

Algebra I/ Geometry A
Final Exam Study Guide

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1. How many minutes are in 300 seconds?

2. 5 gallons = _____ cups

3. 7 miles = _____ ft = _____ in
4. 12 cups = _____ gallons
5. In a science class, each student needs 120 milligrams of purified water for an experiment. If there are 108 students told, how many **grams** of purified water will be used?
6. The Jones family is taking a family trip to New York and has 300 mi left before they get to the hotel. If they are traveling at a rate of 28 miles per gallon and they have 11 gallons of fuel left, should Mr. Jones stop for gas? Show your calculations and explain why or why not in a complete sentence.
7. It takes 13 days of practice to really learn how to ride a bike. How many seconds is that? Be sure to use dimensional analysis.
8. Write an algebraic expression for :
 - a. Six times the quotient of x and two _____
 - b. Seven less than a third of a number _____
 - c. A fourth of the sum of a number and seven _____

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9. Sally has \$70 to go shopping. Each new dress costs \$50 and each new lipstick costs \$8.
A. What are her budget constraints? Write an inequality modeling this situation.

B. If there is a 10% discount on the dress, write a new inequality modeling the situation.

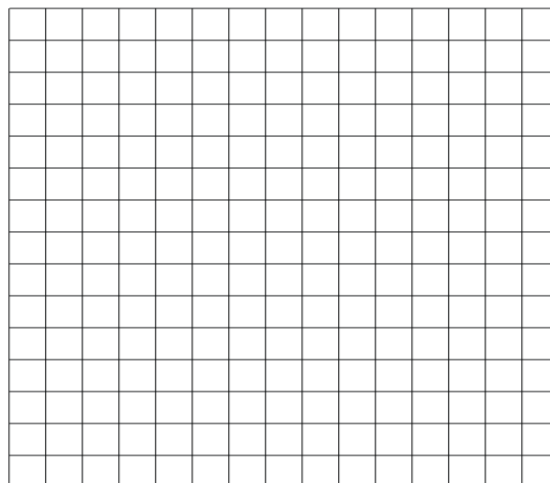
10. The population of Madison, GA is 32,000 people. The population is expected to increase by 500 people per year.

A. Write an equation that models the population (y) of Madison after x number of years.

B. Graph the equation.

Be sure to label the axes.

C. Explain the situation when
 $x = 10$ and $y = 37,000$.



D. If the population instead increases 1.5% per year,

i. Write an equation that models the population after x number of years.

ii. Graph this equation on the same graph.

iii. Compare the two models.

11. Solve the Inequalities and Equations.

A. $3(x - 2) + 4 \geq x$

B. $-4x + 9 \leq 5x - 5$

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12. Solve for x .

A. $9(2x + 5) = -3x - 75$.

B. $\frac{1}{3}(x - 12) = 8$

13. Simplify each radical:

A. $2a\sqrt{12a^5}(6a^3\sqrt{a^5})$

B. $\frac{30c^3\sqrt{20c^6}}{60c^4\sqrt{40c^7}}$

14. Given the polynomials $3a^4 - 2a^3 + 5a^2 - 6a$ and $-2a^3 - 4a^2 + 3a + 2$,

A. Add the two polynomials

B. Subtract the two polynomials

C. Multiply the two polynomials

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15. Match each example with the property it illustrates. Note that some properties will not be used.

- | | |
|---|--|
| <p>____ 1) $9 + w = w + 9.$</p> <p>____ 3) $(7x)y = 7(xy)$</p> <p>____ 5) If $x = 7$, then $7 = x.$</p> <p>____ 7) $14 \cdot x = x \cdot 14$</p> <p>____ 9) $3 \cdot \frac{1}{3} = 1$</p> <p>____ 11) $97 + 0 = 97$</p> <p>____ 13) $x \cdot y = y \cdot x$</p> | <p>____ 2) If $4x + 5 = 8$, then $4x + 5 - 5 = 8 - 5.$</p> <p>____ 4) $2(x - 8) = 2x - 16$</p> <p>____ 6) $x + (y + 7) = (x + y) + 7$</p> <p>____ 8) $16 + (-16) = 0$</p> <p>____ 10) If $a = 12$ and $12 = r$, then $a = r$</p> <p>____ 12) $21 \cdot 1 = 21$</p> <p>____ 14) If $\frac{1}{2}x = 9$, then $(2)\frac{1}{2}x = (2)9$</p> |
|---|--|

A) Reflexive Property	B) Symmetric Property	C) Transitive Property
D) Associative Property of Addition	E) Associative Property of Mult.	F) Addition Property of Eq.
G) Subtraction Property of Eq.	H) Multiplication Property of Eq.	I) Division Property of Eq.
J) Commutative Property of Addition	K) Commutative Property of Mult.	L) Additive Inverse Property
M) Multiplicative Inverse Property	N) Additive Identity Property	O) Multiplicative Identity Property
P) Distributive Property of Multiplication over Addition		

16. Justify each step of the solution with a property.

- | | |
|----------------------------------|----------------|
| $3x + 4 = 7 + 2(x + 6)$ | Given equation |
| $3x + 4 = 7 + 2x + 12$ | _____ |
| $3x + 4 = 7 + 12 + 2x$ | _____ |
| $3x + 4 = 19 + 2x$ | Simplify |
| $3x + 4 - 19 = 19 + 2x - 19$ | _____ |
| $3x + 4 - 19 = 19 - 19 + 2x$ | _____ |
| $3x - 15 = 0 + 2x$ | _____ |
| $3x - 15 = 2x$ | _____ |
| $3x - 15 - 3x = 2x - 3x$ | _____ |
| $-15 + 3x - 3x = 2x - 3x$ | _____ |
| $-15 + 0 = -x$ | _____ |
| $-15 = -x$ | _____ |
| $\frac{-15}{-1} = \frac{-x}{-1}$ | _____ |
| $15 = x$ | Simplify |
| $x = 15$ | _____ |

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For each problem below, define your variable, write an equation or inequality, solve, and answer the question.

17. The width of a rectangle is 4cm less than its length. The perimeter of the rectangle is 48cm.
What are the dimensions of the rectangle?

18. As Dhitra gets better at swimming, her stamina increases and she can swim for longer periods of time. She started at 12 minutes. After the first week, she could swim 28 minutes. After the second, 54 minutes. And after the third, 72 minutes. What is her average rate of change at the beginning of the 4th week?

19. Solve the equation for y . Then, find the value of y when $x = 42$.
 $4x - 2y = -12$

Check if the ordered pair is a solution to the system.

20. $(-5, -3)$
$$\begin{cases} y = x + 2 \\ x - 3y = 4 \end{cases}$$

21. $(3, 1)$
$$\begin{cases} x + y = 4 \\ -x + y = -4 \end{cases}$$

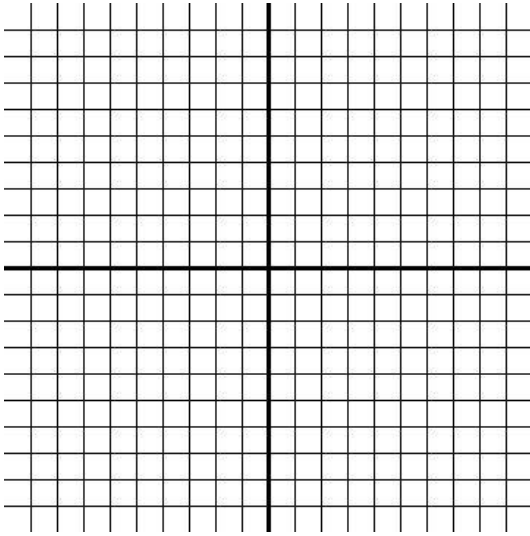
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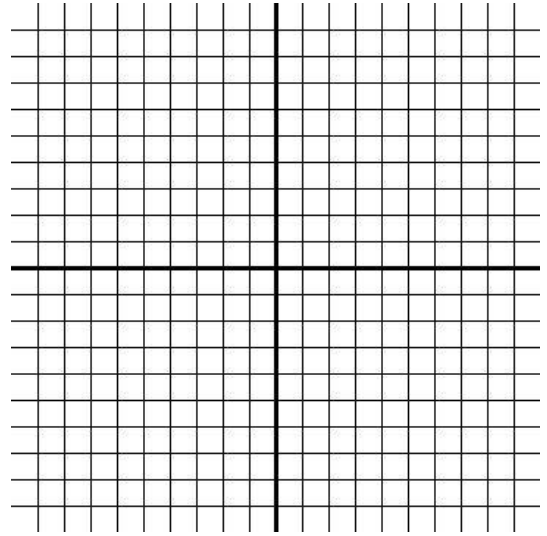
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Solve the system by graphing.

$$22. \begin{cases} y = x + 1 \\ y = 3x - 7 \end{cases}$$



$$23. \begin{cases} -3x + y = 5 \\ y = 3x - 7 \end{cases}$$



Solve the system using substitution.

$$24. \begin{cases} x + 2y = 4 \\ -3x + 6y = 36 \end{cases}$$

$$25. \begin{cases} 6x - 3y = 12 \\ -3x + y = -7 \end{cases}$$

26. Jack had 55 coins in nickels and quarters which when counted totaled \$7.75. Define variables, write a system of equations and solve for all variables.

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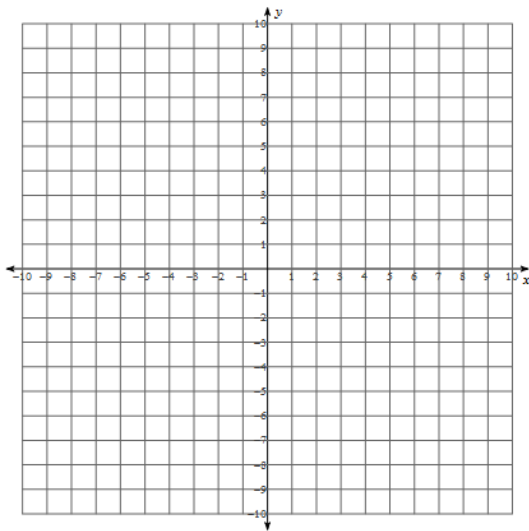
Solve the system using elimination.

27.
$$\begin{cases} -x - 6y = -20 \\ 2x + 12y = 10 \end{cases}$$

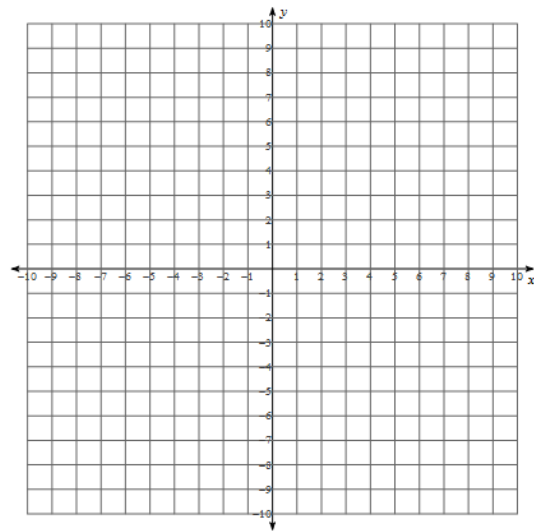
28.
$$\begin{cases} -14x + 2y = 8 \\ -7x + y = 4 \end{cases}$$

29. Graph each inequality or system of inequalities below.

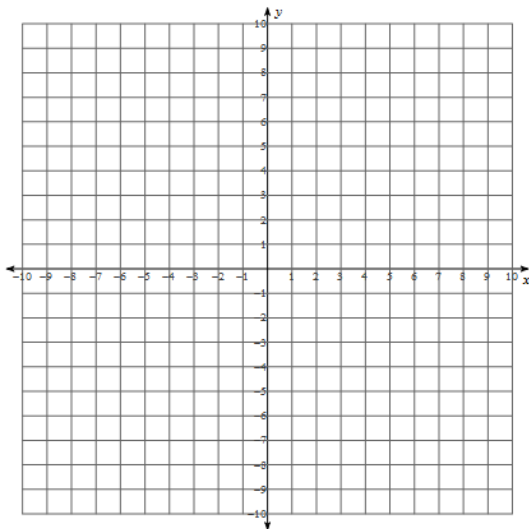
A. $x + 8y > 8$



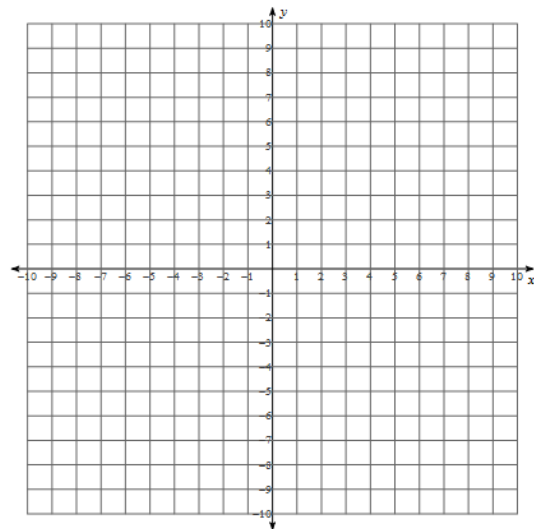
B. $y \leq 7$



C.
$$\begin{cases} y < -3x + 3 \\ y > x - 1 \end{cases}$$



D.
$$\begin{cases} x + y \leq 8 \\ 2x - y > 0 \\ y \leq 4 \end{cases}$$



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30. What is the average rate of change on $[1, 3]$?

x	0	1	2	3	4	5
y	0	3	1	-3	0	6

Graph each exponential equation. List the domain, range, end behavior, and asymptote of each. State if it grows or decays exponentially.

31. $f(x) = \left(\frac{1}{2}\right)^x - 1$

x	$f(x)$

Growth or Decay? _____

As $x \rightarrow +\infty, f(x) \rightarrow$ _____

As $x \rightarrow -\infty, f(x) \rightarrow$ _____

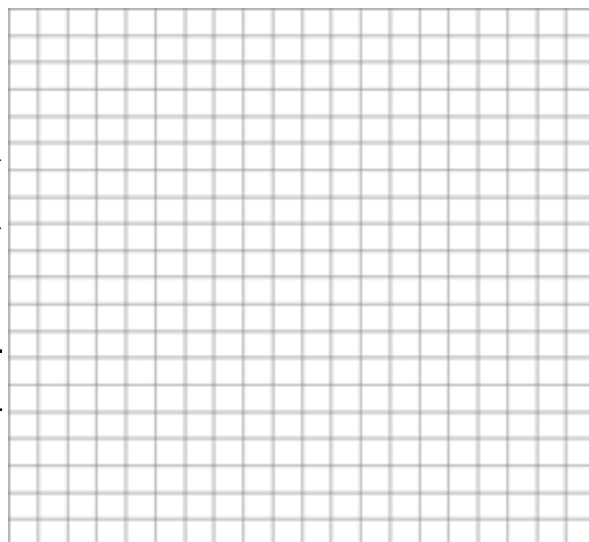
Domain: _____

Range: _____

Asymptote: _____

y-intercept: _____

Average rate of change for $x = [-2, 2]$: _____



32. $f(x) = 2^x - 1$

x	$f(x)$

Growth or Decay? _____

As $x \rightarrow +\infty, f(x) \rightarrow$ _____

As $x \rightarrow -\infty, f(x) \rightarrow$ _____

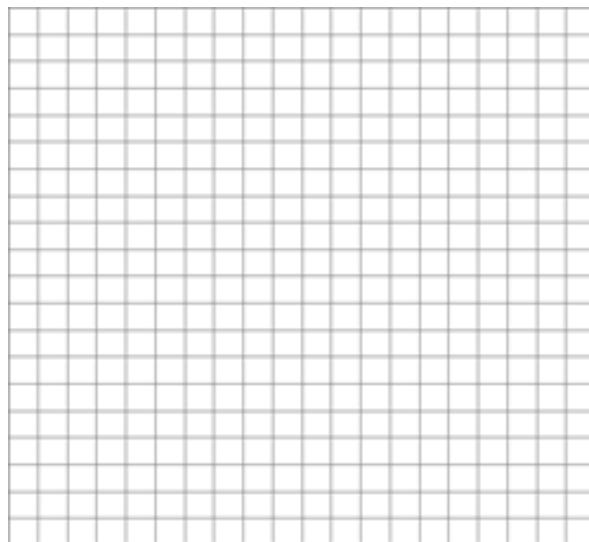
Domain: _____

Range: _____

Asymptote: _____

y-intercept: _____

Average rate of change for $x = [-2, 2]$: _____



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Use the functions to evaluate the given expressions. **CIRCLE YOUR ANSWERS!!!!**

$$f(x) = \frac{1}{2}x + 4$$

$$g(x) = \sqrt{x+1}$$

$$h(x) = 3^{x+2}$$

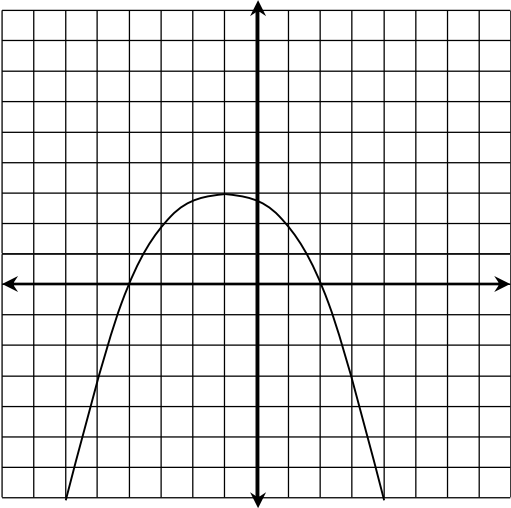
33. $g(8)=$

35. $h(0)=$

34. Find x if $f(x) = -9$

36. Find x if $h(x) = 27$

37. Use the graph of $f(x)$ to complete the given questions.



A. What is the vertex form of the equation of $f(x)$?

B. What is the intercept form of the equation of $f(x)$?

C. What is the general form of the equation of $f(x)$?

D. What is the average rate of change on the interval $[-4, 0]$?

38. Solve the following equations for x .

A. $5^{5x} = 125^{x+2}$

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

B. $-2(x-3)^2 + 1 = -31$

D. $-2(x-3)^2 + 1 = -31$

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39. Change the function $f(x) = 4x^2 - 20x + 3$ into vertex form by completing the square.

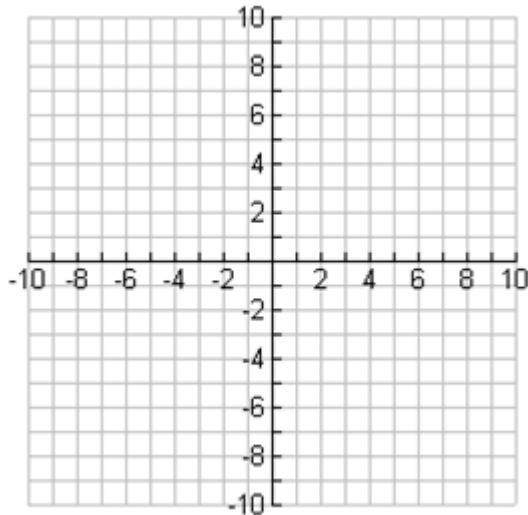
40. Solve $4x^2 + 3x - 9 = 0$ using the quadratic formula.

41. Given $f(x) = 6x^2 + 24x + 9$,

A. Where is the vertex?

B. What is the maximum value of $f(x)$?

42. Graph $g(x) = 2^x - 2$ and find the requested characteristics.



a. x-int = _____

b. y-int = _____

c. Domain = _____

d. Range = _____

e. Asymptote: _____

f. Is the function increasing or decreasing?

Describe the function's end behavior.

g. As $x \rightarrow -\infty, f(x) \rightarrow$ _____

h. As $x \rightarrow \infty, f(x) \rightarrow$ _____

43. Given the function $f(x) = 2^x + 1$, find the average rate of change over the interval $[-1, 1]$.

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44. What are the x and y intercepts of the equation $10x + 2y = 60$?

45. You invest \$1600 at 3.75% compounded quarterly. What is the value in 5 years?

$$A(t) = P \left(1 + \frac{r}{n} \right)^{nt}$$

46. How much must you invest at 4.15% compounded monthly to have \$2,000 in 8 years?

$$P(t) = A \left(1 + \frac{r}{n} \right)^{-nt}$$

47. The amount of groundcover in a region is receding at 2.22% measured annually.

$$G(x) = A_0(1 + r)^x$$

A. What percentage of ground cover has disappeared in 10 years?

B. How much of an original 42,380,000 acres of covered land is now bare?

48. How has $f(x) = -3 \cdot (4)^{x+2} - 1$ been transformed from its parent function?

A. Parent function: _____.

B. Transformation: _____
