

### Honors Math 3: REVIEW Rational and Radicals

Complete the table.

Function	Domain	Holes?	Horizontal Asymptote(s)	Vertical Asymptote(s)	Root(s) (x-ints)	y-intercept(s)
1. $f(x) = \frac{2}{(x-5)(x+3)}$						
2. $f(x) = \frac{x+1}{x-3}$						
3. $f(x) = \frac{x^2+2x}{x-6}$						
4. $f(x) = \frac{3}{x+1} - 7$						
5. $f(x) = \frac{x^2-4}{x^2+3x+2}$						

#### Multiply/Divide

6.  $\frac{5y-20}{3y+15} \cdot \frac{7y+35}{10y+40}$

7.  $\frac{x^2+10x+16}{x^2-6x-16} \div \frac{x+8}{x^2-64}$

8.  $\frac{3x+3}{6x+12} \div \frac{18}{5x+5}$

9.  $\frac{x^2-3x-10}{2x^2-11x+5} \div \frac{x^2-5x+6}{2x^2-7x+3}$

10.  $\frac{x^2+6x}{3x^2+6x-24} \cdot \frac{x^2+2x-8}{x+6}$

11.  $\frac{(y+6)^2}{y^2-36} \cdot \frac{3y-18}{2y+12} \div \frac{2y+12}{2y-4}$

#### Add/Subtract.

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

13.  $\frac{x+2}{x^2+4x+4} + \frac{2}{x+2}$

14.  $\frac{3x-2}{x-2} + \frac{5}{x+2}$

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

16.  $\frac{9}{x^2-1} - \frac{x-2}{x+1}$

17.  $\frac{x}{x^2+5x+6} - \frac{2}{x^2+3x+2}$

#### Simplify.

18.  $\frac{\frac{x}{2} - 5}{6 + \frac{3}{x}}$

19.  $\frac{\frac{20}{x+1}}{\frac{1}{4} - \frac{7}{x+1}}$

20.  $\frac{\frac{4}{x^2-9} + \frac{2}{x-3}}{\frac{1}{x+3} + \frac{1}{x-3}}$

#### Solving each equation and check your answers

21.  $\frac{3}{2x-4} = \frac{5}{3x+7}$

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

23.  $\frac{7}{x^2-5x} + \frac{2}{x} = \frac{3}{2x-10}$

24.  $\frac{x+2}{x-1} + \frac{4}{x-5} = \frac{6}{x^2-6x+5}$

25.  $\frac{5}{x+2} + \frac{x}{x-2} = \frac{8}{x^2-4}$

26.  $\frac{4x}{x+3} + x = \frac{8}{x+3}$

For the following rational function, determine the equations of all asymptotes, give the location of any holes, determine the x and y intercepts, and give the domain of the function. If “none”, say “none”. Asymptotes should be equations and holes/intercepts should be given as points.

27.  $f(x) = \frac{x-5}{x^2-25}$

28.  $f(x) = \frac{15x^2-7x-2}{x^2-4}$

29.  $f(x) = \frac{x^2-16}{x-2}$

Vert: \_\_\_\_\_

Vert: \_\_\_\_\_

Vert: \_\_\_\_\_

Horiz: \_\_\_\_\_

Horiz: \_\_\_\_\_

Horiz: \_\_\_\_\_

Holes: \_\_\_\_\_

Holes: \_\_\_\_\_

Holes: \_\_\_\_\_

x-int: \_\_\_\_\_

x-int: \_\_\_\_\_

x-int: \_\_\_\_\_

y-int: \_\_\_\_\_

y-int: \_\_\_\_\_

y-int: \_\_\_\_\_

domain: \_\_\_\_\_

domain: \_\_\_\_\_

domain: \_\_\_\_\_

30. Write a rational function that has vertical asymptotes at  $x = 5$  and  $x = -2$  and a horizontal asymptote of  $y = 0$ .

31. Write a rational function that has a vertical asymptote at  $x = -3$  and has no horizontal asymptote.

32. It takes 7 hours for Will to paint a house. Judy can paint the same house in 3 hours. How long will it take them to paint the house if they work together?

33. In Grape Creek, Jim can row 30 km downstream in the same amount of time he can row 18 km upstream. The rate of the current is 2 km/h. Find Jim's rate.

34. Howard and Jim work together at Starbucks and can make a pumpkin spice latte in 3 minutes. It takes Jim 5 minutes to make the latte by himself. How long does it take Howard to make the latte alone?

35. An airplane flies 396 miles with a 40 mph tailwind and then flies home into the same wind. The total flying time was 2 hours. What is the speed of the plane?

Graph each of the following. State both the vertical and horizontal asymptote, domain and range (in interval notation), roots and y-intercepts.

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

Vert Asymptote: \_\_\_\_\_

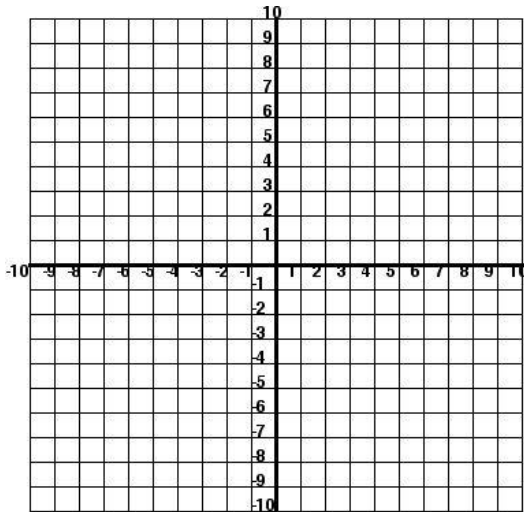
Horiz Asymptote: \_\_\_\_\_

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

Roots: \_\_\_\_\_

y-intercept: \_\_\_\_\_



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

Vert. Asymptote: \_\_\_\_\_

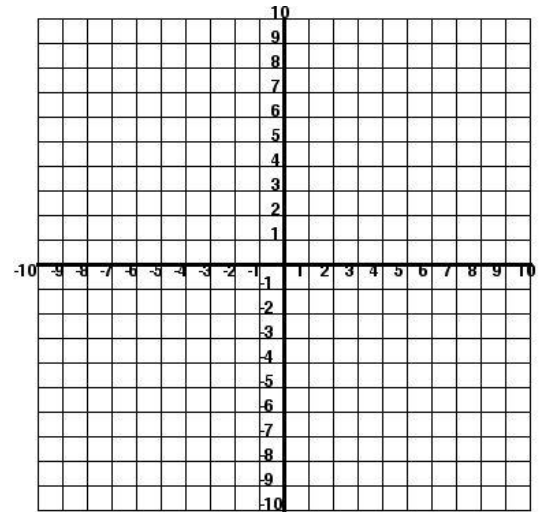
Horiz. Asymptote: \_\_\_\_\_

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

Roots: \_\_\_\_\_

y-intercept: \_\_\_\_\_



Answers: (Please note that the headings on the chart are in a different order.)

Domain	Holes	Horiz.A	y-int	VA	x-intercepts
$(-\infty, -3) \cup (-3, 5) \cup (5, \infty)$	none	$y = 0$	$\left(0, -\frac{2}{15}\right)$	$x = 5$ $x = -3$	None
$(-\infty, 3) \cup (3, \infty)$	none	$y = 1$	$\left(0, -\frac{1}{3}\right)$	$x = 3$	$(-1, 0)$
$(-\infty, 6) \cup (6, \infty)$	none	None	$(0, 0)$	$x = 6$	$(0, 0)$ $(-2, 0)$
$(-\infty, -1) \cup (-1, \infty)$	none	$y = -7$	$(0, -4)$	$x = -1$	$\left(-\frac{4}{7}, 0\right)$
$(-\infty, -2) \cup (-2, -1) \cup (-1, \infty)$	$(-2, 4)$	$y = 1$	$(0, -2)$	$x = -1$	$(2, 0)$

$$6. \frac{7(y-4)}{6(y+4)}$$

$$7. x+8$$

$$8. \frac{5(x+1)^2}{36(x+2)}$$

$$9. \frac{x+2}{x-2}$$

$$10. \frac{x}{3}$$

$$11. \frac{3(y-2)}{2(y+6)}$$

$$12. \frac{4x+1}{(x+5)(x-2)(x+1)}$$

$$13. \frac{3}{x+2}$$

$$14. \frac{3x^2 + 9x - 14}{(x-2)(x+2)}$$

$$15. \frac{x+6}{5x^2}$$

$$16. \frac{-x^2 + 3x + 7}{(x+1)(x-1)}$$

$$17. \frac{x-3}{(x+3)(x+1)}$$

$$18. \frac{x(x-10)}{6(2x+1)}$$

$$19. \frac{80}{x-27}$$

$$20. \frac{x+5}{x}$$

$$21. 41$$

$$22. -2$$

$$23. 6$$

$$24. -5, 4$$

$$25. -9$$

$$26. -8, 1$$

$$30.$$

$$f(x) = \frac{2x}{(x-5)(x+2)}$$

$$31. f(x) = \frac{2x^2}{x+3}$$