

## Algebra 2 Final Review

# Rationals

Sketch the asymptotes and graph the function.

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

Find any points of discontinuity for the rational function.

2.  $y = \frac{x-4}{x^2-10x+21}$

3. Describe the vertical asymptote(s) and hole(s) for the graph of  $y = \frac{(x+1)(x+4)}{(x+4)(x-1)}$ .

4. Find the horizontal asymptote of the graph of  $y = \frac{2x^3 - 6x + 4}{-9x^4 + 9x + 4}$ .

5. Sketch the asymptotes and graph the function.

$$y = \frac{x^2 + x - 6}{x^2 - 25}$$

Simplify the rational expression. State any restrictions on the variable.

6.  $\frac{y^2 + 4y - 21}{y - 3}$

**Multiply or divide. State any restrictions on the variables.**

7.  $\frac{2k^3}{7j^4} \cdot \frac{j^3}{k^4}$

8.  $\frac{x^2 - 9}{x^2 + 5x + 4} \div \frac{x - 2x - 3}{x^2 + 7x + 12}$

**Add or subtract. Simplify if possible.**

9.  $\frac{1}{z + 7} + \frac{5}{z^2 - 49}$

**Solve the equation. Check the solution.**

10.  $\frac{2}{x - 2} = \frac{-2}{x + 4}$

11.  $\frac{8}{5n} + \frac{5}{n} = -4$

12. A group of college students are volunteering for Help the Homeless during their spring break. They are putting the finishing touches on a house they built. Working alone, Jillian can paint a certain room in 4 hours. Mike can paint the same room in 5 hours. Write an equation that can be used to find how long it will take them working together to paint the room. How many hours will it take them to paint the room? If necessary, round your answer to the nearest hundredth.

# Rational Exponents

13. Multiply and simplify  $\sqrt[3]{5x^2} \cdot \sqrt[3]{4x^5}$ . Assume that all variables are positive.

14.  $\frac{\sqrt{196x^{30}}}{\sqrt{2x}}$

**Simplify.**

15.  $27^{\frac{2}{3}}$

16. Write the exponential expression  $7x^{\frac{7}{8}}$  in radical form.

**Solve the equation.**

17.  $\sqrt{x-4} - 8 = -2$

18.  $(-10x - 2)^{\frac{1}{5}} = (6 - 3x)^{\frac{1}{5}}$

# Exponential

**Graph the exponential function.**

19.  $y = 3(5)^x$

20. An initial population of 805 quail increases at an annual rate of 14%. Write an exponential function to model the quail population.
21. Write an exponential function  $y = ab^x$  for a graph that includes (1, 17.5) and (-1, 0.7).
22. Graph  $y = 9(3)^{x+4} + 1$ .

## Logarithm

**Graph the logarithmic equation.**

23.  $y = \log_3 x$
24.  $y = \log_3 x - 5$

**Write the expression as a single logarithm.**

25.  $6 \log_b y + 7 \log_b w$
26.  $3 \log x - 8 \log (x + 5)$

**Expand the logarithmic expression.**

27.  $\log_4 3k^4$
28. Solve  $3^{5x} = 47$ . Round to the nearest ten-thousandth.
29. Solve  $\log(8x + 14) = 2$ .

**Write the expression as a single natural logarithm.**

30.  $3 \ln a - 6 \ln b$

31. Simplify  $\ln e^7$ .

32. Solve  $\ln(4x + 4) = 8$ . Round to the nearest thousandth.

**Use natural logarithms to solve the equation. Round to the nearest thousandth.**

33.  $4e^{4x} + 6 = 25$

## Trigonometry

**Write the measure in radians. Express the answer in terms of  $\pi$ .**

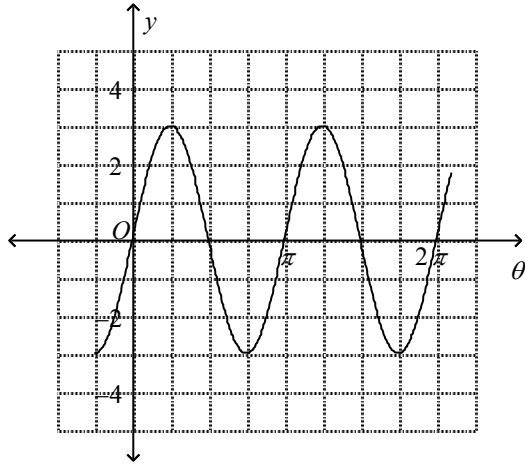
34.  $160^\circ$

**Write the measure in degrees.**

35.  $\frac{4\pi}{5}$  radians

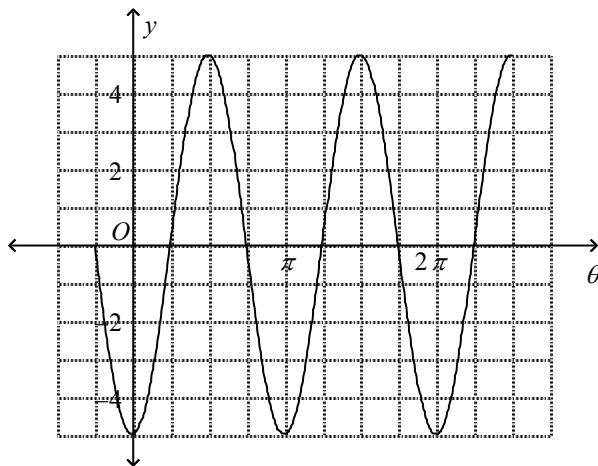
36. Sketch one cycle of  $y = -\sin 4\theta$ .

37. Write the equation for the sine function shown below.



**Write a cosine function for the graph.**

38.



39. Use a graphing calculator to solve the equation  $-3 \cos \frac{\pi}{3} \theta = 1$  in the interval from 0 to  $2\pi$ . Round to the nearest hundredth.
40. Write an equation of the cosine function with amplitude 7 and period  $8\pi$ .
41. Sketch the graph of the tangent curve  $y = \tan \frac{1}{2}x$  in the interval from 0 to  $2\pi$ .
42. Identify the period for  $y = \tan \frac{3\pi}{2} \theta$  and tell where two asymptotes occur for the function.

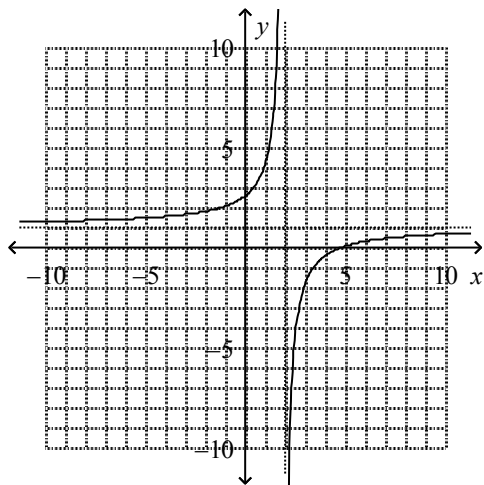
**Graph the function in the interval from 0 to  $2\pi$ .**

43.  $y = \csc x$



# Algebra 2 Final Review Answer Section

1.

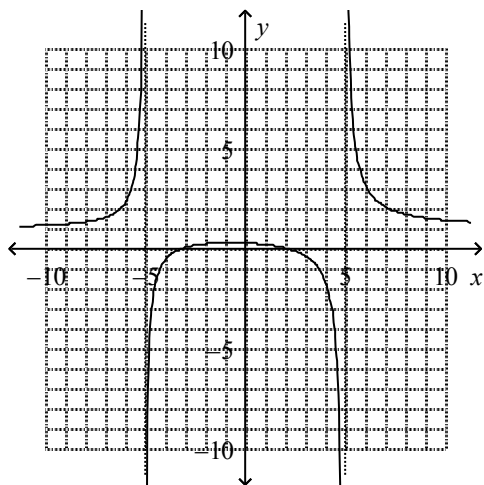


2.  $x = 7, x = 3$

3. asymptote:  $x = 1$  and hole:  $x = -4$

4.  $y = 0$

5.



6.  $y + 7; y \neq 3$

7.  $\frac{2}{7kj}, k \neq 0, j \neq 0$

8. n/a

9.  $\frac{z - 2}{(z - 7)(z + 7)}$

10. -1

11.  $-\frac{33}{20}$



12.  $\frac{x}{4} + \frac{x}{5} = 1$ ; 2.22 hours

13.  $x^2 \cdot \sqrt[3]{20x}$

14.  $7x^{14} \sqrt{2x}$

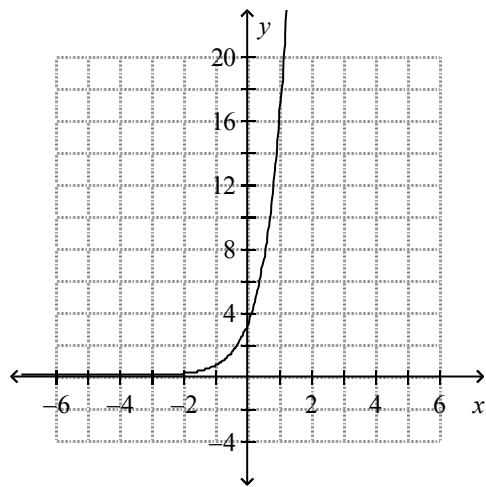
15. 9

16.  $7\sqrt[8]{x^7}$

17. 40

18.  $-\frac{8}{7}$

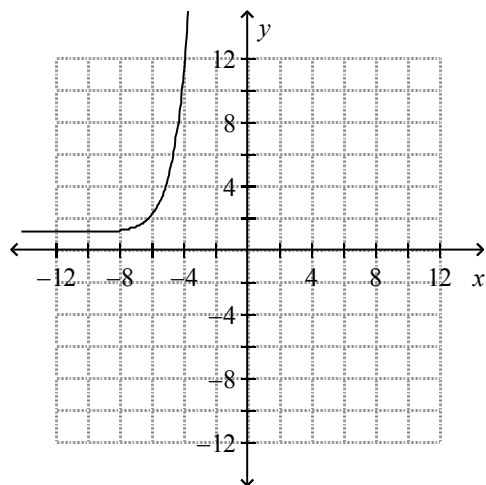
19.



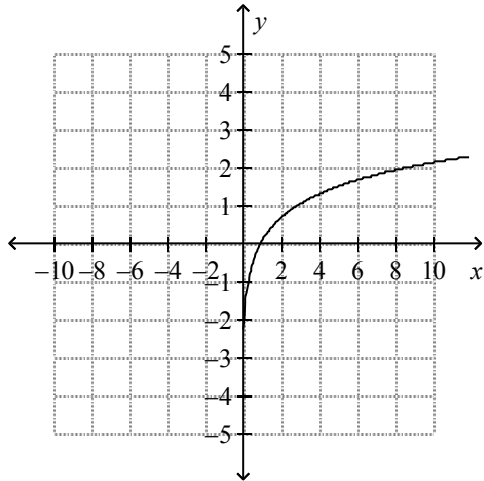
20.  $f(x) = 805(1.14)^x$

21.  $y = 3.5(5)^x$

22.



23.



24. n/a

25.  $\log_8(y^6w^7)$

26. n/a

27.  $\log_4 3 + 4 \log_4 k$

28. 0.7009

29.  $\frac{43}{4}$

30.  $\ln \frac{a^3}{b^6}$

31. 7

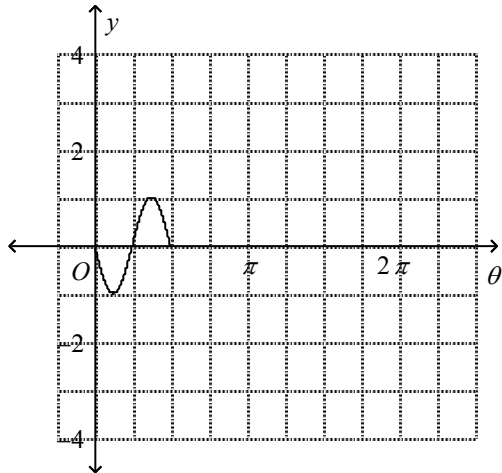
32. 744.239

33. 0.390

34.  $\frac{8\pi}{9}$

35.  $144^\circ$

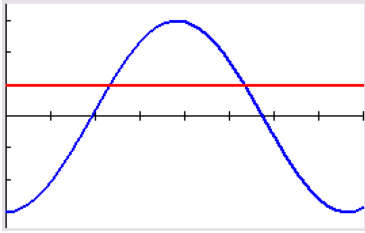
36.



37.  $y = 3 \sin 2\theta$

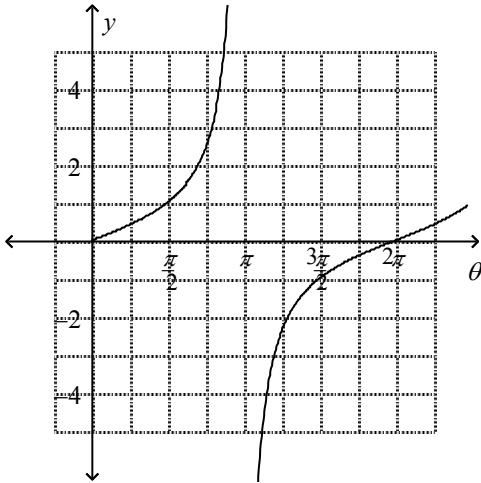
38.  $y = -5 \cos 2\theta$

39. 1.8245203 and 4.1754797  
(where red and blue intersect)



40.  $y = 7 \cos \frac{\theta}{4}$

41.



42. this will **not** be on the final – FYI, period is  $\frac{3\pi}{4}$  with asymptotes at  $\frac{3\pi}{16}$  and  $\frac{9\pi}{16}$  (these are two of many)
43. this will **not** be on the final  
cosecant( $\theta$ ) is the inverse of sine( $\theta$ ), and is graphed in red:

