Chapter 12, Form A

1. If $f(x) = 2x^2 + 1$ and $g(x) = 3x - 2$, find $f[g(x)]$.

1. _____

2. If $f(x) = 4x - 3$, find the following

   a) $f^{-1}(x)$

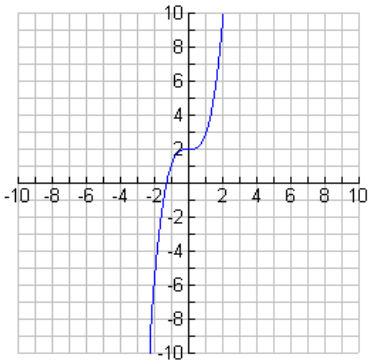
   b) Verify that $f[f^{-1}(x)]$ and $f^{-1}[f(x)] = x$

2. a)_____

   b)_____

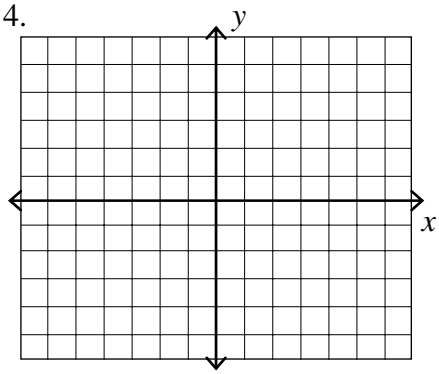
3. Below is the graph of a function f. On the same set of axes, sketch the graph of f^{-1}.

3. _____



4. Sketch the graph of $y = 3^{x-2}$.

4.



5. Solve $3^{6-3x} = \frac{1}{27}$ for x.

5. _____

6. Solve $4^{2x+1} = 1024$ for x. 6. _____

7. A sum of \$2500 is invested at 8% compounded quarterly. 7. a)_____

   a) Find the amount in the account after 4 years. b)_____

   b) Find the number of years until there is \$9500 in the account. Round to the nearest tenth of a year.

8. The half-life of a certain radioactive substance is 9 years. Suppose that at time $t = 0$, there are 28 grams of the substance. Then after t years, the number of grams of the substance remaining will be $N(t) = 28(0.5)^{\frac{t}{18}}$. How many grams remain after 27 years? 8. _____

9. The population P in a certain country is given by the model $P = 2{,}300{,}000e^{0.04t}$ where t is the time in years. How many people will the country have after 3 years? 9. _____

For Exercises 10–11, convert the logarithm into exponential form.

10. $\log_5 625 = 4$ 10. _____

11. $\log_8 \frac{1}{64} = -2$ 11. _____

For Exercises 12 – 14, find the exact solution of each equation.

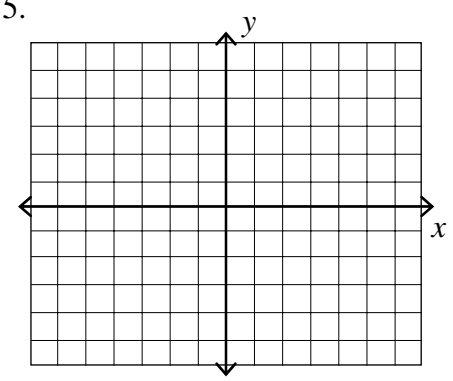
12. $\log_2 \frac{1}{32} = x$ 12. _____

13. $\log_x 16 = 4$ 13. _____

14. $\log_x 0.0001 = -4$ 14. _____

15. Graph $y = \log_3 x$.

15.



For Exercises 16 and 17, write as a sum or difference of multiples of logarithms.

16. $\log_5 \dfrac{8x^3}{yz^2}$ 16. _____

17. $\log_4 x^3 \sqrt[5]{y^2}$ 17. _____

For Exercises 18 and 19, write as a single logarithm.

18. $\dfrac{1}{5}\log_3 x - 2\log_3 y$ 18. _____

19. $3\log_5 x - \log_5 y + 4\log_5 z$ 19. _____

For Exercises 22–24, solve each equation for x. Approximate to four decimal places.

20. $e^{2x} = 8$ 20. _____

21. $5^{3-x} = 27$ 21. _____

22. $22^x = 85$ 22. _____

23. $\log_2 x + \log_2 (x - 8) = 2$ 23. _____

24. $\log_2 (x + 3) - \log_2 x = 2$ 24. _____

25. The number of reports of a certain virus has increased exponentially since 1960. The current number of cases can be approximated using the function $r(t) = 387e^{0.006t}$ where t is the number of years since 1960. Estimate the number of cases in the year 2000.

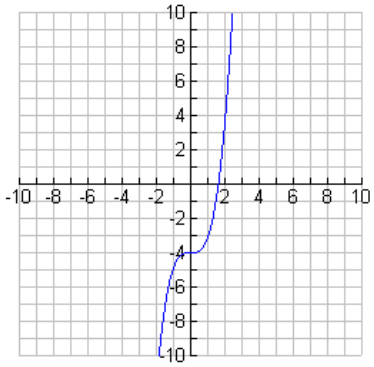
25. _____

Chapter 12, Form B

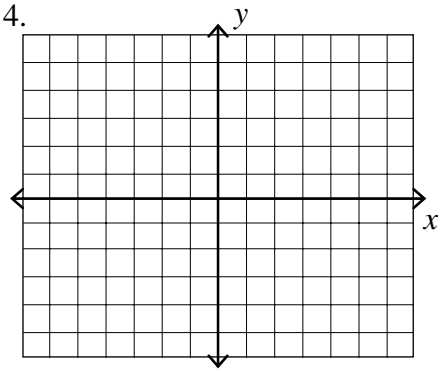
1. If $f(x) = x^2 - 2$ and $g(x) = 5x - 3$, find $f[g(x)]$. 1. _____

2. If $f(x) = 4x - 7$, find the following 2. a)_____
   a) $f^{-1}(x)$ b)_____
   b) Verify that $f[f^{-1}(x)]$ and $f^{-1}[f(x)] = x$

3. Below is the graph of a function f. On the same set of axes, sketch the graph of f^{-1}. 3. _____



4. Sketch the graph of $y = 3^x - 1$. 4.



5. Solve $4^x = 16$ for x. 5. _____

6. Solve $4^{5-3x} = \frac{1}{256}$ for x. 6. _____

7. A sum of $4500 is invested at 8% compounded monthly.
   a) Find the amount in the account after 8 years.
   b) Find the number of years until there is $9000 in the account. Round to the nearest tenth of a year.

7. a)_____
   b)_____

8. Strontium 90 is a radioactive substance that decays exponentially at 2.8% per year. Suppose there are originally 600 grams of strontium 90.
   a) Find the number of grams left after 60 years?
   b) What is the half-life of strontium 90?

8. a)_____
   b)_____

9. Assume the cost of a car is $22,000. With continuous compounding in effect, find the number of years it would take to double the cost of a car at an annual inflation rate of 3.6%. Round to the nearest hundredth.

9. _____

For Exercises 10–11, convert the logarithm into exponential form.

10. $\log_5 125 = 3$

10. _____

11. $\log_3 \frac{1}{81} = -4$

11. _____

For Exercises 12 – 14, find the exact solution of each equation.

12. $\log_2 \frac{1}{64} = x$

12. _____

13. $\log_x 64 = 3$

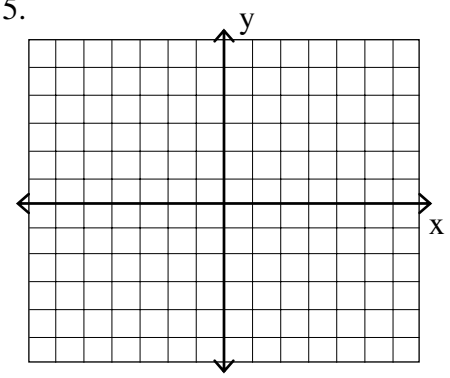
13. _____

14. $\log_x \frac{1}{32} = -5$

14. _____

15. Graph $y = \log_2 x$.

15.



For Exercises 16 and 17, write as a sum or difference of multiples of logarithms.

16. $\log_6 \dfrac{5x^2}{4y^3}$ 16. _____

17. $\log_5 6x^3y^2\sqrt{z}$ 17. _____

For Exercises 18 and 19, write as a single logarithm.

18. $3\log_2 x + 6\log_2 y - \dfrac{1}{5}\log_2 z$ 18. _____

19. $5\log_6 x - 2\log_6 y - \log_6 (z + 3)$ 19. _____

For Exercises 22–24, solve each equation for x. Approximate to four decimal places.

20. $e^{6x} = 5$ 20. _____

21. $2^x = 10$ 21. _____

22. $5^{4x-7} = 13$ 22. _____

23. $\log_2 (x + 3) + \log_2 (x - 3) = 4$ 23. _____

24. $\log (x + 5) - \log (x - 2) = \log 6$ 24. _____

25. An economist predicts that the buying power $B(x)$ of a dollar x years from now will be given by the formula $B(x) = 0.78^x$. How much will today's dollar be worth in 4 years? Round your answer to the nearest cent.

25. _____

Chapter 12, Form C

1. If $f(x) = 2x^2 - 1$ and $g(x) = 3x - 4$, find $f[g(x)]$.

1. _____

2. If $f(x) = 2x - 3$, find the following

   a) $f^{-1}(x)$

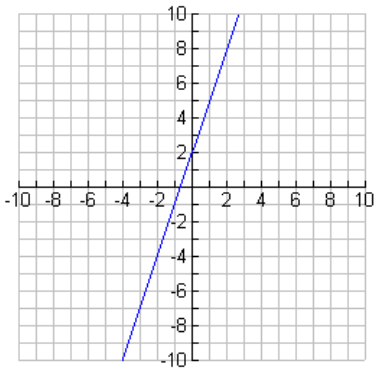
   b) Verify that $f[f^{-1}(x)]$ and $f^{-1}[f(x)] = x$

2. a)_____

   b)_____

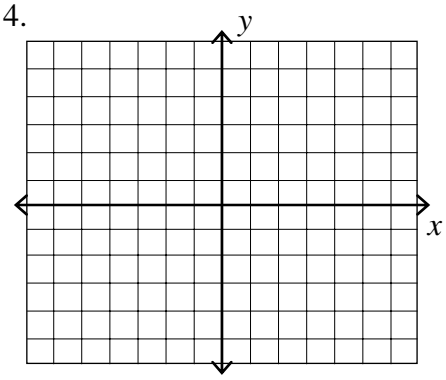
3. Below is the graph of a function f. On the same set of axes, sketch the graph of f^{-1}.

3. _____



4. Sketch the graph of $y = 3^x + 1$.

4.



5. Solve $4^x = 256$ for x.

5. _____

6. Solve $2^{7-3x} = 4$ for x.

6. _____

7. A sum of $9000 is invested at 7.8% compounded continuously.
   a) Find the amount in the account after 5 years.
   b) Find the number of years until there is $44,400 in the account. Round your answer to the nearest hundredth of a year.

7. a)_____
   b)_____

8. A computer is purchased for $4100. Its value each year is about 75% of the value for the preceding year. Its value in dollars, after t years is given by the exponential function $V(t)=4100(0.75)^t$. What is the value of the computer after 4 years?

8. _____

9. The number of books in a small library increases according to the function $B(t) = 3600e^{0.05t}$, where t is measured in years. How many books will the library have after 10 years?

9. _____

For Exercises 10–11, convert the logarithm into exponential form.

10. $\log_8 512 = 3$

10. _____

11. $\log_6 \frac{1}{216} = -3$

11. _____

For Exercises 12 – 14, find the exact solution of each equation.

12. $\log_7 \frac{1}{49} = x$

12. _____

13. $\log_x 125 = -3$

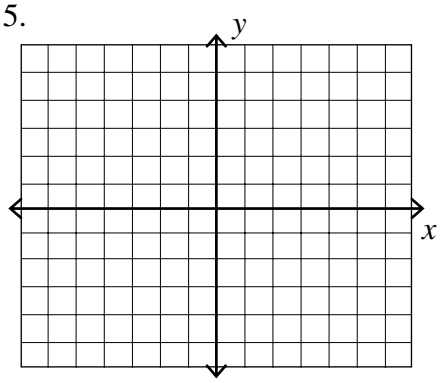
13. _____

14. $\log_x \frac{1}{144} = -2$

14. _____

15. Graph $y = \log_5 x$.

15.



For Exercises 16 and 17, write as a sum or difference of multiples of logarithms.

16. $\log_4 \dfrac{2x^3}{5y^2}$ 16. _____

17. $\log_3 x^4 y^2 \sqrt{z}$ 17. _____

For Exercises 18 and 19, write as a single logarithm.

18. $\dfrac{1}{4}\log_5 x - 2\log_5 y + 4\log_5 z$ 18. _____

19. $4\log_3 x - \dfrac{2}{3}\log_3 y$ 19. _____

For Exercises 22–24, solve each equation for x. Approximate to four decimal places.

20. $e^{-0.06x} = 0.12$ 20. _____

21. $7^x = 12$ 21. _____

22. $12^{x-1} = 30$ 22. _____

23. $\log_9 (x - 7) + \log_9 (x - 7) = 1$ 23. _____

24. $\log (x + 5) - \log (x - 2) = \log 2$ 24. _____

25. How long will it take for $2800 to grow to $36,500 at an interest rate of 7.8% if the interest rate is compounded quarterly? Round to the nearest hundredth of a year.

25. _____

1. If $f(x) = \dfrac{5}{x-8}$ and $g(x) = \dfrac{7}{3x}$, find $f[g(x)]$.

1. _____

2. If $f(x) = \sqrt[3]{4x-2}$, find the following

   a) $f^{-1}(x)$

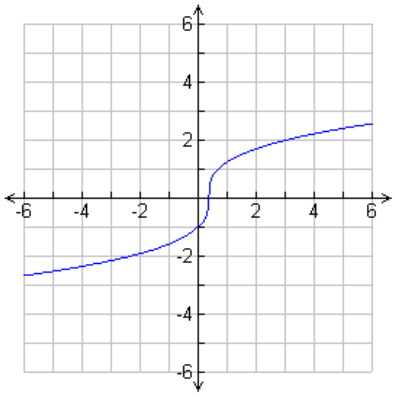
   b) Verify that $f[f^{-1}(x)]$ and $f^{-1}[f(x)] = x$

2. a)_____

   b)_____

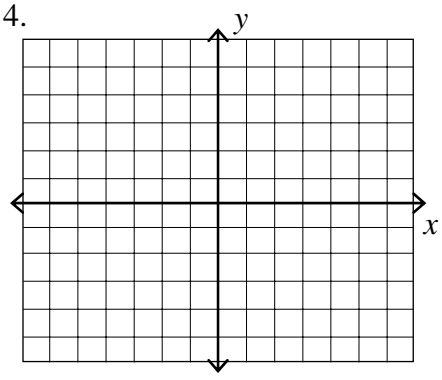
3. Below is the graph of a function f. On the same set of axes, sketch the graph of f^{-1}.

3. _____



4. Sketch the graph of $y = 3^{-2x-1}$.

4.



5. Solve $3^{1+2x} = 27$ for x.

5. _____

6. Solve $\left(\dfrac{25}{4}\right)^{x+1} = \left(\dfrac{2}{5}\right)^{x-1}$ for x.

6. _____

7. A sum of \$5600 is invested at 1.6% compounded continuously.
   a) Find the amount in the account after 10 years.
   b) Find the number of years until there is \$28,100 in the account. Round to the nearest hundredth of a year.

7. a)_____
   b)_____

8. The half-life of a certain radioactive substance is 24 years. Suppose that at time $t = 0$, there are 20 grams of the substance. Then after t years, the number of grams of the substance remaining will be $N(t) = 20(0.5)^{\frac{t}{48}}$. How many grams remain after 72 years? Round to the nearest hundredth of a gram.

8. _____

9. Assume the cost of a car is \$19,000. With continuous compounding in effect, find the number of years it would take to double the cost of a car at an annual inflation rate of 9.4%. Round to the nearest hundredth.

9. _____

For Exercises 10–11, convert the logarithm into exponential form.

10. $\log_7 2401 = 4$

10. _____

11. $\log_5 \sqrt{5} = \frac{1}{2}$

11. _____

For Exercises 12 – 14, find the exact solution of each equation.

12. $\log_4 x = -4$

12. _____

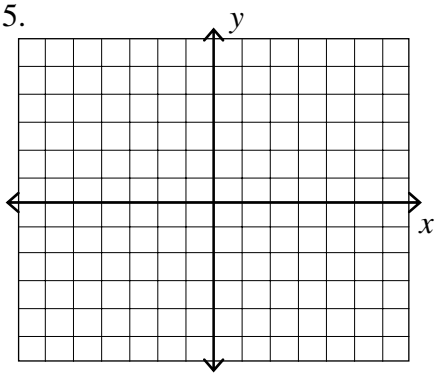
13. $\log_x 0.00001 = -5$

13. _____

14. $\log_x \frac{1}{32} = -5$

14. _____

15. Graph $y = \log_{\frac{1}{2}} x$.

15. 

For Exercises 16 and 17, write as a sum or difference of multiples of logarithms.

16. $\log_3 \dfrac{5x^4}{6y^2}$ 16. _____

17. $\log_2 5x^3 y^2 \sqrt[4]{z}$ 17. _____

For Exercises 18 and 19, write as a single logarithm.

18. $\dfrac{2}{3}\log_6 z - 3\log_6 y - \dfrac{3}{4}\log_6 x$ 18. _____

19. $4\log_5 x - 8\log_5 y - \dfrac{1}{2}\log_5 z$ 19. _____

For Exercises 22–24, solve each equation for x. Approximate to four decimal places.

20. $e^{5.9x} = 12.27421$ 20. _____

21. $10^{1-x} = 18$ 21. _____

22. $7^{2x} = 5^{x+1}$ 22. _____

23. $\ln(5x - 4) + \ln(x - 1) = \ln 4$ 23. _____

24. $\log(x + 10) - \log(x + 4) = \log x$ 24. _____

25. The number of reports of a certain virus has increased exponentially since 1960. The current number of cases can be approximated using the function $r(t) = 162e^{0.006t}$ where t is the number of years since 1960. Estimate the number of cases in the year 2000.

25. _____

ELEMENTARY & INTERMEDIATE ALGEBRA Name:

Chapter 12, Form E

1. If $f(x) = 6 - 2x$ and $g(x) = 5x + 9$, find $g[f(x)]$ 1. _____

   (a) $-10x + 24$ (b) $-10x - 12$ (c) $x + 39$ (d) $-10x + 39$

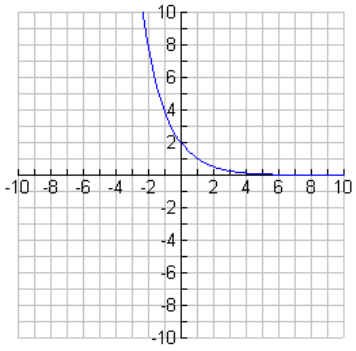
2. If $f(x) = -\frac{1}{5}x + 2$, find the following $f^{-1}(x)$. 2. _____

   (a) $-5x + 10$ (b) $-5x - 10$ (c) $5x - 2$ (d) $5x - 10$

3. If $(2, -4)$ lies on the graph of $f(x)$, which of the following points lie on the graph of its inverse $f^{-1}(x)$? 3. _____

   (a) $(-4, -2)$ (b) $(-2, 4)$ (c) $(4, -2)$ (d) $(-4, 2)$

4. Match the graph below with its equation. 4. _____



   (a) $y = -2^x$ (b) $y = 2^{1-x}$ (c) $y = -2^{-x}$ (d) $y = 2^{x-1}$

5. Solve $4^{2x+1} = 64$ for x. 5. _____

   (a) -1 (b) 1 (c) 4 (d) 16

6. Solve $3^{6-3x} = \frac{1}{27}$ for x. 6. _____

   (a) -3 (b) $\frac{1}{9}$ (c) 3 (d) 9

7. A sum of \$4500 is invested at 8% compounded monthly. Find the amount in the account after 8 years. 7. _____

   (a) \$4745.68 (b) \$7276.87 (c) \$8329.19 (d) \$8516.06

8. If \$7000 is invested at 7% compounded continuously, determine the balance in the account after 4 years. 8. _____

   (a) \$8960 (b) \$9175.57 (c) \$9261.91 (d) \$16,261.91

9. Strontium-90 (Sr^{90}) has a half-life of 28.1 years. Write a function to model the amount of Strontium-90 after t years if the initial amount present is 1000 grams. 9. _____

(a) $A = 1000e^{0.0281}$ (c) $A = 500e^{-0.693}$

(b) $A = 1000e^{-0.693}$ (d) $A = 500e^{-0.0281}$

For Exercises 10–11, convert the logarithm into exponential form.

10. Write in exponential form: $\log_x 16 = 4$ 10. _____

(a) $4^x = 16$ (b) $x^4 = 16$ (c) $16^x = 4$ (d) $16^4 = x$

11. Write in exponential form: $\ln x = \sqrt{7}$ 11. _____

(a) $x = \sqrt{7}$ (b) $e^x = \sqrt{7}$ (c) $\left(\sqrt{7}\right)^x = y$ (d) $e^{\sqrt{7}} = x$

For Exercises 12 – 14, find the exact solution of each equation.

12. Solve $\log_x 9 = -2$ 12. _____

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) 3 (d) 81

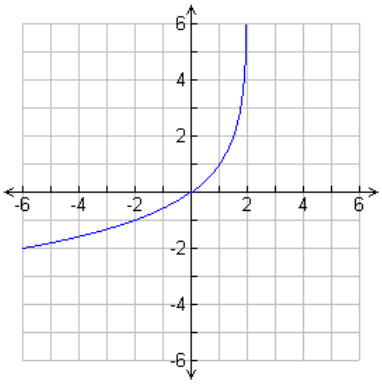
13. Solve $\log_{25} x = -\frac{1}{2}$ 13. _____

(a) $-\frac{1}{5}$ (b) $\frac{1}{5}$ (c) –5 (d) 5

14. Solve $\log_4 64 = x$ 14. _____

(a) 3 (b) 4 (c) 8 (d) 16

15. Match the graph below with its equation. 15. _____



(a) $y = \log_2 (x + 2)$ (c) $y = 1 - \log_2 (2 - x)$

(b) $y = 1 - \log_2 (1 - x)$ (d) $y = \log_2 (x + 2) + 1$

For Exercises 16 and 17, write as a sum or difference of multiples of logarithms and simplify.

16. $\log_a 9x^4z^2$ 16. _____

(a) $9 + \log_a x^4 + \log_a z^2$

(b) $\log_a 9 + 4\log_a x + 2\log_a z$

(c) $8\log_a 9xz$

(d) $\log_a 9 - 4\log_a x - 2\log_a z$

17. $\log_2\left(\dfrac{8\sqrt{x}}{y^2}\right)$ 17. _____

(a) 0.45

(b) $\dfrac{3 + 0.5\log_2 x}{2\log_2 y}$

(c) $\log_2 8 + \log_2 \sqrt{x} + \log_2 y^2$

(d) $3 + \dfrac{1}{2}\log_2 x - 2\log_2 y$

For Exercises 18 and 19, write as a single logarithm.

18. $3\log_a x - \log_a y$ 18. _____

(a) $\log_a\left(x^3 - y\right)$

(b) $\log_a \dfrac{x^3}{y}$

(c) $\log_a \dfrac{3x}{y}$

(d) $\log_a x^3 \div \log_a y$

19. $\log_b x^6 - 2\log_b \sqrt{x}$ 19. _____

(a) $\log_b x^5$

(b) $\dfrac{\log_b x^6}{\log_b x}$

(c) $\log_b x^7$

(d) $\log_b\left(x^6 - x\right)$

For Exercises 20 – 24, solve each equation for x. Approximate to four decimal places.

20. $e^{-2x} = 0.5$ 20. _____

(a) –0.0920 (b) –0.2500 (c) 0.3466 (d) 3.6945

21. $9^x = 6^{x+1}$ 21. _____

(a) –10.0471 (b) 0.2263 (c) 1.2851 (d) 4.4190

22. $2^{x-1} = 5$ 22. _____

(a) 3.3219 (b) 0.5693 (c) -1.3219 (d) 1.4307

23. $\log_4(x-3) + \log_4(x-3) = 1$ 23. _____

(a) $-5, 5$ (b) 5 (c) $\sqrt{10}$ (d) $\pm\sqrt{10}$

24. $\log(x+10) - \log(x+4) = \log x$ 24. _____

(a) $-5, 2$ (b) $-2, 5$ (c) 2 (d) 6

25. The number of reports of a certain virus has increased exponentially since 1960. The current number of cases can be approximated using the function $r(t) = 387e^{0.006t}$ where t is the number of years since 1960. Estimate the number of cases in the year 2000. 25. _____

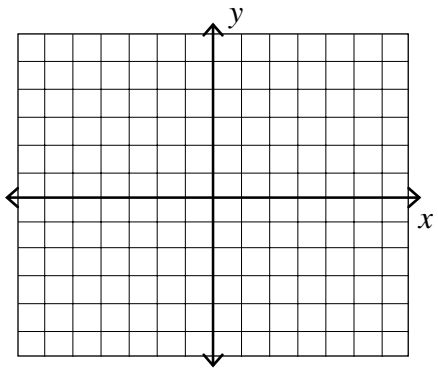
(a) 369 (b) 463 (c) 492 (d) 984

For Exercises 1–2, find:

a) the direction the parabola opens.
b) the coordinates of the vertex.
c) the equation of the axis of symmetry. Draw the graph.

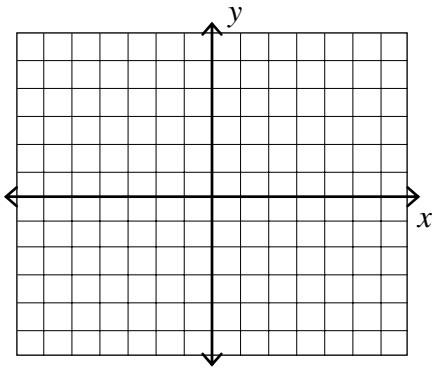
1. $y = -2(x+1)^2 - 3$

1. a)_____
   b)_____
   c)_____



2. $x = (y+3)^2 - 1$

2. a)_____
   b)_____
   c)_____

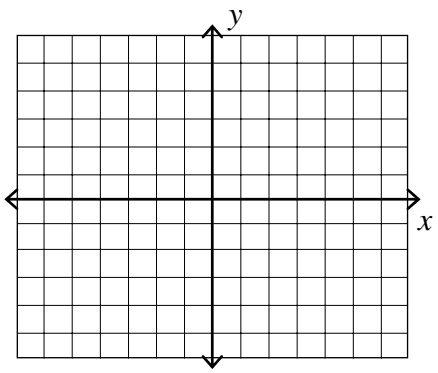


3. Given $y = -2x^2 + 4x + 1$. Find the direction the parabola opens, the coordinates of the vertex, and the equation of the axis of symmetry. Draw the graph.

3. a)_____

b)_____

c)_____



4. Find the distance between the points whose coordinates are (–2, 3) and (4, –5).

4. _____

5. Find the distance between the points whose coordinates are (–3, 5) and (–5, –5).

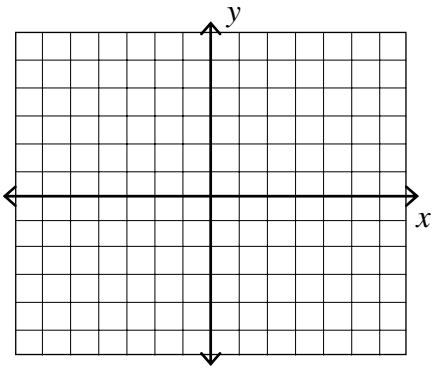
5. _____

For Exercises 6 and 7, find the center and radius. Draw the graph.

6. $(x+3)^2 + (y-1)^2 = 9$

6. _____

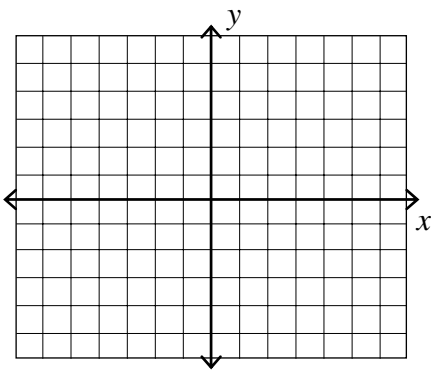
_____



7. $x^2 + y^2 - 10x - 8y - 23 = 0$

7. _____

_____



8. Write the equation of the circle with center (7, 6) and passes through the point (5, 4).

8. _____

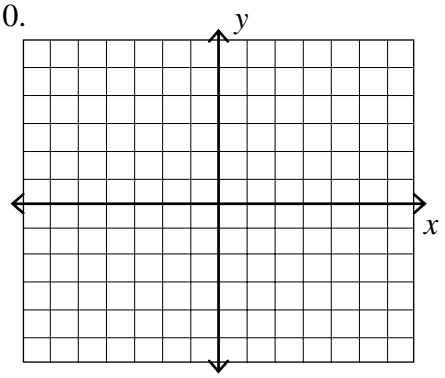
9. Write the equation of the circle with center (4, 0) and passes through the point (2, –4).

9. _____

For Exercises 10–13, sketch the graph of each equation.

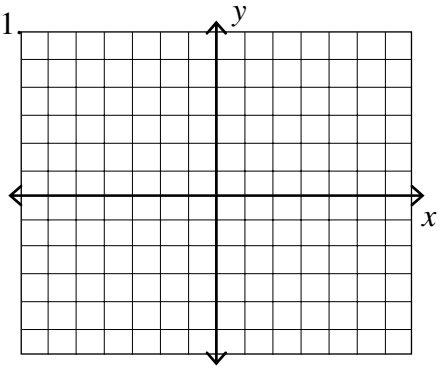
10. $\frac{x^2}{25} + \frac{y^2}{16} = 1$

10.



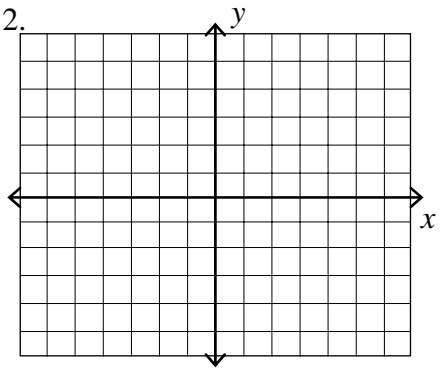
11. $\frac{x^2}{9} - \frac{y^2}{4} = 1$

11.



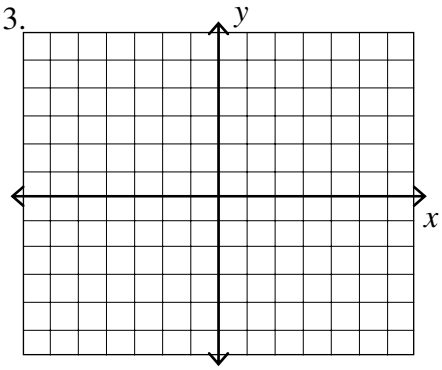
12. $16x^2 + 4y^2 = 64$

12.



13. $9x^2 - 4y^2 = 36$

13.



For Exercises 14–18, find the solution set of each system of equations.

14. $\begin{cases} y = 7x - x^2 \\ 2x - y = -6 \end{cases}$

14. _____

15. $\begin{cases} x^2 + y^2 = 85 \\ x - y = 1 \end{cases}$

15. _____

16. $\begin{cases} 4x^2 - 36y^2 = 144 \\ 4x^2 + 16y^2 = 64 \end{cases}$

16. _____

17. $\begin{cases} 3x^2 + 4y^2 = 76 \\ 4x^2 - 3y^2 = -32 \end{cases}$

17. _____

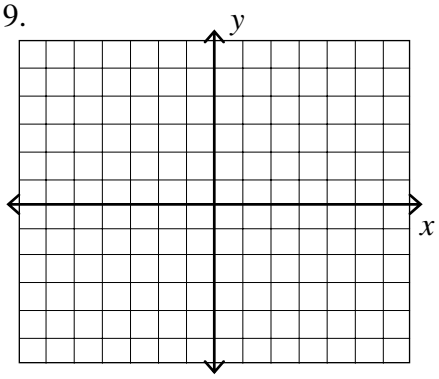
18. $\begin{cases} 4x^2 + 3y^2 = 19 \\ x^2 - 3y^2 = 1 \end{cases}$

18. _____

For Exercises 19–21, draw the graph.

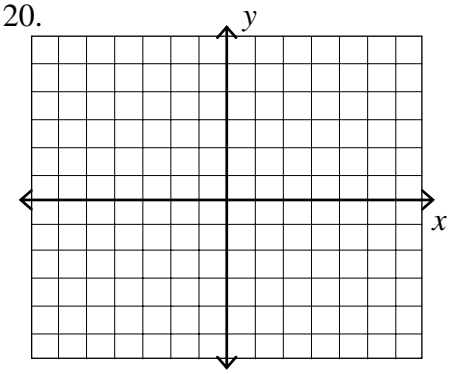
19. $x^2 < 4y$

19.



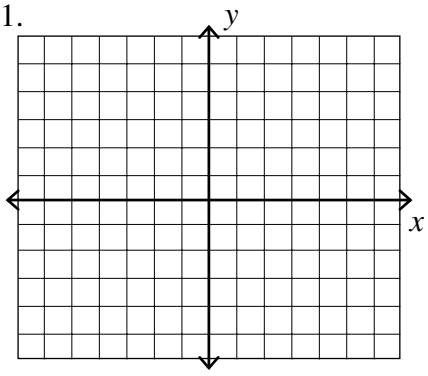
20. $\frac{x^2}{4} + \frac{y^2}{9} \geq 1$

20.



21. $\frac{x^2}{4} + \frac{y^2}{9} \leq 1$

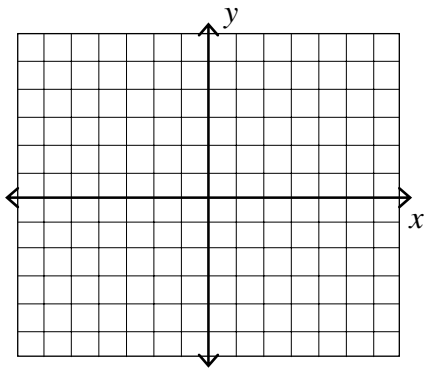
21.



For Exercise 22 and 23, graph the solution set for the following system of inequalities.

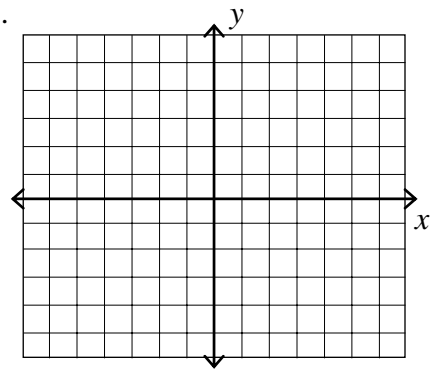
22. $\begin{cases} x^2 + y^2 > 1 \\ \dfrac{x^2}{4} + y^2 \geq 1 \end{cases}$

22.



23. $\begin{cases} y^2 - x^2 > 1 \\ x^2 + y^2 > 9 \end{cases}$

23.



24. An arch is in the shape of a parabola and is 40 feet high and 100 feet wide at the base. If the vertex is placed at the origin, find the equation of the parabola.

24. _____

25. A bridge has an arch in the shape of a half-ellipse. If the arch has a width of 30 feet and a height of 10 feet, what is the equation of the ellipse?

25. _____

ELEMENTARY & INTERMEDIATE ALGEBRA Name:

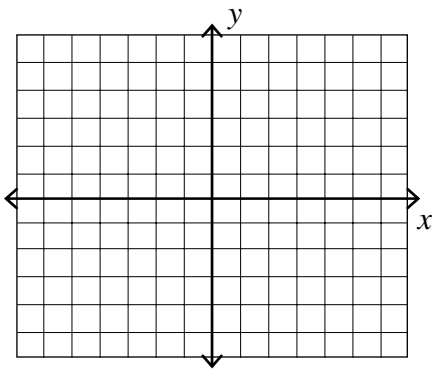
Chapter 13, Form B

For Exercises 1–2, find:

a) the direction the parabola opens.
b) the coordinates of the vertex.
c) the equation of the axis of symmetry. Draw the graph.

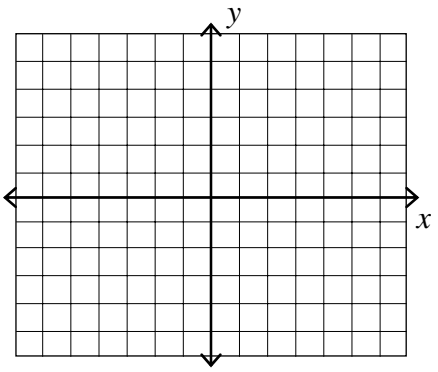
1. $y = (x-4)^2 - 6$

1. a)_____
   b)_____
   c)_____



2. $x = 2(y+1)^2 - 7$

2. a)_____
   b)_____
   c)_____

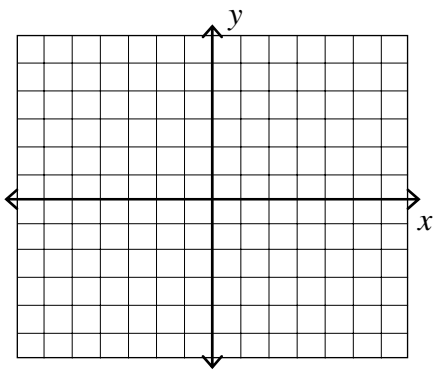


3. Given $x = y^2 - 6y - 6$. Find the direction the parabola opens, the coordinates of the vertex, and the equation of the axis of symmetry. Draw the graph.

3. a)_____

b)_____

c)_____



4. Find the distance between the points whose coordinates are (–6, 2) and (–2, 2).

4. _____

5. Find the distance between the points whose coordinates are (–4, –5) and (5, –2).

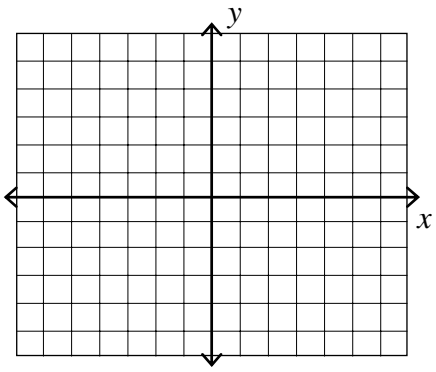
5. _____

For Exercises 6 and 7, find the center and radius. Draw the graph.

6. $(x-5)^2 + (y+2)^2 = 1$

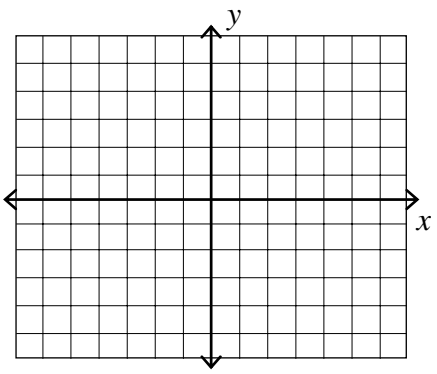
6. _____

_____



7. $x^2 + y^2 - 2x + 4y - 20 = 0$

7. _____



8. Write the equation of the circle with center (3, 2) and passes through the point (15, 17).

8. _____

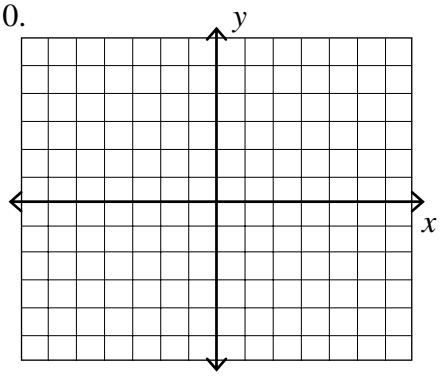
9. Write the equation of the circle with center (–3, –2) and passes through the point (13, 10).

9. _____

For Exercises 10–13, sketch the graph of each equation.

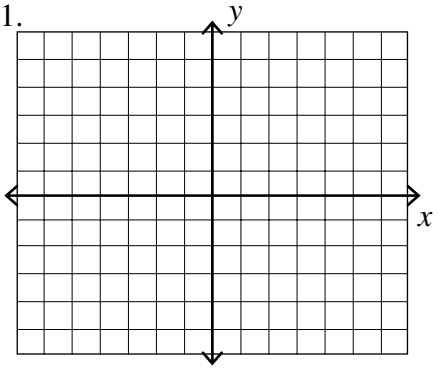
10. $\frac{x^2}{4} + \frac{y^2}{9} = 1$

10.



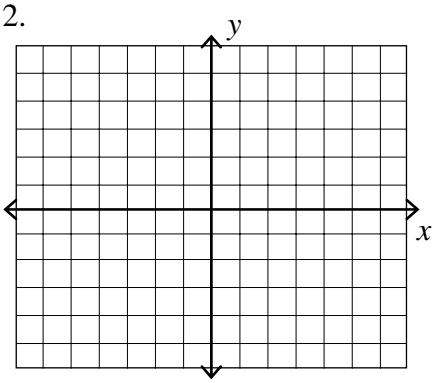
11. $\frac{x^2}{4} - \frac{y^2}{25} = 1$

11.



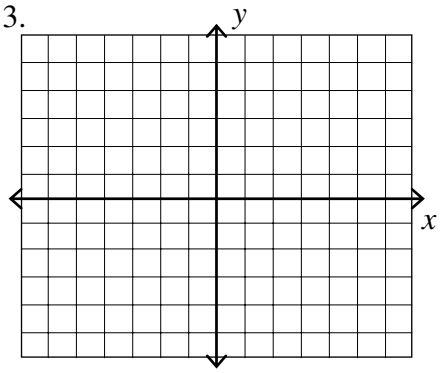
12. $25y^2 + 9x^2 = 225$

12.



13. $9y^2 - 4x^2 = 36$

13.



For Exercises 14–18, find the solution set of each system of equations.

14. $\begin{cases} y = 2 - x^2 \\ x^2 + y^2 = 4 \end{cases}$

14. _____

15. $\begin{cases} x^2 + 4y^2 = 73 \\ x + y = 7 \end{cases}$

15. _____

16. $\begin{cases} x^2 - y^2 = 19 \\ x^2 + y^2 = 181 \end{cases}$

16. _____

17. $\begin{cases} 5x^2 - 2y^2 = -13 \\ 3x^2 + 4y^2 = 39 \end{cases}$

17. _____

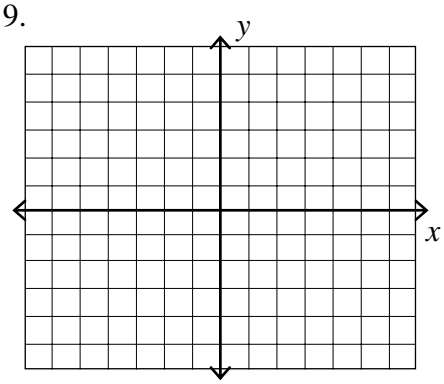
18. $\begin{cases} x^2 + 2y^2 = 6 \\ 2x^2 - y^2 = 7 \end{cases}$

18. _____

For Exercises 19–21, draw the graph.

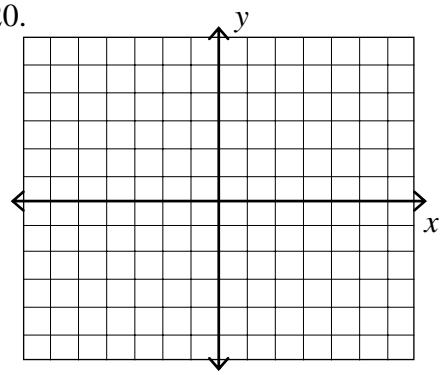
19. $y < (x-2)^2 + 1$

19.



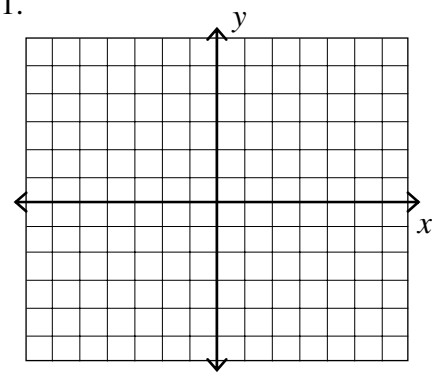
20. $\frac{x^2}{4} + \frac{y^2}{9} \geq 1$

20.



21. $\frac{x^2}{16} - \frac{y^2}{4} \geq 1$

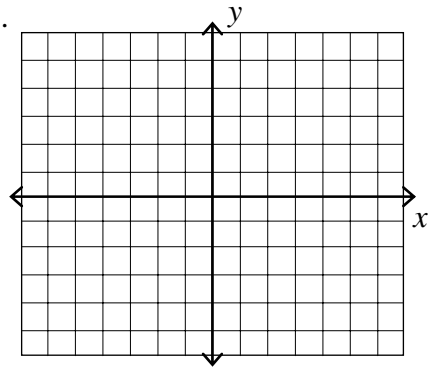
21.



For Exercise 22 and 23, graph the solution set for the following system of inequalities.

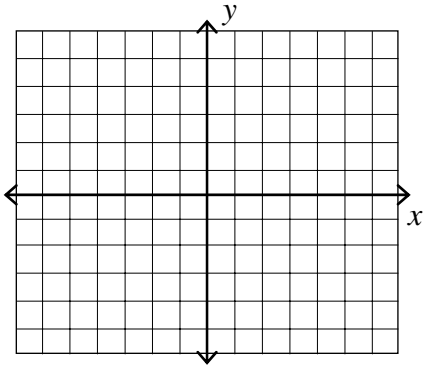
22. $\begin{cases} x^2 - y^2 \geq 1 \\ x^2 + 4y \leq 16 \end{cases}$

22.



23. $\begin{cases} x^2 + y^2 > 1 \\ x^2 + y^2 < 16 \end{cases}$

23.



24. An arch is in the shape of a parabola and is 40 feet high and 32 feet wide at the base. If the vertex is placed at the origin, find the equation of the parabola.

24. _____

25. The path of a planet with an elliptical orbit has a length of 200 miles and a height of 160 miles. What is the equation of the path of the planet?

25. _____

ELEMENTARY & INTERMEDIATE ALGEBRA Name:

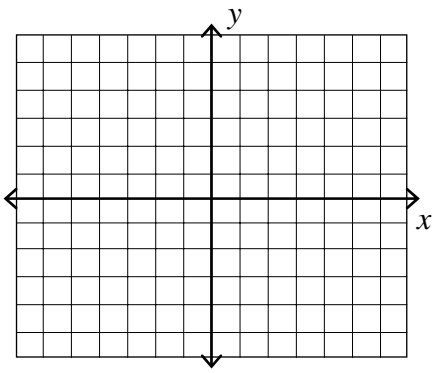
Chapter 13, Form C

For Exercises 1–2, find:

a) the direction the parabola opens.
b) the coordinates of the vertex.
c) the equation of the axis of symmetry. Draw the graph.

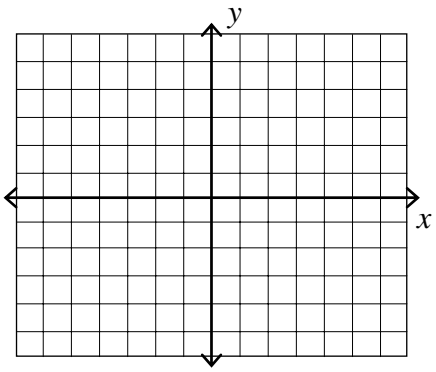
1. $y = -3(x+1)^2 - 2$

1. a)_____
   b)_____
   c)_____



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

2. a)_____
   b)_____
   c)_____

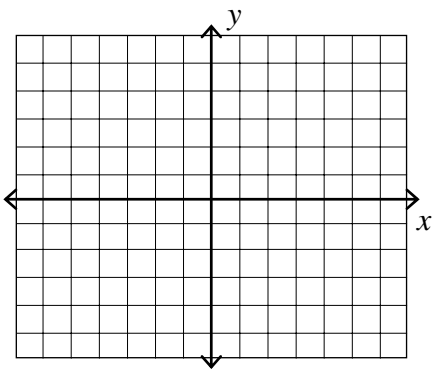


3. Given $y = x^2 + 2x - 4$. Find the direction the parabola opens, the coordinates of the vertex, and the equation of the axis of symmetry. Draw the graph.

3. a)_____

b)_____

c)_____



4. Find the distance between the points whose coordinates are (5, 3) and (–4, 3).

4. _____

5. Find the distance between the points whose coordinates are (1, 7) and (6, 0).

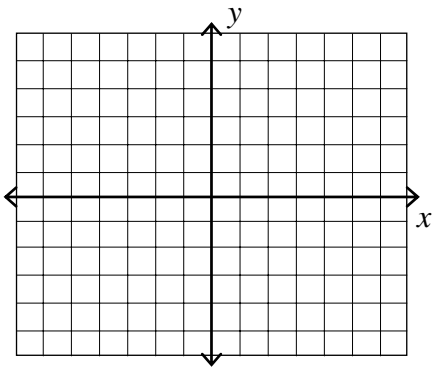
5. _____

For Exercises 6 and 7, find the center and radius. Draw the graph.

6. $(x-5)^2 + (y-3)^2 = 16$

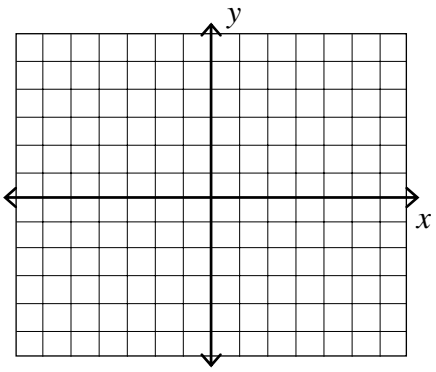
6. _____

_____



7. $x^2 + y^2 - 2x + 4y - 4 = 0$

7. _____



8. Write the equation of the circle with center (–3, 7) and passes through the point (4, 0).

8. _____

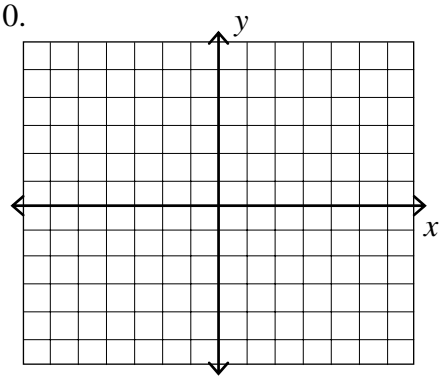
9. Write the equation of the circle with center (–5, 0) and passes through the point (6, –3).

9. _____

For Exercises 10–13, sketch the graph of each equation.

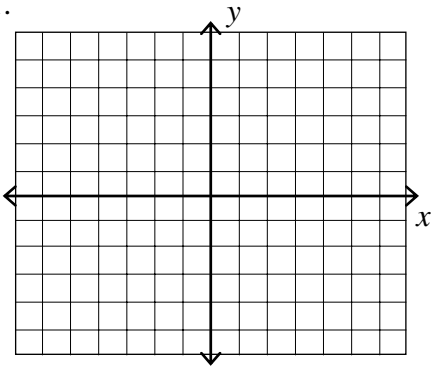
10. $\frac{x^2}{1} + \frac{y^2}{9} = 1$

10.



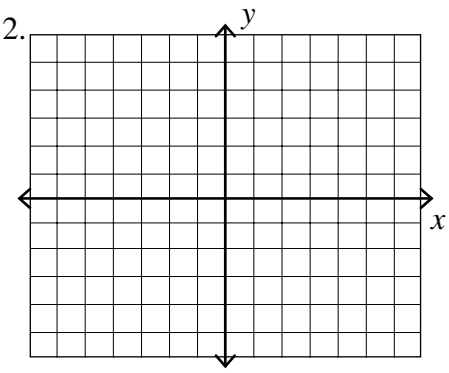
11. $\frac{x^2}{25} - \frac{y^2}{4} = 1$

11.



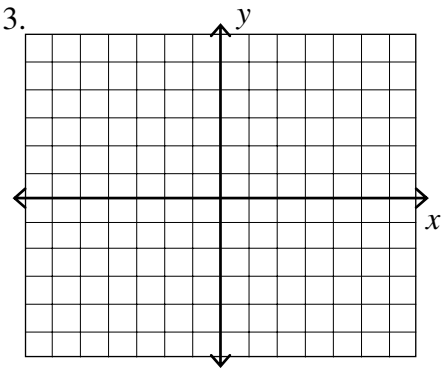
12. $25y^2 + 4x^2 = 100$

12.



13. $9y^2 - 4x^2 = 36$

13.



For Exercises 14–18, find the solution set of each system of equations.

14. $\begin{cases} y = x^2 - 5 \\ 3x + 2y = 10 \end{cases}$

14. _____

15. $\begin{cases} x^2 + y^2 = 4 \\ x - 2y = 4 \end{cases}$

15. _____

16. $\begin{cases} x + 2y = 3 \\ x^2 + y^2 = 9 \end{cases}$

16. _____

17. $\begin{cases} 4x^2 + 9y^2 = 36 \\ 2x^2 - 9y^2 = 18 \end{cases}$

17. _____

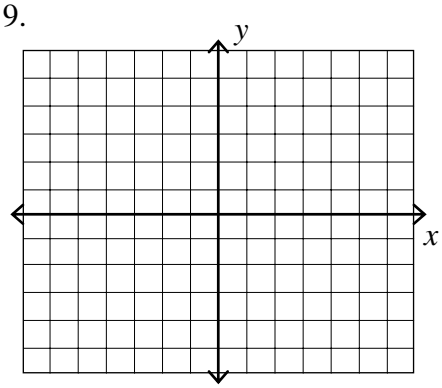
18. $\begin{cases} -4x^2 + y^2 = 12 \\ 8x^2 + 2y^2 = -8 \end{cases}$

18. _____

For Exercises 19–21, draw the graph.

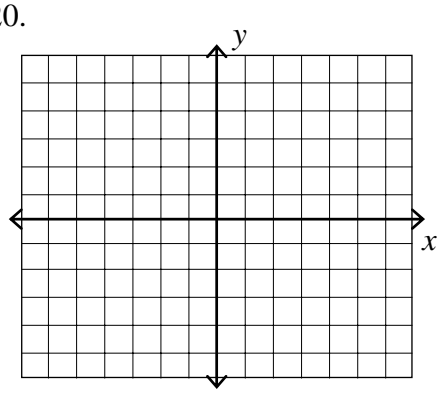
19. $4x^2 < y^2 - 16$

19.



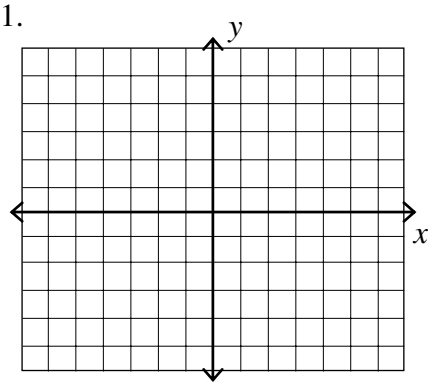
20. $\frac{y^2}{16} - \frac{x^2}{9} \geq 1$

20.



21. $y < (x-2)^2 + 1$

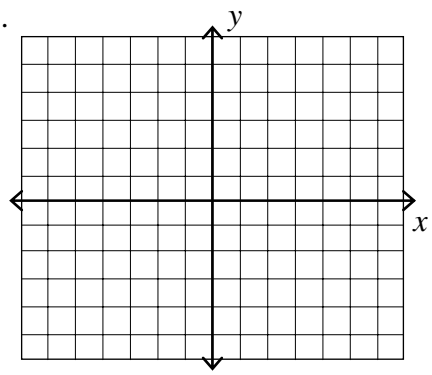
21.



For Exercise 22 and 23, graph the solution set for the following system of inequalities.

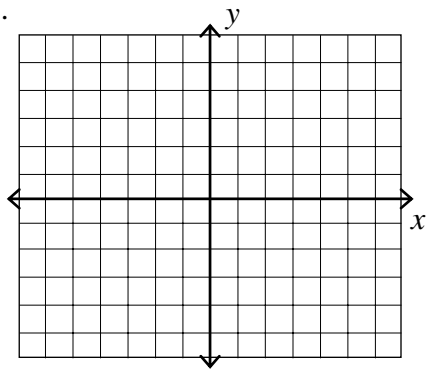
22. $\begin{cases} x^2 - y^2 < 1 \\ x^2 + 16y^2 \le 16 \end{cases}$

22.



23. $\begin{cases} y^2 - x^2 > 1 \\ x^2 + y^2 > 9 \end{cases}$

23.



24. The path of a fly ball is in the shape of a parabola and is 100 feet high and 60 feet from home plate. Find the equation of the parabola.

24. _____

25. An oval track is elliptical in shape has a length of 120 yards and a width of 80 yards. Write an equation of the track that has its center at the origin?

25. _____

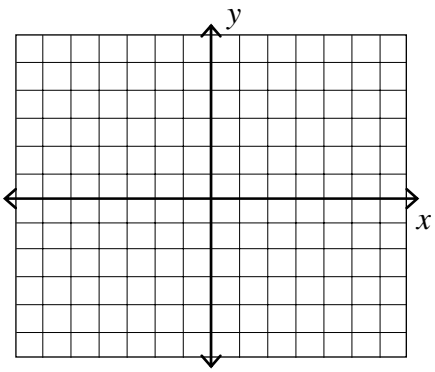
Chapter 13, Form D

For Exercises 1–2, find:

a) the direction the parabola opens.
b) the coordinates of the vertex.
c) the equation of the axis of symmetry. Draw the graph.

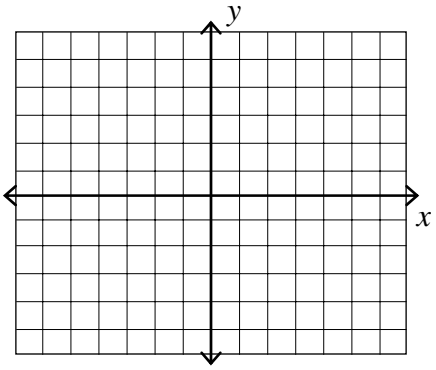
1. $y = -3(x-1)^2 + 1$

1. a)_____
   b)_____
   c)_____



2. $x = 5(y+4)^2 - 7$

2. a)_____
   b)_____
   c)_____

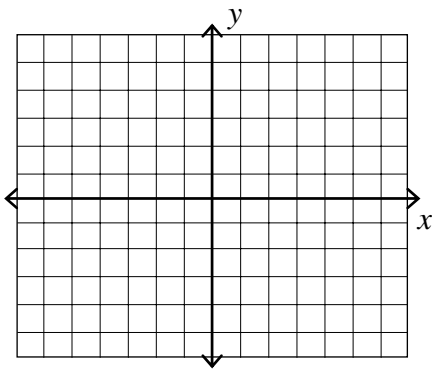


3. Given $y = x^2 + 6x + 10$. Find the direction the parabola opens, the coordinates of the vertex, and the equation of the axis of symmetry. Draw the graph.

3. a)_____

b)_____

c)_____



4. Find the distance between the points whose coordinates are (–5, –2) and (–6, –6).

4. _____

5. Find the distance between the points whose coordinates are (–6, 3) and (–8, –7).

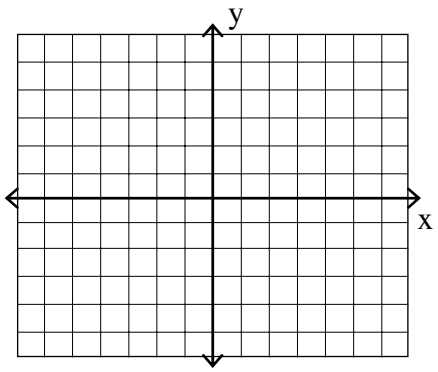
5. _____

For Exercises 6 and 7, find the center and radius. Draw the graph.

6. $(x-2)^2 + (y-4)^2 = 9$

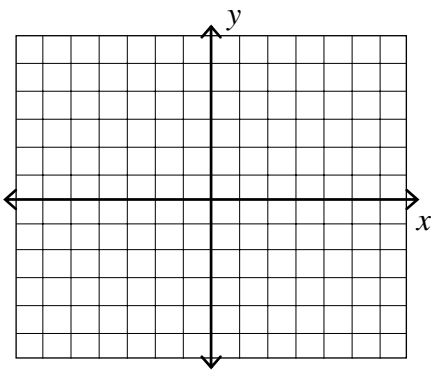
6. _____

_____



7. $x^2 + y^2 - 4x - 8y - 2 = 0$

7. _____



8. Write the equation of the circle with center (1, 0) and passes through the point (0, –2).

8. _____

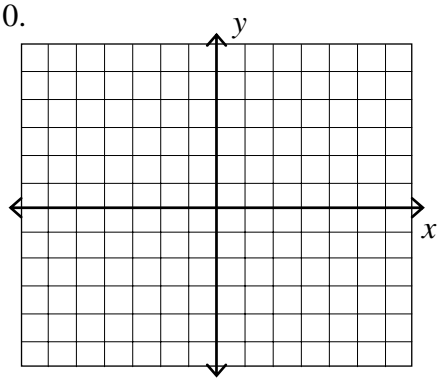
9. Write the equation of the circle with center (–3, –4) and passes through the point (–3, 0).

9. _____

For Exercises 10–13, sketch the graph of each equation.

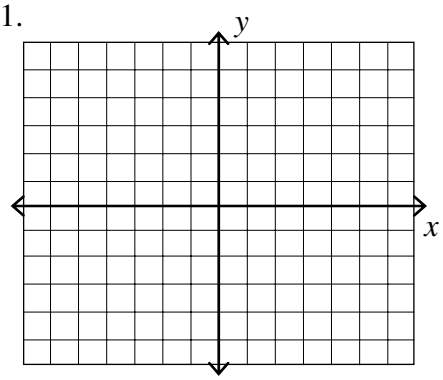
10. $\frac{x^2}{16} + \frac{y^2}{9} = 1$

10.



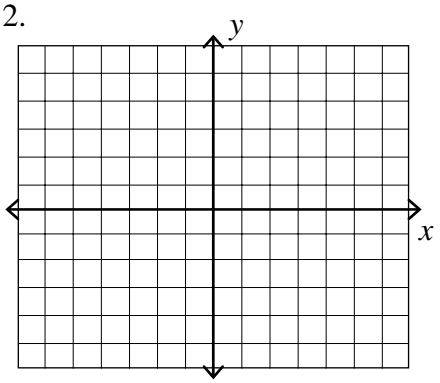
11. $\frac{x^2}{4} - \frac{y^2}{9} = 1$

11.



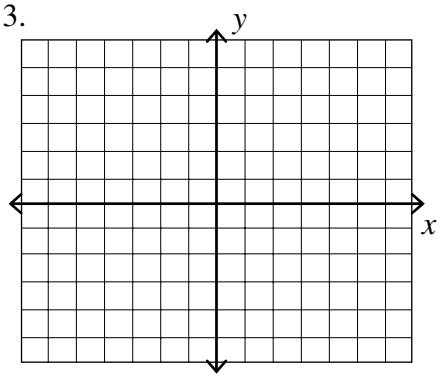
12. $9y^2 - 4x^2 = 36$

12.



13. $9x^2 - 4y^2 = 36$

13.



For Exercises 14–18, find the solution set of each system of equations.

14. $\begin{cases} 3x + 9 = y \\ x^2 + y^2 = 9 \end{cases}$

14. _____

15. $\begin{cases} 4x^2 - 2y^2 = 2 \\ -x^2 + y^2 = 2 \end{cases}$

15. _____

16. $\begin{cases} 2x^2 + 4y^2 = 14 \\ x^2 - 6y^2 = 19 \end{cases}$

16. _____

17. $\begin{cases} x^2 + y^2 = 25 \\ x^2 - 2y^2 = -2 \end{cases}$

17. _____

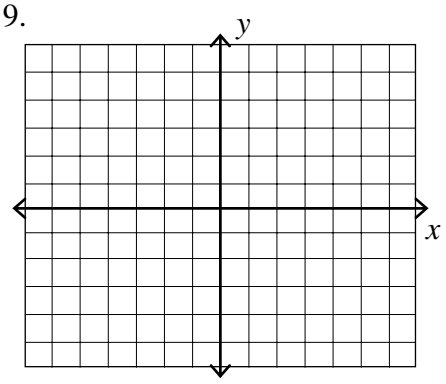
18. $\begin{cases} 5x^2 + 4y^2 = 15 \\ -2x^2 - 3y^2 = -6 \end{cases}$

18. _____

For Exercises 19–21, draw the graph.

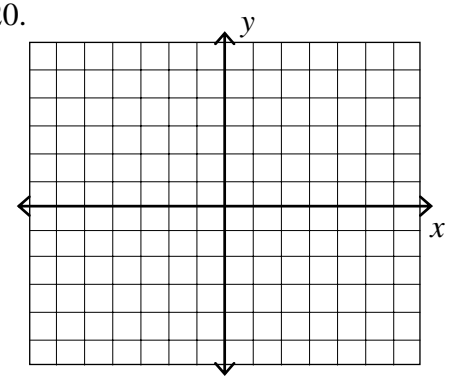
19. $y^2 < 4x$

19.



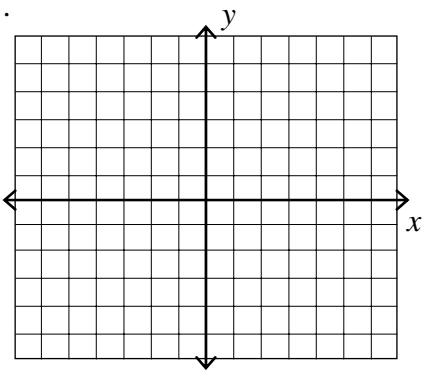
20. $x^2 - \frac{y^2}{9} \geq 1$

20.



21. $\frac{x^2}{4} + \frac{y^2}{9} \leq 1$

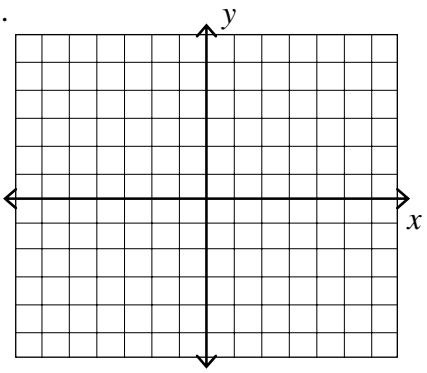
21.



For Exercise 22 and 23, graph the solution set for the following system of inequalities.

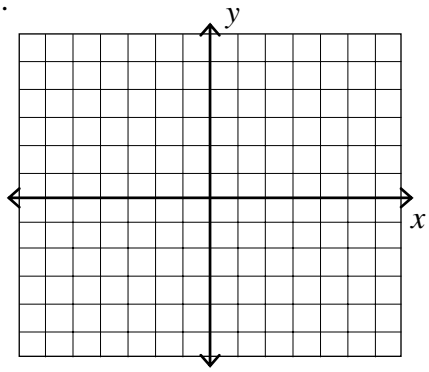
22. $\begin{cases} x^2 - y^2 \geq 1 \\ x^2 + y^2 \leq 16 \end{cases}$

22.



23. $\begin{cases} x^2 - y^2 \geq 1 \\ x^2 + 4y^2 \leq 16 \end{cases}$

23.



24. The path of a fly ball is in the shape of a parabola and is 40 feet high and 180 feet from home plate. Find the equation of the parabola.

24. _____

25. An oval track is elliptical in shape has a length of 200 meters and a width of 160 meters. Write an equation of the track that has its center at the origin?

25. _____

ELEMENTARY & INTERMEDIATE ALGEBRA Name:

Chapter 13, Form E

1. Find the vertex of the parabola $-x^2+6x+8$. 1. _____

   (a) (–3, 17) (b) (3, 17) (c) (3, –17) (d) (–3, –17)

2. Find the vertex of the parabola $3x^2-6x+5$. 2. _____

   (a) (–3, –1) (b) (–1, 2) (c) (1, 2) (d) (2, 1)

3. Find the equation of the parabola with vertex (–1, 3) that passes through (2, 1). 3. _____

   (a) $y=\frac{4}{9}(x+1)^2+3$ (c) $y=-2(x-1)^2+3$

   (b) $y=-\frac{2}{9}(x+1)^2+3$ (d) $y=-2x^2-4x-2$

4. A circle centered at (0, 0) passes through point (2, –4). Its radius is: 4. _____

   (a) $\sqrt{20}$ (b) $4\sqrt{5}$ (c) $5\sqrt{2}$ (d) $2\sqrt{5}$

5. A circle centered at (3, 1) passes through point (2, 5). Its radius is: 5. _____

   (a) $\sqrt{17}$ (b) $\sqrt{61}$ (c) $\sqrt{15}$ (d) $\sqrt{5}$

6. A circle centered at (0, 0) passes through point (0, 3). Its equation is: 6. _____

   (a) $x^2+y^2=3$ (c) $x^2+y^2=9$

   (b) $x^2+y^2=6$ (d) $x^2+y^2=81$

7. A circle centered at (–9, 4) passes through point (–8, 1). Its equation is: 7. _____

   (a) $(x+9)^2+(y-4)^2=100$ (c) $(x+9)^2+(y-4)^2=10$

   (b) $(x-9)^2+(y+4)^2=10$ (d) $(x-9)^2+(y+4)^2=100$

8. Find the equation of a circle with a center at (2, 4) and a radius = 3. 8. _____

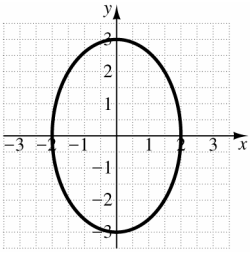
   (a) $(x-2)^2+(y-4)^2=3$ (c) $(x-2)^2+(y-4)^2=9$

   (b) $(x+2)^2-(y+4)^2=3$ (d) $(x+2)^2-(y+4)^2=9$

9. Find the center of a circle given by the equation $x^2 + y^2 - 3x + 8y - 8 = 0$ 9. _____

(a) $\left(\frac{3}{2}, -4\right)$ (b) (–3, 8) (c) $\left(-\frac{3}{2}, 4\right)$ (d) (3, –8)

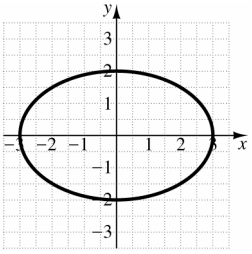
10. The equation of the graph shown is: 10. _____



(a) $\frac{x^2}{9} + \frac{y^2}{4} = 1$ (c) $\frac{y^2}{9} - \frac{x^2}{4} = 1$

(b) $\frac{y^2}{4} - \frac{x^2}{9} = 1$ (d) $\frac{x^2}{4} + \frac{y^2}{9} = 1$

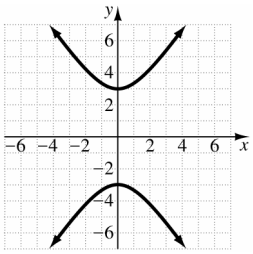
11. The equation of the graph shown is: 11. _____



(a) $\frac{x^2}{9} + \frac{y^2}{4} = 1$ (c) $\frac{y^2}{9} - \frac{x^2}{4} = 1$

(b) $\frac{y^2}{4} - \frac{x^2}{9} = 1$ (d) $\frac{x^2}{4} + \frac{y^2}{9} = 1$

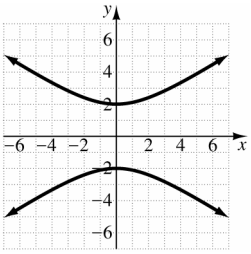
12. The equation of the graph shown is: 12. _____



(a) $\frac{x^2}{9}+\frac{y^2}{4}=1$ (c) $\frac{y^2}{9}-\frac{x^2}{4}=1$

(b) $\frac{y^2}{4}-\frac{x^2}{9}=1$ (d) $\frac{x^2}{4}+\frac{y^2}{9}=1$

13. The equation of the graph shown is: 13. _____



(a) $\frac{x^2}{9}+\frac{y^2}{4}=1$ (c) $\frac{y^2}{9}-\frac{x^2}{4}=1$

(b) $\frac{y^2}{4}-\frac{x^2}{9}=1$ (d) $\frac{x^2}{4}+\frac{y^2}{9}=1$

For Exercises 14–17, find the solution set of each system of equations.

14. $\begin{cases} y = 8x - x^2 \\ 3x - y = -4 \end{cases}$ 14. _____

(a) (–4, –8), (–1, 1) (c) (4, 16), (1, 7)

(b) (4, 1) (d) No solution

15. $\begin{cases} x^2 + y^2 = 25 \\ x - y = -1 \end{cases}$ 15. _____

(a) (3, 3), (–3, –3) (c) (4, 3), (–3, –4)

(b) (3, 4), (–4, –3) (d) (4, 4), (–4, –4)

16. $\begin{cases} x^2 + y^2 = 61 \\ x + y = -11 \end{cases}$ 16. _____

(a) (5, 6), (6, 5)
(c) (–5, –6), (–6, –5)
(b) (–5, 6), (–6, 5)
(d) (5, –6), (6, –5)

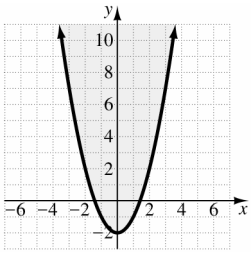
17. $\begin{cases} y = x^2 - 3 \\ x^2 + y^2 = 9 \end{cases}$ 17. _____

(a) $(0, 3), (\sqrt{5}, 2)$
(c) $(-\sqrt{5}, 2), (0, -3), (\sqrt{5}, 2)$
(b) $(0, -3), (\sqrt{5}, 2)$
(d) No solution

18. Give the equation of the ellipse with intercepts (8, 0), (–8, 0), (0, 6), and (0, –6). 18. _____

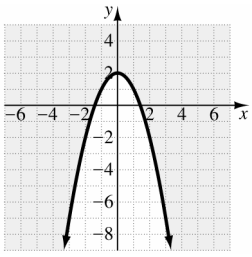
(a) $\frac{x^2}{16} + \frac{y^2}{12} = 1$
(c) $\frac{x^2}{64} - \frac{y^2}{36} = 1$
(b) $\frac{x^2}{8} + \frac{y^2}{6} = 1$
(d) $\frac{x^2}{64} + \frac{y^2}{36} = 1$

19. Which of the following inequalities best describes the graph? 19. _____



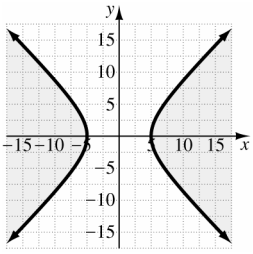
(a) $y \le x^2 + 2$
(c) $x \le y^2 + 2$
(b) $y \ge x^2 - 2$
(d) $x \ge y^2 - 2$

20. Which of the following inequalities best describes the graph? 20. _____



(a) $y \le -x^2 + 2$
(c) $x \le -y^2 - 2$
(b) $y \ge -x^2 + 2$
(d) $x \le -y^2 + 2$

21. Match the inequality with the graph. 21. _____



(a) $x^2 - y^2 \geq 25$ (c) $y^2 - x^2 \geq 25$

(b) $x^2 - y^2 < 25$ (d) $y^2 - x^2 < 25$

22. Which of the following is true for the graph region of: 22. _____

$$\begin{cases} x^2 + y^2 < 16 \\ \dfrac{x^2}{4} + \dfrac{y^2}{25} \geq 1 \end{cases}$$

(a) inside the circle and inside the ellipse
(b) inside the circle and outside the ellipse
(c) outside the circle and inside the ellipse
(d) outside the circle and outside the ellipse

23. Which of the following is true for the graph region of: 23. _____

$$\begin{cases} x^2 + y^2 > 4 \\ \dfrac{x^2}{36} + \dfrac{y^2}{16} < 1 \end{cases}$$

(a) inside the circle and inside the ellipse
(b) inside the circle and outside the ellipse
(c) outside the circle and inside the ellipse
(d) outside the circle and outside the ellipse

24. A footbridge over a creek is in the shape of a parabola. If the span of the bridge is 32 feet and the arch rises 4 feet above the bank of the creek, find the equation of the parabola assuming that the vertex is at the origin and it opens down. 24. _____

(a) $y = \dfrac{1}{8}x^2$ (c) $y = -\dfrac{1}{8}x^2$

(b) $y = \dfrac{1}{64}x^2$ (d) $y = -\dfrac{1}{64}x^2$

25. A communications satellite is placed in an elliptical orbit around the earth by the space shuttle. Assuming that the earth is a sphere with a radius of 4000 miles, that the closest the satellite comes to the earth is 290 miles, and the farthest it is from the earth is 310 miles, find an equation of the ellipse that describes the orbit.

25. _____

(a) $\frac{x^2}{(4310)^2} + \frac{y^2}{(4290)^2} = 1$

(b) $\frac{x^2}{(310)^2} + \frac{y^2}{(290)^2} = 1$

(c) $\frac{x^2}{(4310)^2} - \frac{y^2}{(4290)^2} = 1$

(d) $\frac{x^2}{(310)^2} - \frac{y^2}{(290)^2} = 1$