

Math 3
Semester 2 Final Review

Name: _____
Date: _____ **Per:** _____

Unit 6: Radical Functions

[1-6] Simplify each real expression completely.

1. $\sqrt{27x^2y^7}$

2. $\sqrt{80m^4n^5}$

3. $5x^2\sqrt{48x^3y^6}$

4. $\sqrt[3]{24m^6n^5}$

5. $(64x^9)^{-\frac{1}{3}}$

6. $3x^{\frac{1}{2}} \cdot 8x^{\frac{3}{4}}$

[7-10] Perform the operation and simplify completely.

7. $\sqrt[4]{8x^3y^3} \cdot \sqrt[4]{4x^6y}$

8. $3m\sqrt{12m^3} \cdot 7\sqrt{15m^2}$

9. $4m\sqrt{75mn^5} - 2n^2\sqrt{48m^3n}$

10. $x\sqrt[3]{40x^4} + 4\sqrt[3]{625x^7}$

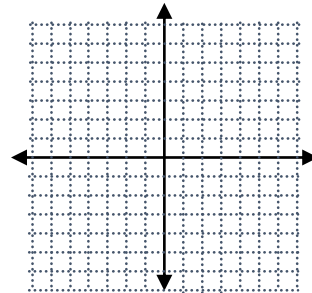
[11-14] Sketch the graph for each of the following. Identify its domain, range, x - and the y -intercepts.

11. $f(x) = 2\sqrt{x-3} + 1$

a) Domain & Range

b) x - and y - intercept(s)

c) The average rate of change for f on $3 \leq x \leq 12$

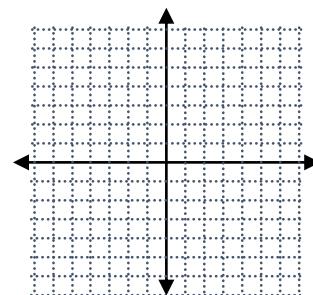


12. $g(x) = 3\sqrt{x+4} - 3$

a) Domain & Range

b) x - and y - intercept(s)

c) The open interval where $g(x) > 0$ and $g(x) < 0$

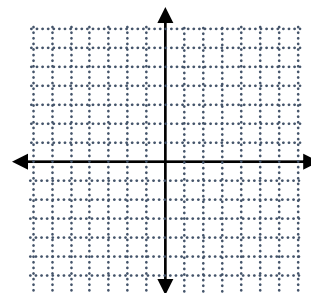


13. $h(x) = \sqrt[3]{x-1} + 4$

a) Domain & Range

b) x - and y - intercept(s)

c) The average rate of change for h on $1 \leq x \leq 9$

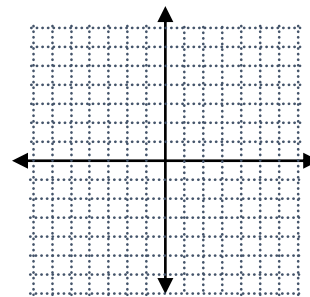


14. $j(x) = -3\sqrt{x+7} + 6$

a) Domain & Range

b) x – and y – intercept(s)

c) The open interval where $j(x) > 0$ and $j(x) < 0$



[15-18] Solve for x algebraically. {Don't forget to check for extraneous solutions.}

15. $17 - 4\sqrt{x-8} = -19$

16. $3\sqrt{x+4} + 18 = 33$

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

18. $\sqrt{5-x} - x = 7$

[19-20] Simplify the expression. {Assume all variables represent positive numbers.}

19. $\frac{4}{\sqrt{2y}}$

20. $\frac{6}{\sqrt{5}-2}$

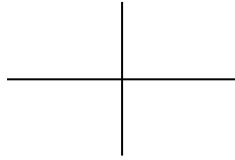
Unit 7: Parabolas & Circles

1. What is the definition of a circle?

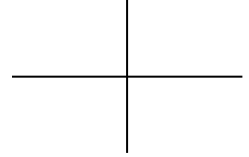
2. What is the definition of a parabola?

[3-4] Find the center and the radius for the following and sketch the circle:

3. $x^2 + y^2 + 8x - 6y - 3 = 0$



4. $x^2 + y^2 + 10y = 11$



5. Find the equation of a circle with center $(4,-1)$ and a radius of 3.

6. Find the equation of a circle with center $(-2,5)$ and a radius of 4.

[7-9] Put the following into descriptive form, state the vertex and the direction the parabola opens. How many times does the graph intersect the x-axis?:

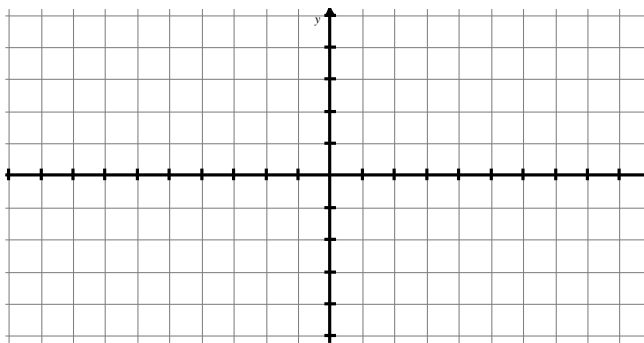
7. $(x + 3)^2 = 2(y + 4)$

8. $x = y^2 - 12y + 10$

9. $4x^2 - 24x - y + 40 = 0$

[10-11] Put the following into descriptive form, state the vertex, focus, directrix, and sketch the graph.

10. $y - 1 = \frac{1}{2}(x + 5)^2$

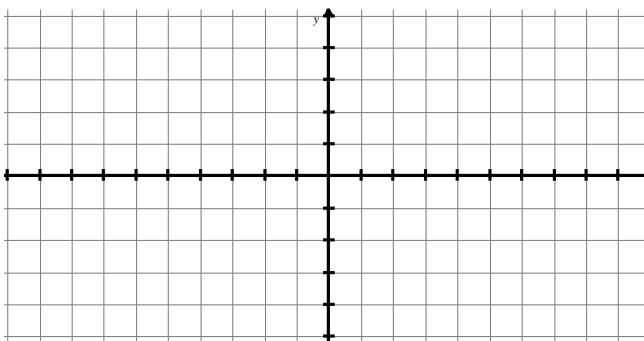


Vertex: _____

Focus: _____

Directrix: _____

11. $(y + 2)^2 = -8(x - 4)$



Vertex: _____

Focus: _____

Directrix: _____

[12-14] Using the distance formula and the definition of a parabola, write the equation of each parabola in descriptive form. Reminder: $PF = PD$ and $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

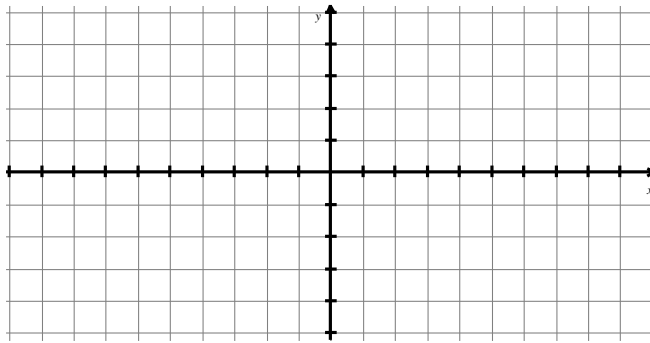
12. Focus is at $(-5, 0)$ and the equation for the directrix is $x = 5$.

13. Focus is at $(0, -6)$ and the equation for the directrix is $y = 6$.

14. Focus is at $(-4, 5)$ and the equation for the directrix is $y = -3$.

[15-17] Find and graph the vertex, focus, directrix, and focal chord endpoints.

15. $y^2 = 2x$



Vertex: _____

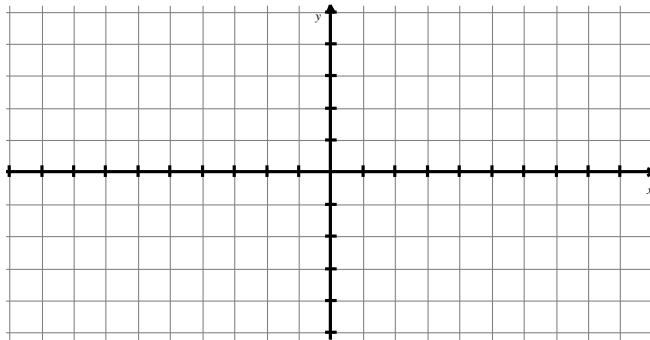
Focus: _____

Directrix: _____

Focal chord endpoints:

_____ and _____

16. $x + 2 = -\frac{1}{8}(y - 3)^2$



Vertex: _____

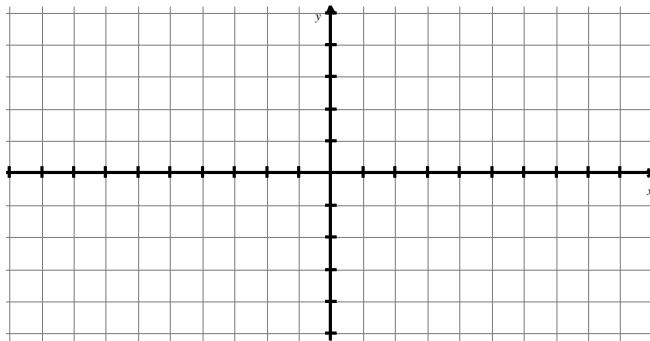
Focus: _____

Directrix: _____

Focal chord endpoints:

_____ and _____

17. $y = \frac{1}{12}x^2 - 2$



Vertex: _____

Focus: _____

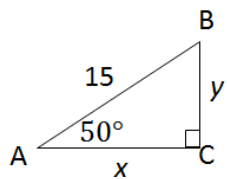
Directrix: _____

Focal chord endpoints:

_____ and _____

Unit 8: Trigonometry

1. Select all of the following statements that are true.



A) $x = 15 \cos 50^\circ$

C) $x = y \tan 50^\circ$

E) $x = \frac{15}{\tan 50^\circ}$

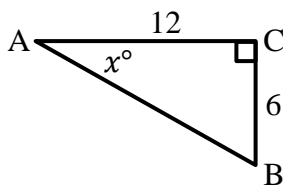
B) $y = \frac{15}{\sin 50^\circ}$

D) $y = 15 \sin 50^\circ$

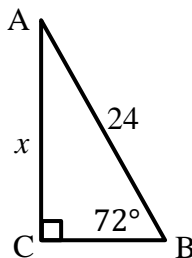
F) $y = x \tan 50^\circ$

[2-3] Solve for x. Leave your solution in exact form.

2.

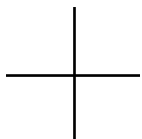


3.



[4-9] Sketch each angle in standard position, identify the quadrant for the terminating ray, and find the reference angle, θ' .

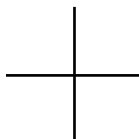
4. $\theta = 320^\circ$



b) Quadrant _____

c) $\text{Ref} \angle \theta' =$ _____

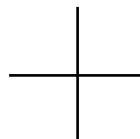
5. $\theta = 165^\circ$



b) Quadrant _____

c) $\text{Ref} \angle \theta' =$ _____

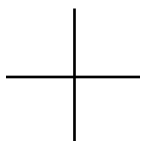
6. $\theta = -400^\circ$



b) Quadrant _____

c) $\text{Ref} \angle \theta' =$ _____

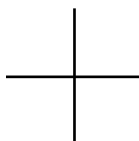
7. $\theta = \frac{17\pi}{12}$



b) Quadrant _____

c) $\text{Ref} \angle \theta' =$ _____

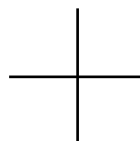
8. $\theta = \frac{13\pi}{5}$



b) Quadrant _____

c) $\text{Ref} \angle \theta' =$ _____

9. $\theta = -\frac{14\pi}{9}$



b) Quadrant _____

c) $\text{Ref} \angle \theta' =$ _____

[10-14] Find one positive angle and one negative angle that are coterminal with each angle:

10. $\theta = 220^\circ$

11. $\theta = \frac{7\pi}{12}$

12. $\theta = -450^\circ$

13. $\theta = -\frac{3\pi}{8}$

14. $\theta = -5\pi$

Pos $\angle =$ _____

Pos $\angle =$ _____

Pos $\angle =$ _____

Pos $\angle =$ _____

Pos $\angle =$ _____

Neg $\angle =$ _____

Neg $\angle =$ _____

Neg $\angle =$ _____

Neg $\angle =$ _____

Neg $\angle =$ _____

[15-19] Convert each angle from degrees to radian measure or radians to degrees, whichever is appropriate.

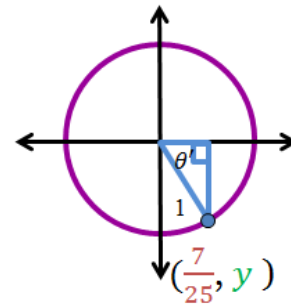
15. $\theta = 128^\circ$ 16. $\theta = \frac{17\pi}{9}$ 17. $\theta = -50^\circ$ 18. $\theta = -\frac{4\pi}{7}$ 19. $\theta = 3\pi$

[20-25] Identify the sine, cosine, and tangent ratio for each.

20. $\theta = \frac{5\pi}{6}$ 21. $\theta = -\frac{2\pi}{3}$ 22. $\theta = 480^\circ$ 23. $\theta = -225$ 24. $\theta = -\frac{3\pi}{2}$ 25. $\theta = 5\pi$

$\sin \theta = \underline{\hspace{2cm}}$	$\sin \theta = \underline{\hspace{2cm}}$	$\sin \theta = \underline{\hspace{2cm}}$	$\sin \theta = \underline{\hspace{2cm}}$	$\sin \theta = \underline{\hspace{2cm}}$	$\sin \theta = \underline{\hspace{2cm}}$
$\cos \theta = \underline{\hspace{2cm}}$	$\cos \theta = \underline{\hspace{2cm}}$	$\cos \theta = \underline{\hspace{2cm}}$	$\cos \theta = \underline{\hspace{2cm}}$	$\cos \theta = \underline{\hspace{2cm}}$	$\cos \theta = \underline{\hspace{2cm}}$
$\tan \theta = \underline{\hspace{2cm}}$	$\tan \theta = \underline{\hspace{2cm}}$	$\tan \theta = \underline{\hspace{2cm}}$	$\tan \theta = \underline{\hspace{2cm}}$	$\tan \theta = \underline{\hspace{2cm}}$	$\tan \theta = \underline{\hspace{2cm}}$

26. Find the missing coordinate for the point on the unit circle. Then find the simplified sine, cosine, and tangent ratios for the angle, θ , by using its reference angle, θ' .



[27-29] Find two solutions of θ in degrees without a calculator such that $0^\circ \leq \theta < 360^\circ$.

27. $12 \cos \theta - 6\sqrt{3} = 0$ 28. $\sqrt{2} \tan \theta + \sqrt{6} = 0$ 29. $4\sqrt{3} \sin \theta + 6 = 0$

[30-35] Find all solutions of θ in degrees without a calculator such that $0^\circ \leq \theta < 2\pi$.

30. $8 \sin \theta - 4\sqrt{2} = 0$ 31. $18 \tan^2 \theta - 6 = 0$ 32. $2 \tan \theta (\cos \theta + 1) = 0$

33. $4 \cos \theta (\tan \theta + \sqrt{3}) = 0$ 34. $(2 \sin \theta + \sqrt{3})(\tan \theta - 1) = 0$ 35. $4 \tan \theta \cos \theta + 4\sqrt{3} \cos \theta = 0$

[36-38] If the terminating ray for θ in the 4th quadrant, determine if each of the following is true or false.

36. $\sin \theta > 0$

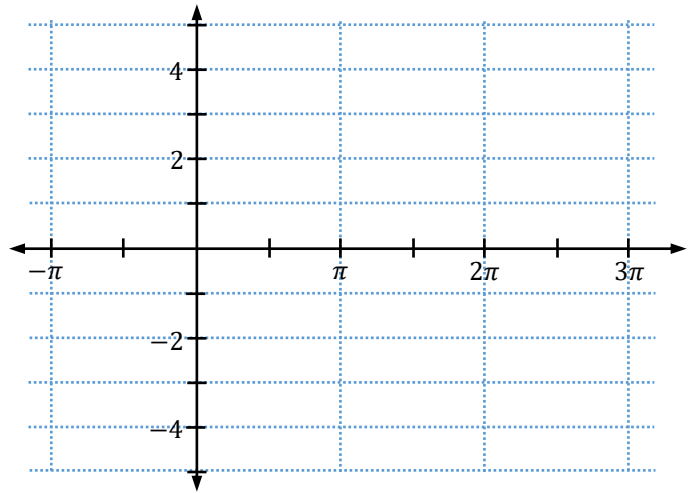
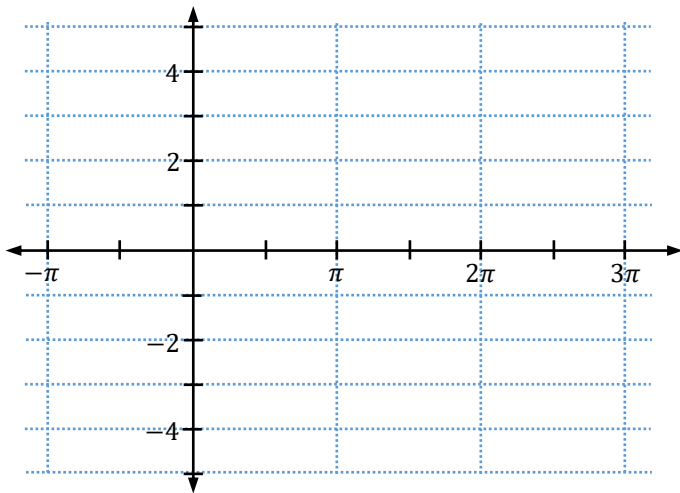
37. $\cos \theta < 0$

38. $\tan \theta > 0$

[39-42] Sketch the first period for each of the following functions.

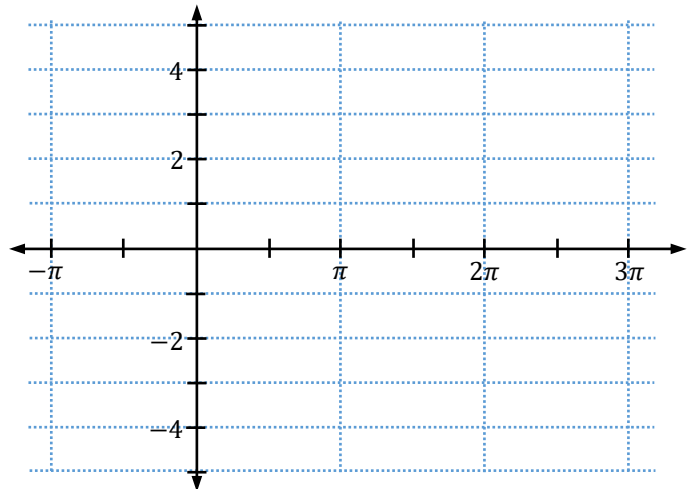
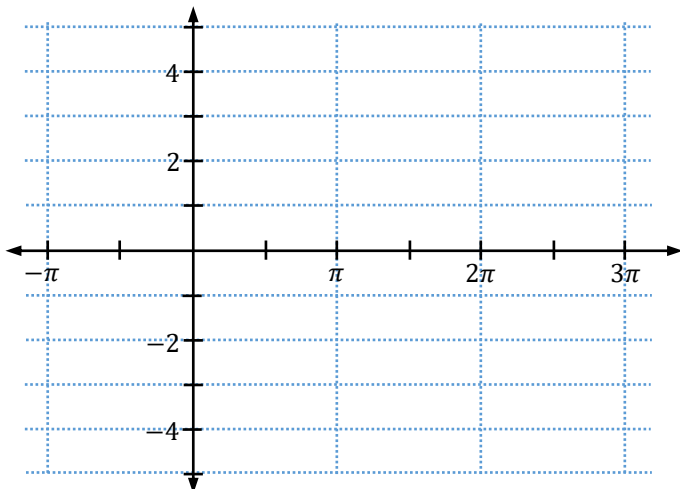
39. $f(x) = 4 \cos x + 1$

40. $f(x) = -2 \sin x + 3$



41. $f(x) = 3 \sin \left(x - \frac{\pi}{2}\right) - 1$

42. $f(x) = -\frac{1}{2} \cos \left(x + \frac{\pi}{2}\right) - 2$



Unit 9: Logarithms - Scientific Calculator is not allowed!

[1-9] Simplify.

1. $\log_3 \frac{1}{81}$

2. $\ln \frac{1}{e}$

3. $\log_2 2\sqrt{2}$

4. $\log_7 1$

5. $\log_3 27\sqrt{3}$

6. $\ln 1$

7. $\log_8 4$

8. $\log_7 \sqrt[3]{49}$

9. $\log 100$

[10-11] Determine which two consecutive integers the following logarithms lie between:

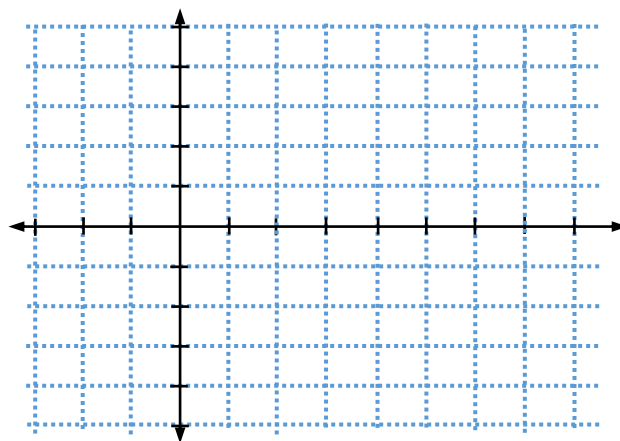
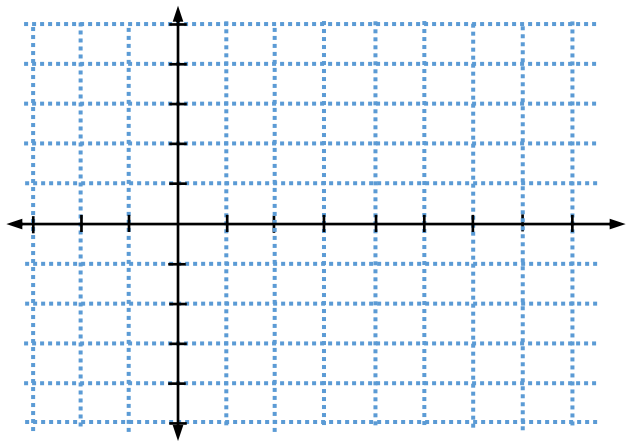
10. $\log_2 30$

11. $\log_4 100$

[12-15] Graph the logarithmic function and identify the asymptote, domain, and range.

12. $f(x) = \log_3 x$

13. $f(x) = \log_3(x - 1) - 2$



Vertical Asymptote: _____

Domain: _____

Range: _____

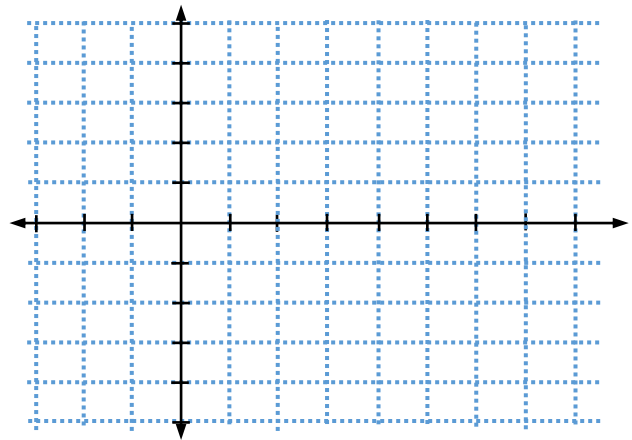
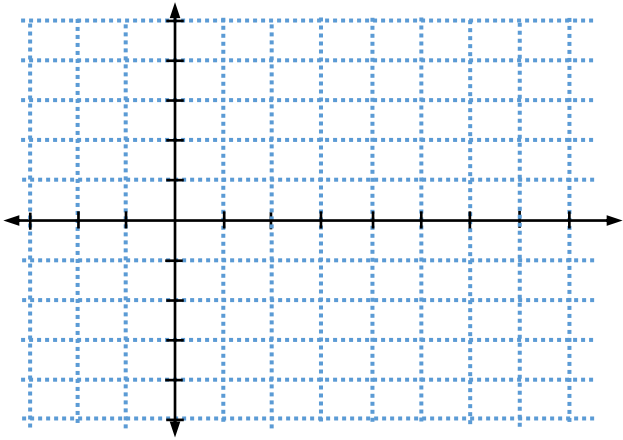
Vertical Asymptote: _____

Domain: _____

Range: _____

14. $f(x) = \log_2 x$

15. $g(x) = 3 + \log_2(x + 1)$



Vertical Asymptote: _____
 Domain: _____
 Range: _____

Vertical Asymptote: _____
 Domain: _____
 Range: _____

[16-17] Find the x - & y -intercepts of the logarithmic function.

16. $f(x) = \log_4(x + 16) - 1$

17. $f(x) = \log_2(x - 4) - 3$

[18] Find the rate of change for the function over the given interval.

18. $y = \log_3(x + 9) - 1, -8 \leq x \leq 18$

[19-20] Expand.

19. $\ln \frac{e^3 y^2}{\sqrt{x}}$

20. $\log_3 \frac{81x^2}{\sqrt[4]{y}}$

[21-29] Solve for x .

21. $4^{3x+5} = 16^{x+1}$

22. $7^x = 12$

23. $3(5)^{x+2} = 30$

24. $5(10)^{x-3} + 2 = 92$

25. $5e^x - 7 = 43$

26. $1000 - 2e^{x+3} = 20$

27. $\log_{11} 6 + \log_{11}(x - 2) = \log_{11} 45$

28. $\log_5 12 - \log_5(x + 2) = -2$

29. $2 = \log_5(x^2 - 5x + 1)$

30. $2 \ln x - 3 \ln 2 = \ln 18$