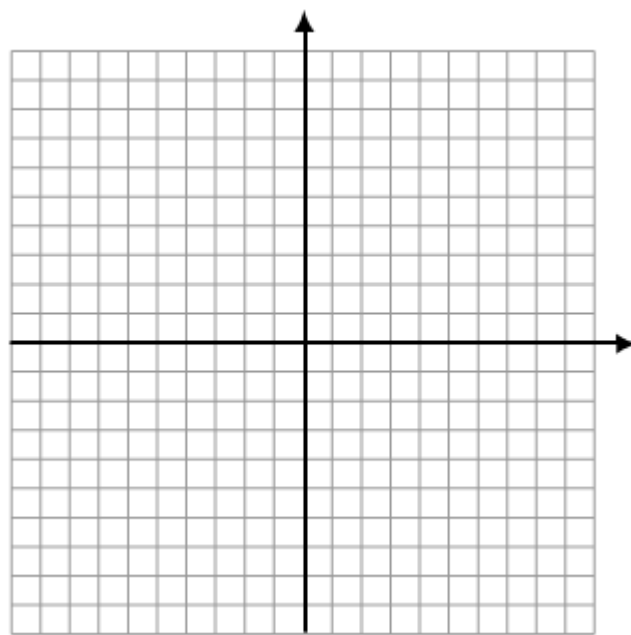
 _____ *1 mark*

v) State the horizontal asymptote _____.

_____ *1 mark*

vi) State the Domain and Range

 _____ *1 mark*



3 marks

c. $y = \frac{3x^2 - 18x + 24}{x^2 - 2x - 8}$

i) Equation of any vertical asymptote(s)

_____ *1 mark*

ii) State any restrictions or non-permissible value(s)

_____ *1 mark*

iii) Determine coordinates of any intercept(s). (*algebraically*)

_____ *2 marks*

iv) Describe the behavior of the function as it approaches and leaves vertical asymptotes and/or point of discontinuity.

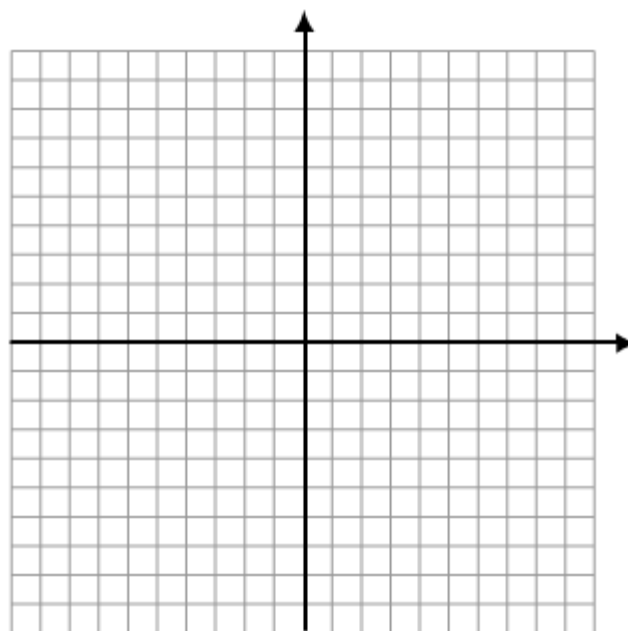
 _____ *1 mark*

v) State the horizontal asymptote.

_____ *1 mark*

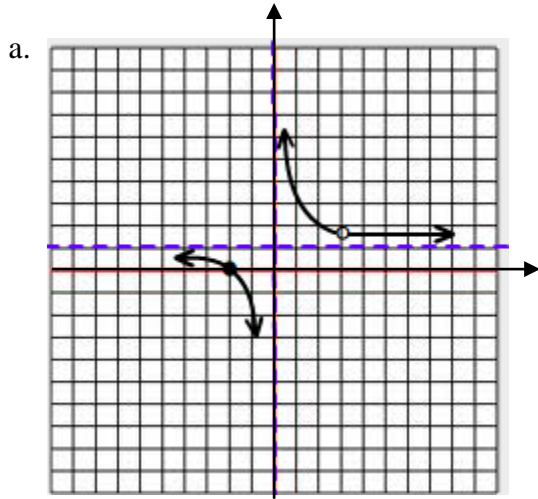
vi) State the Domain and Range

 _____ *1 mark*

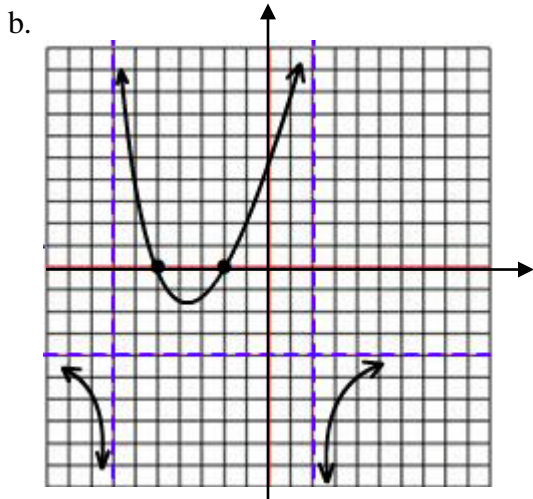


3 marks

11. Write a possible equation for each of the following graphs. Explain your reasoning.



a. _____
3 marks



b. _____
3 marks

12. Write the equation of a possible rational function with the following characteristics. Explain your reasoning.

- a) Vertical asymptotes at $x = \pm 3$, x intercepts of $x = 5$ and $x = -1$, and a horizontal asymptote of $y = \frac{1}{2}$

a. _____
2 marks

b) Vertical asymptotes at $x = \frac{1}{4}$, x intercept of $x = 0$, and a discontinuous point at $\left(5, \frac{5}{19}\right)$

b. _____
2 marks

c) Y-intercept at -5 , no x-intercepts, discontinuous points at $(-1, -5)$ and $(3, -5)$

c. _____
3 marks

13. Solve each of the following rational functions algebraically for their exact values.

a) $\frac{8}{(x-1)^2} = 2$

a. _____
3 marks

b) $\frac{1}{x} = \frac{x}{3x+18}$

b. _____
3 marks

$$c) \frac{3x}{4x+1} - 1 = \frac{x}{2x-1}$$

c. _____
3 marks

$$d) \frac{2x}{x-1} - \frac{x}{x^2-4x+3} = \frac{x+1}{x-3} - 2$$

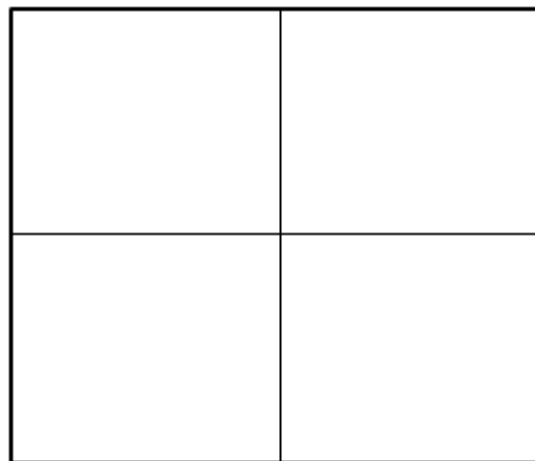
d. _____
3 marks

14. A river boat can travel at 20 km per hour in still water. The boat travels 30 km upstream against the current then turns around and travels the same distance back with the current. If the total trip took 7.5 hours, what is the speed of the current? Solve this question algebraically as well as graphically.

a) Algebra Solution

a. _____
3 marks

b) Bonus: graphing calculator! Graphical.



x min x max y min y max
-30 30 -10 10

2 marks