AP Precalculus · 2.4 | Worksheet A

Name: _____ Date: _____ Period: _____

1. Rewrite in the form ab^x: 4^{x+2}.

2. Rewrite in the form ab^x: 6^{x-2}.

3. Rewrite in the form ab^x: 4^{x+4}.

4. Rewrite in the form ab^x: 6^{x-3}.

5. Rewrite in the form ab^x: $8 \cdot 4^{x-1}$.

6. Rewrite in the form ab^x: 4^{3x}.

7. Rewrite in the form ab^x: $36^{\frac{x}{2}}$.

8. Rewrite in the form ab^x: $27^{\frac{x}{3}}$.

9. Rewrite in the form ab^x: $7 \cdot 3^{4x}$.

10. Choose an equivalent expression for $3 \cdot 16^x$. (Assume a is positive.)

A. $3 \cdot 4^{\frac{x}{2}}$ **B.** $3 \cdot 4^{2x}$ **C.** $9 \cdot 4^{2x}$ **D.** $9 \cdot 4^{\frac{x}{2}}$

11. Choose an equivalent expression for $6 \cdot 3^{3x}$. (Assume a is positive.)

A. 162^x **B.** $36 \cdot 3^x$ **C.** $6 \cdot 27^x$ **D.** $36 \cdot 27^x$

12. Choose an equivalent expression for $6 \cdot 16^{\frac{x}{2}}$. (Assume a is positive.)

A. $24 \cdot 4^x$ **B.** $6 \cdot 16^{2x}$ **C.** $3 \cdot 4^x$ **D.** $6 \cdot 4^x$

13. Choose an equivalent expression for $a^3 \cdot 36^x$. (Assume a is positive.)

A. $a^3 \cdot 6^{2x}$ **B.** $a \cdot 6^{2x}$ **C.** $a^3 \cdot 6^{\frac{x}{2}}$ **D.** $a \cdot 6^{\frac{x}{2}}$

14. Choose an equivalent expression for 4^{-3x}. (Assume a is positive.)

A. -64^x **B.** $(\frac{1}{64})^x$ **C.** 64^x **D.** $-(\frac{1}{64})^x$

15. Choose an equivalent expression for $6 \cdot 9^{\frac{x}{3}}$. (Assume a is positive.)

A. $3 \cdot (9^{\frac{1}{3}})^x$ **B.** $6 \cdot 3^x$ **C.** $6 \cdot (9^{\frac{1}{3}})^x$ **D.** $6 \cdot 9^{3x}$

16. Describe the transformation(s): $f(x) = 4^x$, $g(x) = \frac{f(x)}{1024}$.

17. Describe the transformation(s): $f(x) = 4^x$, $g(x) = 64 \cdot f(x)$.

18. Describe the transformation(s): $f(x) = 4^x$, $g(x) = (f(x))^{-1}$.

19. Describe the transformation(s): $f(x) = 4^x$, $g(x) = 64^x$.

20. Describe the transformation(s): $f(x) = 4^x$, $g(x) = (f(x))^{-3}$.

21. Describe the transformation(s): $f(x) = 64^x$, $g(x) = 4^x$.

22. Describe the transformation(s): $f(x) = 4^x$, $g(x) = -4f(x)$.

23. Describe the transformation(s): $f(x) = 4^x$, $g(x) = -\frac{f(x)}{16}$.

24. Evaluate exactly: $h(x) = 3 \cdot 4^{\frac{x}{2}}$, **find** $h(1)$.

25. Evaluate exactly: $h(x) = 6 \cdot 4^{\frac{x}{5}}$, **find** $h(2)$.

26. Evaluate exactly: $h(x) = 3 \cdot 6^{\frac{x}{3}}$, **find** $h(-2)$.

27. Evaluate exactly: $h(x) = 6 \cdot 3^{\frac{x}{5}}$, **find** $h(-1)$.

28. Calculator: evaluate $f(x) = 4^x$ **at** $x = -\pi$. **Round to three decimals.**

29. Calculator: evaluate $f(x) = 5.2^x$ **at** $x = 7.3$. **Round to three decimals.**

30. Calculator: evaluate $f(x) = 3.1^{-2x}$ **at** $x = -\sqrt{3}$. **Round to three decimals.**

31. Calculator: evaluate $f(x) = 2.3^{-x}$ **at** $x = \frac{1}{3}$. **Round to three decimals.**

32. Describe the graph transformation: $f(x) = 4^x$, $g(x) = 4^x + 3$

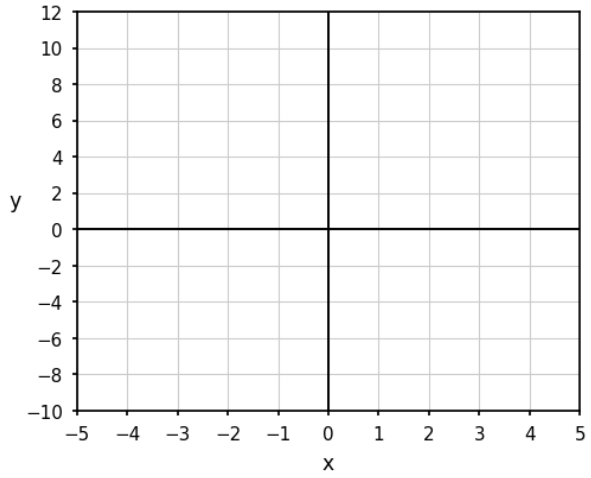
33. Describe the graph transformation: $f(x) = -6^x$, $g(x) = -6^{x-3}$

34. Describe the graph transformation: $f(x) = (\frac{1}{4})^x$, $g(x) = (\frac{1}{4})^{-(x+3)}$

35. Describe the graph transformation: $f(x) = 0.4^x$, $g(x) = -0.4^x - 3$

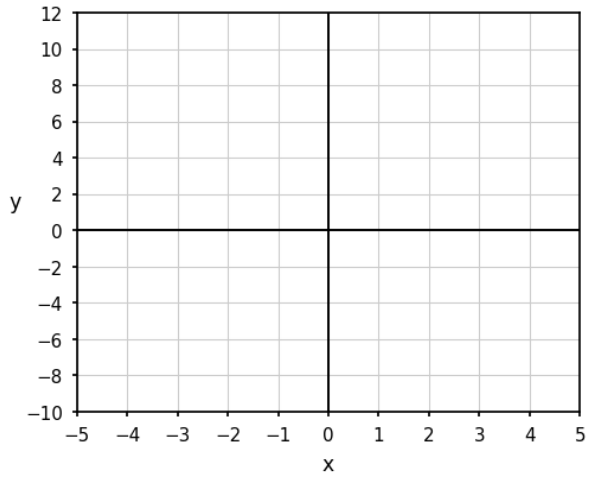
36. Graph by hand; find asymptote, intercepts, increasing/decreasing and concavity:

$g(x) = (\frac{4}{3})^x$.

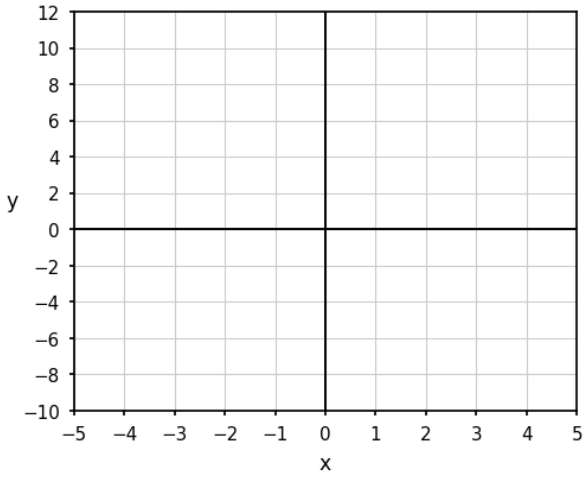


37. Graph by hand; find asymptote, intercepts, increasing/decreasing and concavity:

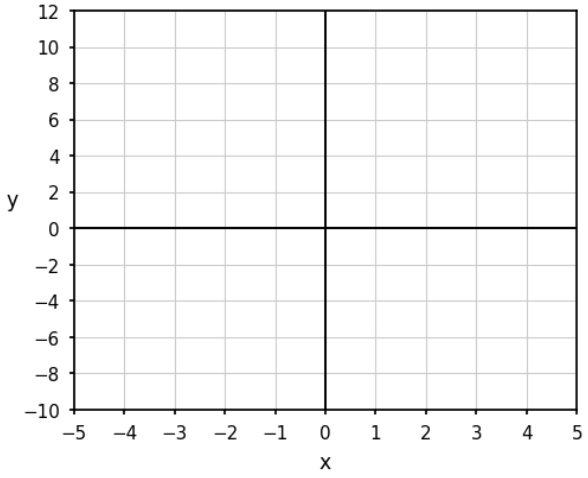
$h(x) = -4^x + 3$.



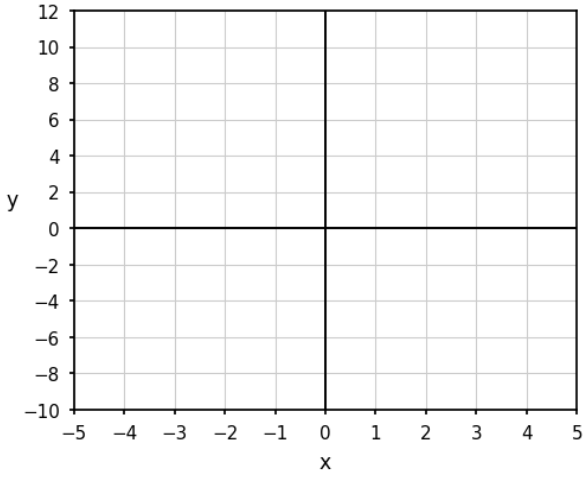
38. Graph by hand; find asymptote, intercepts, increasing/decreasing and concavity: $g(x) = (\frac{4}{3})^{-x}$.



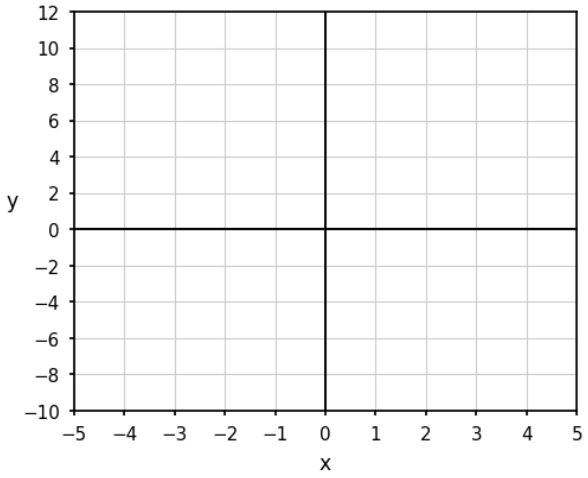
39. Graph by hand; find asymptote, intercepts, increasing/decreasing and concavity: $h(x) = -4^{-x} + 4$.



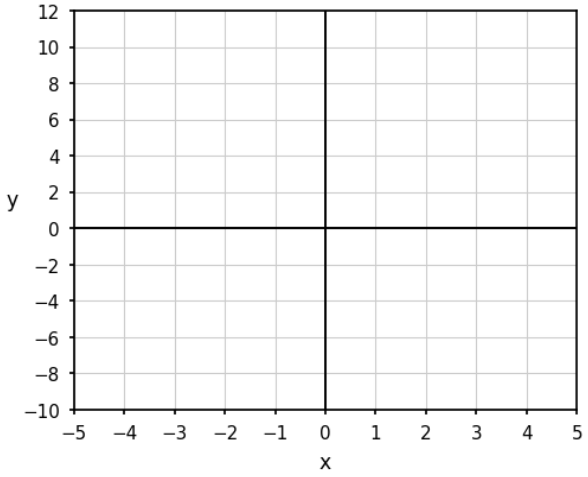
40. Rewrite in equivalent exponential form; graph; state domain, range, y-intercept, asymptote and transformations: $f(x) = 4^{x+1}$.



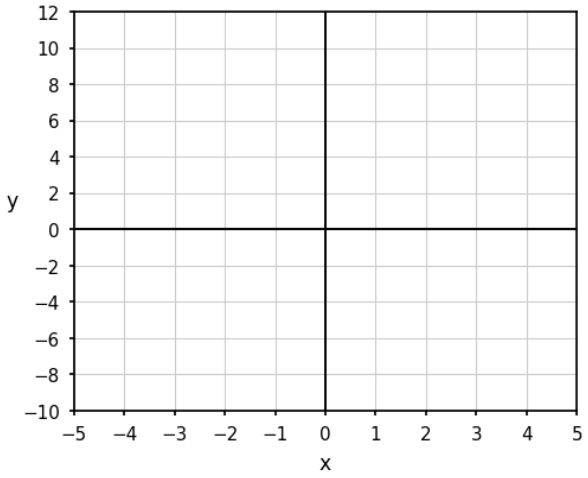
41. Rewrite in equivalent exponential form; graph; state domain, range, y-intercept, asymptote and transformations: $f(x) = -\left(\frac{1}{4}\right)^{-(x+1)}$.



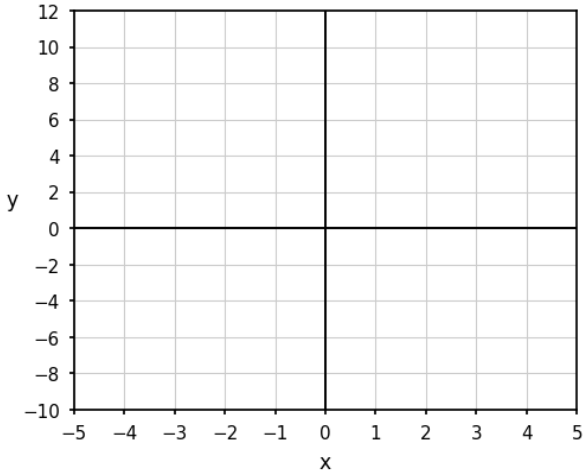
42. Graph both f and g; label each asymptote and y-intercept; state domain and range of g: $f(x) = \left(\frac{1}{4}\right)^{x}$, $g(x) = \left(\frac{1}{4}\right)^{x-1} - 3$.



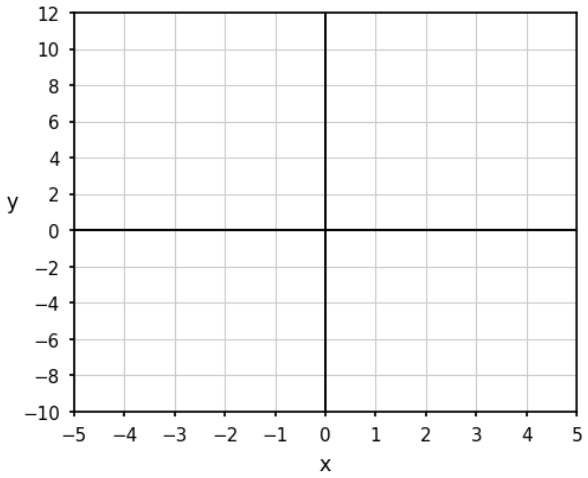
43. Graph both f and g; label each asymptote and y-intercept; state domain and range of g: $f(x) = -4^{-x}$, $g(x) = -4^{1-x} + 4$.



44. Graph both f and g; label each asymptote and y-intercept; state domain and range of g: $f(x) = 4^{-x}$, $g(x) = 4^{-3x} - 3$.



45. Graph both f and g; label each asymptote and y-intercept; state domain and range of g: $f(x) = 4^{x}$, $g(x) = -4^{x} + 3$.



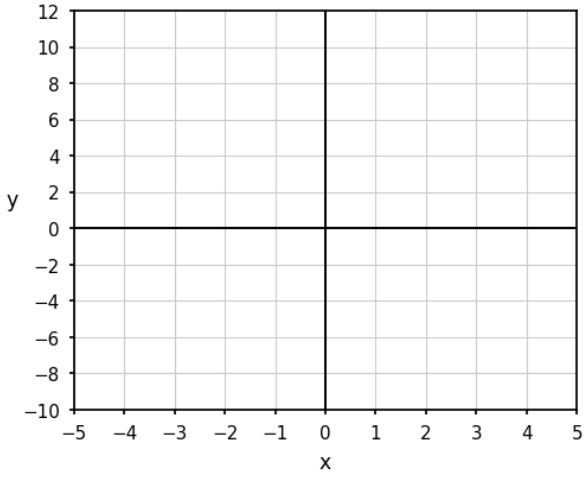
46. Given $f(x) = 4^{x}$**, write the equation and describe** $g(x) = f(x + 3)$.

47. Given $f(x) = 4^{x}$**, write the equation and describe** $g(x) = f(x) - 3$.

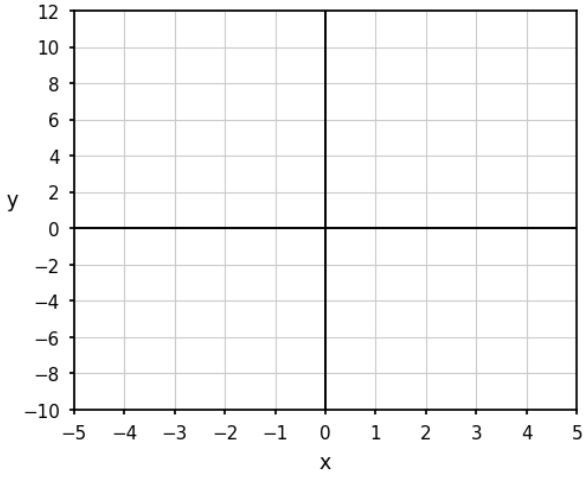
48. Given $f(x) = 4^x$, write the equation and describe $g(x) = f(-3x)$.

49. Given $f(x) = 4^x$, write the equation and describe $g(x) = -3f(x-1) + 2$.

50. Rewrite in equivalent exponential form; graph; state domain, range, y-intercept, asymptote and transformations: $f(x) = 4^{-2x}$.



51. Rewrite in equivalent exponential form; graph; state domain, range, y-intercept, asymptote and transformations: $f(x) = \left(\frac{1}{6}\right)^{-3x}$.



AP Precalculus · 2.4 | Worksheet B

Name: _____ Date: _____ Period: _____

1. Rewrite in the form ab^x: 5^{x+2}.

2. Rewrite in the form ab^x: 7^{x-2}.

3. Rewrite in the form ab^x: 5^{x+4}.

4. Rewrite in the form ab^x: 7^{x-3}.

5. Rewrite in the form ab^x: $9 \cdot 5^{x-1}$.

6. Rewrite in the form ab^x: 5^{3x}.

7. Rewrite in the form ab^x: $49^{\frac{x}{2}}$.

8. Rewrite in the form ab^x: $64^{\frac{x}{3}}$.

9. Rewrite in the form ab^x: $8 \cdot 4^{4x}$.

10. Choose an equivalent expression for $4 \cdot 25^x$. (Assume a is positive.)

A. $4 \cdot 5^{\frac{x}{2}}$ **B.** $16 \cdot 5^{2x}$ **C.** $4 \cdot 5^{2x}$ **D.** $16 \cdot 5^{\frac{x}{2}}$

11. Choose an equivalent expression for $7 \cdot 4^{3x}$. (Assume a is positive.)

A. 448^x **B.** $49 \cdot 4^x$ **C.** $49 \cdot 64^x$ **D.** $7 \cdot 64^x$

12. Choose an equivalent expression for $7 \cdot 25^{\frac{x}{2}}$. (Assume a is positive.)

A. $7 \cdot 5^x$ **B.** $35 \cdot 5^x$ **C.** $7 \cdot 25^{2x}$ **D.** $4 \cdot 5^x$

13. Choose an equivalent expression for $a^3 \cdot 49^x$. (Assume a is positive.)

A. $a \cdot 7^{2x}$ **B.** $a^3 \cdot 7^{2x}$ **C.** $a^3 \cdot 7^{\frac{x}{2}}$ **D.** $a \cdot 7^{\frac{x}{2}}$

14. Choose an equivalent expression for 5^{-3x}. (Assume a is positive.)

A. -125^x **B.** 125^x **C.** $(\frac{1}{125})^x$ **D.** $-(\frac{1}{125})^x$

15. Choose an equivalent expression for $7 \cdot 16^{\frac{x}{3}}$. (Assume a is positive.)

A. $4 \cdot (16^{\frac{1}{3}})^x$ **B.** $7 \cdot 4^x$ **C.** $7 \cdot 16^{3x}$ **D.** $7 \cdot (16^{\frac{1}{3}})^x$

16. Describe the transformation(s): $f(x) = 5^x$, $g(x) = \frac{f(x)}{15625}$.

17. Describe the transformation(s): $f(x) = 5^x$, $g(x) = 625 \cdot f(x)$.

18. Describe the transformation(s): $f(x) = 5^x$, $g(x) = (f(x))^{-1}$.

19. Describe the transformation(s): $f(x) = 5^x$, $g(x) = 125^x$.

20. Describe the transformation(s): $f(x) = 5^x$, $g(x) = (f(x))^{-4}$.

21. Describe the transformation(s): $f(x) = 125^x$, $g(x) = 5^x$.

22. Describe the transformation(s): $f(x) = 5^x$, $g(x) = -5f(x)$.

23. Describe the transformation(s): $f(x) = 5^x$, $g(x) = -\frac{f(x)}{25}$.

24. Evaluate exactly: $h(x) = 4 \cdot 5^{\frac{x}{2}}$, **find** $h(1)$.

25. Evaluate exactly: $h(x) = 7 \cdot 5^{\frac{x}{5}}$, **find** $h(2)$.

26. Evaluate exactly: $h(x) = 4 \cdot 7^{\frac{x}{3}}$, **find** $h(-2)$.

27. Evaluate exactly: $h(x) = 7 \cdot 4^{\frac{x}{5}}$, **find** $h(-1)$.

28. Calculator: evaluate $f(x) = 5^x$ **at** $x = -\pi$. **Round to three decimals.**

29. Calculator: evaluate $f(x) = 6.2^x$ **at** $x = 8.3$. **Round to three decimals.**

30. Calculator: evaluate $f(x) = 4.1^{-2x}$ **at** $x = -\sqrt{3}$. **Round to three decimals.**

31. Calculator: evaluate $f(x) = 3.3^{-x}$ **at** $x = \frac{1}{3}$. **Round to three decimals.**

32. Describe the graph transformation: $f(x) = 5^x$, $g(x) = 5^x + 4$

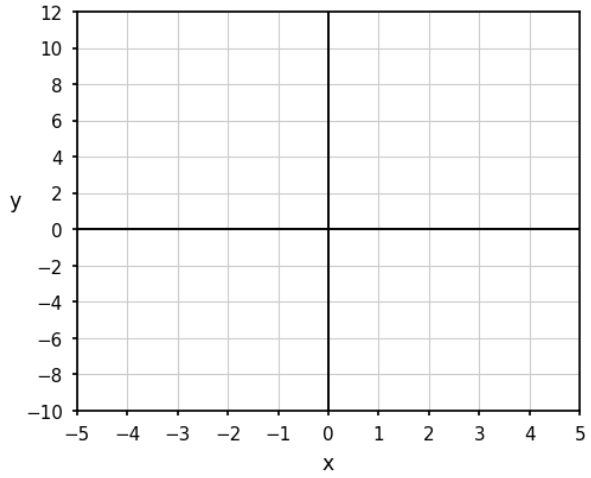
33. Describe the graph transformation: $f(x) = -7^x$, $g(x) = -7^{x-4}$

34. Describe the graph transformation: $f(x) = (\frac{1}{5})^x$, $g(x) = (\frac{1}{5})^{-(x+4)}$

35. Describe the graph transformation: $f(x) = 0.5^x$, $g(x) = -0.5^x - 4$

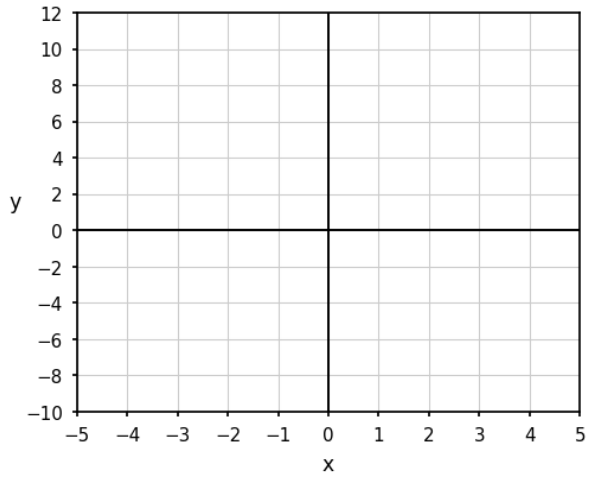
36. Graph by hand; find asymptote, intercepts, increasing/decreasing and concavity:

$g(x) = (\frac{5}{4})^x$.

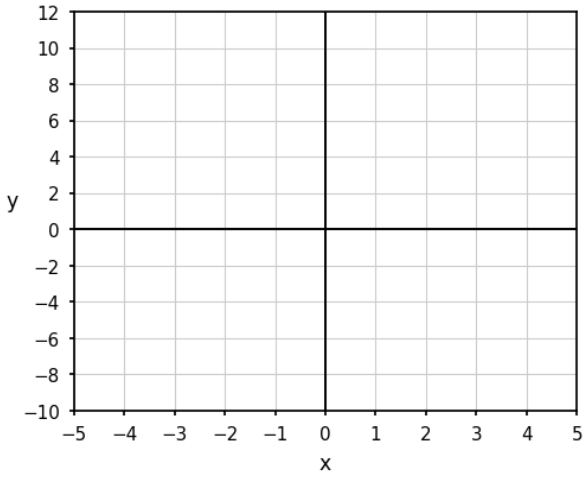


37. Graph by hand; find asymptote, intercepts, increasing/decreasing and concavity:

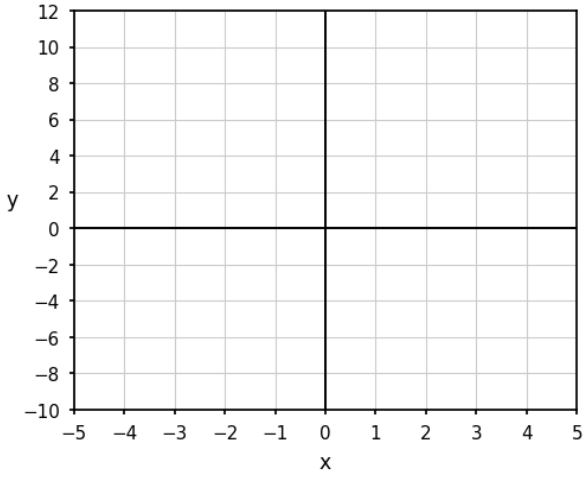
$h(x) = -5^x + 4$.



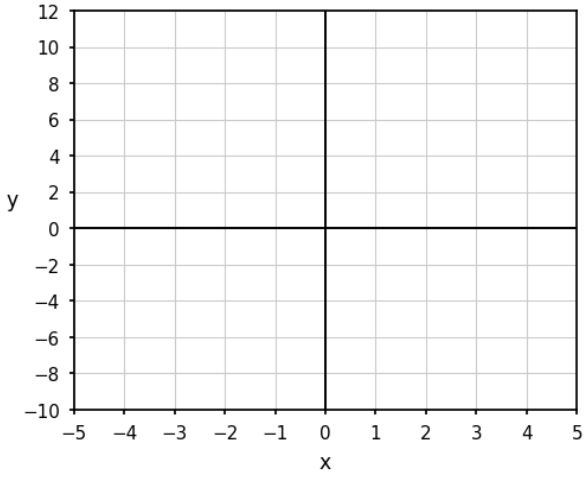
38. Graph by hand; find asymptote, intercepts, increasing/decreasing and concavity: $g(x) = (\frac{5}{4})^{-x}$.



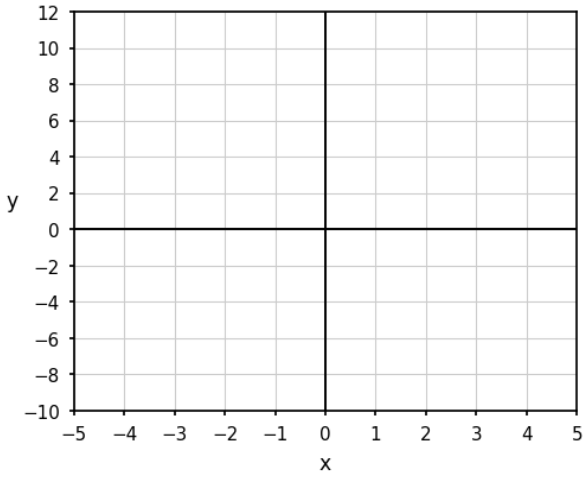
39. Graph by hand; find asymptote, intercepts, increasing/decreasing and concavity: $h(x) = -5^{-x} + 5$.



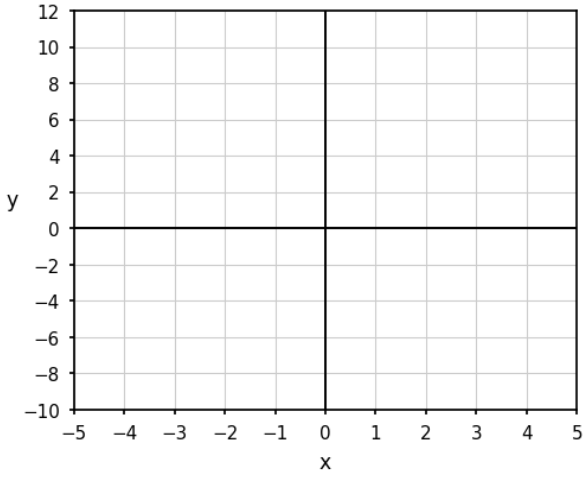
40. Rewrite in equivalent exponential form; graph; state domain, range, y-intercept, asymptote and transformations: $f(x) = 5^{x+1}$.



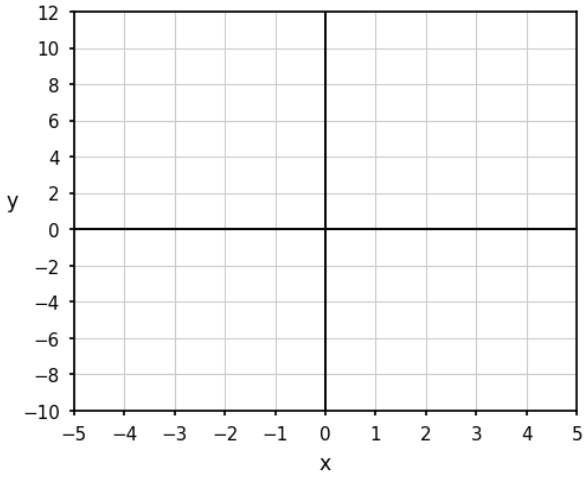
41. Rewrite in equivalent exponential form; graph; state domain, range, y-intercept, asymptote and transformations: $f(x) = -\left(\frac{1}{5}\right)^{-(x+1)}$.



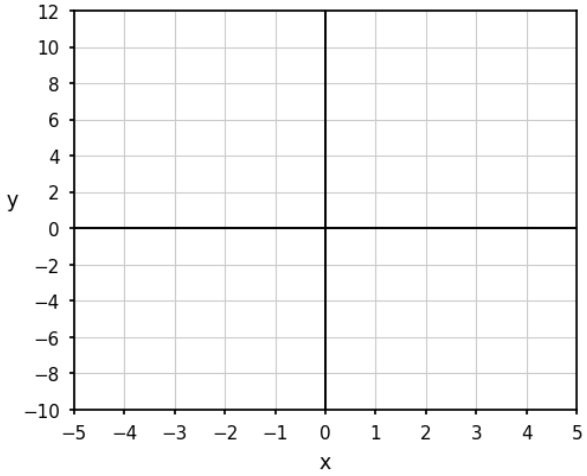
42. Graph both f and g; label each asymptote and y-intercept; state domain and range of g: $f(x) = \left(\frac{1}{5}\right)^{x}$, $g(x) = \left(\frac{1}{5}\right)^{x-1} - 4$.



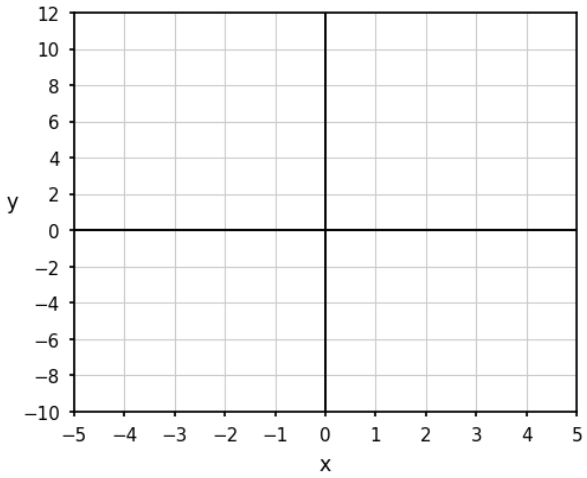
43. Graph both f and g; label each asymptote and y-intercept; state domain and range of g: $f(x) = -5^{-x}$, $g(x) = -5^{1-x} + 5$.



44. Graph both f and g; label each asymptote and y-intercept; state domain and range of g: $f(x) = 5^{-x}$, $g(x) = 5^{-3x} - 4$.



45. Graph both f and g; label each asymptote and y-intercept; state domain and range of g: $f(x) = 5^{x}$, $g(x) = -5^{x} + 4$.



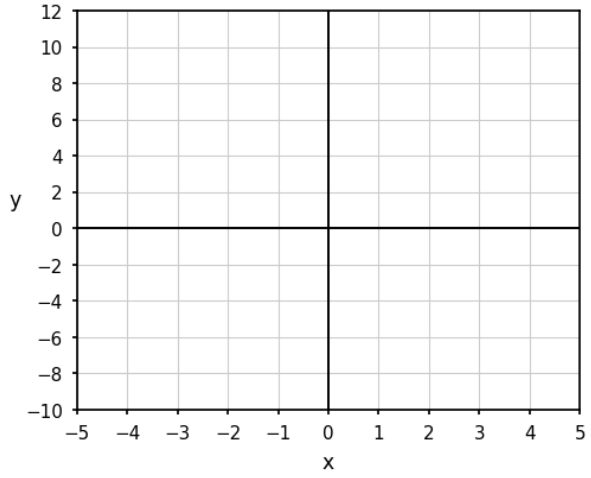
46. Given $f(x) = 5^{x}$**, write the equation and describe** $g(x) = f(x + 4)$.

47. Given $f(x) = 5^{x}$**, write the equation and describe** $g(x) = f(x) - 4$.

48. Given $f(x) = 5^x$, write the equation and describe $g(x) = f(-3x)$.

49. Given $f(x) = 5^x$, write the equation and describe $g(x) = -4f(x-1) + 2$.

50. Rewrite in equivalent exponential form; graph; state domain, range, y-intercept, asymptote and transformations: $f(x) = 5^{-2x}$.



51. Rewrite in equivalent exponential form; graph; state domain, range, y-intercept, asymptote and transformations: $f(x) = \left(\frac{1}{7}\right)^{-3x}$.

