24218 Garner St. Southfield, MI, 48033 (248) 351-0000

Where excellence in education and character is the expectation.

Dear Students and Families,

Welcome to 12th Grade, Pre-Calculus class! I'm thrilled to have the opportunity to teach 12th grade and I look forward to meeting you and your parents. I am excited about this subject matter and determined to make this a very productive school year.

A little bit about me: I graduated from Lucian Blaga University, Romania, in 2006. After graduating I moved to South Carolina where I taught for 3 years in a public middle school. In 2009, I relocated to MI and have been at Bradford Academy since then. My number one expectation in class is that every student respects each other and the teacher.

The areas of curriculum we will focus on this year include: Functions from a Calculus
Perspective; Power, Polynomials, and Rational Functions; Exponential and Logarithmic Functions; Trigonometric Functions; Trigonometric Identities and Equations; Conic Sections and Parametric Equations; Vectors; Polar Coordinates And Complex Numbers; Sequences and Series; Inferential Statistics; Limits and Derivatives.

Students are asked to bring the following supplies to school before 9/9/12:
-3 ring binder with plenty of line paper OR a thick notebook
-pack of #2 pencils and a sharpener with an attached shavings container

If you have any questions or concerns or if you would like to visit our classroom, schedule a conference, or volunteer to help out, you can contact me by phone at: (248)-351-0000, ext 13403, or email: adrianapop@choiceschools.com. The best way to reach me and ensure an immediate answer is through email.

Once again, welcome to 12th Grade, Pre-Calculus. Let's work together to make this the best year ever!

Sincerely,
Mrs. Pop

APop

CHAPTER

0 Pretest

Use set notation to write the elements of each set. Then determine whether the statement about the set is *true* or *false*.

1. L is the set of whole number multiples of 2 that are less than 22. $18 \in L$

2. S is the set of integers that are less than 5 but greater than -6. $-8 \in S$

Let $C = \{0, 1, 2, 3, 4\}$, $D = \{3, 5, 7, 8\}$, $E = \{0, 1, 2\}$, and $F = \{0, 8\}$. Find each of the following.

3. $D \cap E$

4. $C \cap E$

5. $C \cap F$

6. $D \cup E$

Simplify.

7. $(6 + 5i) + (-3 + 2i)$

8. $(-3 + 4i) - (4 - 5i)$

9. $(1 + 8i)(6 + 2i)$

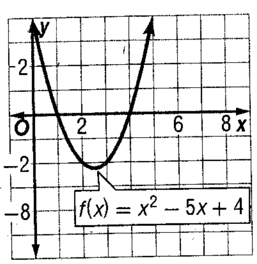
10. $(-3 + 3i)(-2 + 2i)$

11. $\frac{3 + i}{5 - 2i}$

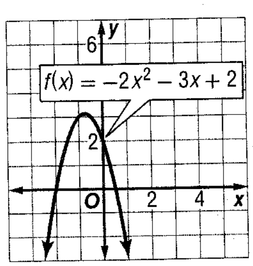
12. $\frac{-3 + i}{4 - 3i}$

Determine whether each function has a *maximum* or *minimum* value. Then find the value of the maximum or minimum, and state the domain and range of the function.

13.



14.



Solve each equation.

15. $x^2 - x - 20 = 0$

16. $x^2 - 3x + 5 = 0$

17. $x^2 + 2x - 1 = 0$

18. $x^2 + 11x + 24 = 0$

19. CARS The current value V and the original value v of a car are related by $V = v(1 - r)^n$, where r is the rate of depreciation per year and n is the number of years. If the original value of a car is $10,000, what would be the current value of the car after 30 months at an annual depreciation rate of 10%?

Simplify each expression.

20. $\sqrt[6]{x^{12}y^{15}}$

21. $\sqrt[3]{8a^9b^7}$

22. $\sqrt{25r^5t^4u^2}$

23. $\sqrt[5]{32x^{11}y^{20}z^5}$

Simplify.

24. $\frac{x^{\frac{1}{2}}}{x^{\frac{1}{4}}}$

25. $\sqrt[4]{81x^8y^{14}}$

26. $\sqrt[7]{x^{15}y^{23}}$

27. $\frac{\sqrt[8]{49}}{\sqrt[6]{7}}$

28. JOBS Destiny mows lawns for $8 per lawn and weeds gardens for $10 per garden. If she had 8 jobs and made $72, how many of the jobs were mowing? How many were weeding?

Solve each system of equations. State whether the system is *consistent and independent, consistent and dependent,* or *inconsistent.*

29. $3x + y = 4$
$x - y = 12$

30. $2x - y = 2$
$-4x + 2y = -4$

31. $2x + 4y - z = -1$
$2x - 3y + 2z = 6$
$-x - 5y + z = -2$

32. $-3x + 9y - 3z = -12$
$-3x + y - z = -1$
$2x - 6y + 2z = 9$

Solve each system of inequalities. If the system has no solution, state *no solution*.

33. $y \geq x + 5$
$y \leq 2x + 2$

34. $y + x < 3$
$y > -2x - 4$

35. $4x - 3y < 7$
$2y - x < -6$

36. $3y \leq 2x - 8$
$y \geq \frac{2}{3}x - 1$

Find each of the following for $D = \begin{bmatrix} -2 & 4 \\ 0 & 1 \\ 4 & -3 \end{bmatrix}$, $E = \begin{bmatrix} 3 & 5 \\ -2 & -1 \\ 0 & -1 \end{bmatrix}$, and $F = \begin{bmatrix} 8 & 2 \\ -3 & -5 \\ 2 & 2 \end{bmatrix}$.

37. $D - F$

38. $D + 2F$

39. $2D - E$

40. $D + E + F$

41. $3D - 2E$

42. $D - 3E + 3F$

Find each permutation or combination.

43. ${}_9C_5$

44. ${}_9P_5$

45. ${}_5P_5$

46. ${}_5C_5$

47. ${}_4P_2$

48. ${}_4C_2$

49. CARDS Three cards are randomly drawn from a standard deck of 52 cards. Find each probability.

a. P(all even)

b. P(two clubs and one heart)

Find the mean, median, and mode for each set of data. Then find the range, variance, and standard deviation for each population.

50. $\{7, 7, 8, 10, 10, 10\}$

51. $\{0.5, 0.4, 0.2, 0.5, 0.2\}$

Assignment 1

● = **Step-by-Step Solutions** begin on page R29.

Exercises

Use set notation to write the elements of each set. Then determine whether the statement about the set is *true* or *false*. (Example 1)

1. J is the set of whole number multiples of 3 that are less than 15. $15 \in J$
2. K is the set of consonant letters in the English alphabet. $h \in K$
3. L is the set of the first six prime numbers. $9 \in L$
4. V is the set of states in the U.S. that border Georgia. Alabama $\notin V$
5. N is the set of natural numbers less than 12. $0 \in N$
6. D is the set of days that start with S. Sunday $\in D$
7. A is the set of girls names that start with A. Ashley $\in A$
8. S is the set of the 48 continental states in the U.S. Hawaii $\notin S$

For Exercises 9–24, use the following information.
Let $U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$, $A = \{1, 2, 6, 9, 10, 12\}$, $B = \{2, 9, 10\}$, $C = \{0, 1, 6, 9, 11\}$, $D = \{4, 5, 10\}$, $E = \{2, 3, 6\}$, and $F = \{2, 9\}$.

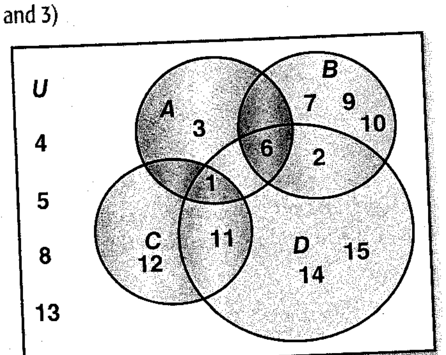
Determine whether each statement is *true* or *false*. Explain your reasoning. (Examples 1 and 2)

9. $3 \in D$
10. $8 \notin A$
11. $B \subset A$
12. $U \subset A$
13. $5 \notin D$
14. $2 \in E$
15. $0 \in F$
16. $6 \notin F$

Find each of the following. (Examples 2 and 3)

17. C'
18. U'
19. A'
20. $D \cap E$
21. $C \cap E$
22. $E \cup F$
23. $A \cup B$
24. $A \cap B$

Use the Venn diagram to find each of the following. (Examples 2 and 3)



25. $A \cup B$
26. $A \cap D$
27. $C \cup D$
28. A'
29. $A \cap B \cap D$
30. $(A \cup B) \cup C$

31. **SPORTS** Sixteen students in Mr. Frank's gym class each participate in one or more sports as shown in the table. (Examples 2 and 3)

Mr. Frank's Gym Class		
Basketball	**Soccer**	**Volleyball**
Ayanna	Lisa	Pam
Pam	Ayanna	Lisa
Sue	Ron	Shiv
Lisa	Tyron	Max
Ron	Max	Aida
Max	Aida	Juan
Ito	Evita	Tino
Juan	Nelia	Kai
Nelia	Percy	Percy

a. Let B represent the set of basketball players, S represent the set of soccer players, and V represent the set of volleyball players. Draw a Venn diagram of this situation.

b. Find $S \cap V$. What does this set represent?

c. Find S'. What does this set represent?

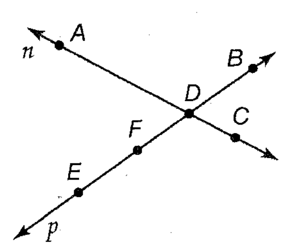
d. Find $B \cup V$. What does this set represent?

32. **ACADEMICS** There are 26 students at West High School who take either calculus or physics or both. Each student is represented by a letter of the alphabet below. Draw a Venn diagram of this situation. (Examples 2 and 3)

Calculus	A, D, F, I, J, K, L, M, P, R, T, V, X, Y, Z
Physics	B, C, D, E, F, G, H, I, J, K, L, N, O, Q, S, U, W

33. **BEVERAGES** Suppose you can select a juice from three possible kinds: apple, orange, or grape, or you can select a soda from two possible kinds, Brand A or Brand B. If you can choose a juice *or* a soda to drink, according to the Addition Principle, you have 3 + 2 or 5 possible choices. Using notation that you have learned in this lesson, justify this result. In what situation could this principle not be applied?

GEOMETRY **Use the figure to find the simplest name for each of the following.**



34. $\overline{DE} \cap \overline{BF}$
35. $\overline{AD} \cup \overline{DC}$
36. $\overrightarrow{DE} \cup \overrightarrow{DC}$
37. line $n \cap$ line p
38. $\overleftrightarrow{AC} \cap \overline{EF}$
39. $\overrightarrow{FB} \cup \overrightarrow{EB}$

Assignment 2

● = **Step-by-Step Solutions** begin on page R29.

Exercises

Simplify. (Example 1)

1. i^{-10}
2. $i^2 + i^8$
3. $i^3 + i^{20}$
4. i^{100}
5. i^{77}
6. $i^4 + i^{-12}$
7. $i^5 + i^9$
8. i^{18}

Simplify. (Example 2)

9. $(3 + 2i) + (-4 + 6i)$
10. $(7 - 4i) + (2 - 3i)$
11. $(0.5 + i) - (2 - i)$
12. $(-3 - i) - (4 - 5i)$
13. $(2 + 4.1i) - (-1 - 6.3i)$
14. $(2 + 3i) + (-6 + i)$
15. $(-2 + 4i) + (5 - 4i)$
16. $(5 + 7i) - (-5 + i)$

17. **ELECTRICITY** Engineers use imaginary numbers to express the two-dimensional quantity of alternating current, which involves both amplitude and angle. In these imaginary numbers, i is replaced with j because engineers use I as a variable for the entire quantity of current. *Impedance* is the measure of how much hinderance there is to the flow of the charge in a circuit with alternating current. The impedance in one part of a series circuit is $2 + 5j$ ohms and the impedance in another part of the circuit is $7 - 3j$ ohms. Add these complex numbers to find the total impedance in the circuit. (Example 2)

Simplify. (Example 3)

18. $(-2 - i)^2$
19. $(1 + 4i)^2$
20. $(5 + 2i)^2$
21. $(3 + i)^2$
22. $(2 + i)(4 + 3i)$
23. $(3 + 5i)(3 - 5i)$
24. $(5 + 3i)(2 + 6i)$
25. $(6 + 7i)(6 - 7i)$

Simplify. (Example 4)

26. $\frac{5 + i}{6 + i}$
27. $\frac{i}{1 + 2i}$
28. $\frac{5 - i}{5 + i}$
29. ● $\frac{3 - 2i}{-4 - i}$
30. $\frac{1 + 2i}{2 - 3i}$
31. $\frac{3 + 4i}{1 + 5i}$
32. $\frac{2 - \sqrt{2}i}{3 + \sqrt{6}i}$
33. $\frac{1 + \sqrt{3}i}{1 - \sqrt{2}i}$

ELECTRICITY The voltage E, current I, and impedance Z in a circuit are related by $E = I \cdot Z$. Find the voltage (in volts) in each of the following circuits given the current and impedance.

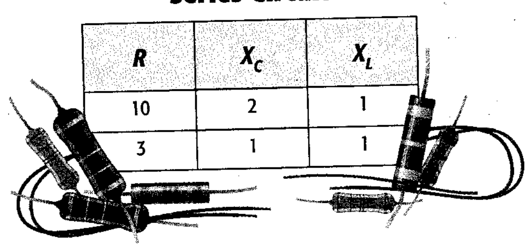
34. $I = 1 + 3j$ amps, $Z = 7 - 5j$ ohms
35. $I = 2 - 7j$ amps, $Z = 4 - 3j$ ohms
36. $I = 5 - 4j$ amps, $Z = 3 + 2j$ ohms
37. $I = 3 + 10j$ amps, $Z = 6 - j$ ohms

Solve each equation.

38. $5x^2 + 5 = 0$
39. $4x^2 + 64 = 0$
40. $2x^2 + 12 = 0$
41. $6x^2 + 72 = 0$
42. $8x^2 + 120 = 0$
43. $3x^2 + 507 = 0$

44. **ELECTRICITY** The impedance Z of a circuit depends on the resistance R, the reactance due to capacitance X_C, and the reactance due to inductance X_L, and can be written as a complex number $R + (X_L - X_C)j$. The values (in ohms) for R, X_C, and X_L in the first and second parts of a particular series circuit are shown.

Series Circuit



R	X_C	X_L
10	2	1
3	1	1

a. Write complex numbers that represent the impedances in the two parts of the circuit.

b. Add your answers from part **a** to find the total impedance in the circuit.

c. The *admittance* S of a circuit is the measure of how easily the circuit allows current to flow and is the reciprocal of impedance. Find the admittance (in siemens) in a circuit with an impedance of $6 + 3j$ ohms.

Find values of x and y to make each equation true.

45. $3x + 2iy = 6 + 10i$
46. $5x + 3iy = 5 - 6i$
47. $x - iy = 3 + 4i$
48. $-5x + 3iy = 10 - 9i$
49. $2x + 3iy = 12 + 12i$
50. $4x - iy = 8 + 7i$

Simplify.

51. $(2 - i)(3 + 2i)(1 - 4i)$
52. $(-1 - 3i)(2 + 2i)(1 - 2i)$
53. $(2 + i)(1 + 2i)(3 - 4i)$
54. $(-5 - i)(6i + 1)(7 - i)$

Assignment 3

Exercises

Graph each equation by making a table of values. (Example 1)

1. $f(x) = x^2 + 5x + 6$
2. $f(x) = x^2 - x - 2$
3. $f(x) = 2x^2 + x - 3$
4. $f(x) = 3x^2 + 4x - 5$
5. $f(x) = x^2 - x - 6$
6. $f(x) = -x^2 - 3x - 1$

7. **BASEBALL** A batter hits a baseball with an initial speed of 80 feet per second. If the initial height of the ball is 3.5 feet above the ground, the function $d(t) = 80t - 16t^2 + 3.5$ models the ball's height above the ground in feet as a function of time in seconds. Graph the function using a table of values. (Example 1)

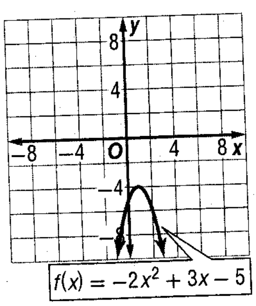
Use the axis of symmetry, y-intercept, and vertex to graph each function. (Example 2)

8. $f(x) = x^2 + 3x + 2$
9. $f(x) = x^2 - 9x + 8$
10. $f(x) = x^2 - 2x + 1$
11. $f(x) = x^2 - 6x - 16$
12. $f(x) = 2x^2 - 8x - 5$
13. $f(x) = 3x^2 + 12x - 4$

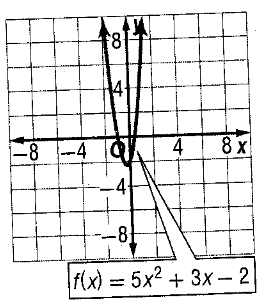
14. **HEALTH** The normal systolic pressure P in millimeters of mercury (mm Hg) for a woman can be modeled by $P = 0.01x^2 + 0.05x + 107$, where x is age in years. (Example 2)
    a. Find the axis of symmetry, y-intercept, and vertex for the graph of P.
    b. Graph P using the values you found in part **a**.

Determine whether each function has a *maximum* or *minimum* value. Then find the value of the maximum or minimum, and state the domain and range of the function. (Example 3)

15.



16.



17. $f(x) = -x^2 + 3x - 5$
18. $f(x) = x^2 - 5x + 6$
19. $f(x) = 2x^2 + 4x + 7$
20. $f(x) = 6x^2 + 3x - 1$
21. $f(x) = -3x^2 - 2x - 1$
22. $f(x) = -5x^2 + 10x - 6$

Solve each equation by factoring. (Example 4)

23. $x^2 - 10x + 21 = 0$
24. $p^2 - 6p + 5 = 0$
25. $x^2 - 3x - 28 = 0$
26. $4w^2 + 19w - 5 = 0$
27. $4r^2 - r = 5$
28. $g^2 + 6g - 16 = 0$

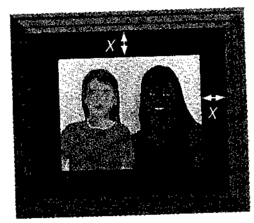
Solve each equation by completing the square. (Example 5)

29. $x^2 + 8x - 20 = 0$
30. $2a^2 + 11a - 21 = 0$
31. $z^2 - 2z - 24 = 0$
32. $p^2 - 3p - 88 = 0$
33. $t^2 - 3t - 7 = 0$
34. $3g^2 - 12g = -4$

Solve each equation by using the Quadratic Formula. (Example 6)

35. $m^2 + 12m + 36 = 0$
36. $t^2 - 6t + 13 = 0$
37. $6m^2 + 7m - 3 = 0$
38. $c^2 - 5c + 9 = 0$
39. $4x^2 - 2x + 9 = 0$
40. $3p^2 + 4p = 8$

41. **PHOTOGRAPHY** Jocelyn wants to frame a photograph that has an area of 20 square inches with a uniform width of matting between the photograph and the edge of the frame as shown.



    a. Write an equation to model the situation if the length and width of the matting must be 8 inches by 10 inches, respectively, to fit in the frame.
    b. Graph the related function.
    c. What is the width of the exposed part of the matting x?

Solve each equation.

42. $x^2 + 5x - 6 = 0$
43. $a^2 - 13a + 40 = 0$
44. $x^2 - 11x + 24 = 0$
45. $q^2 - 12q + 36 = 0$
46. $-x^2 + 4x - 6 = 0$
47. $7x^2 + 3 = 0$
48. $x^2 - 4x + 7 = 0$
49. $2x^2 + 6x - 3 = 0$

50. **PETS** A rectangular turtle pen is 6 feet long by 4 feet wide. The pen is enlarged by increasing the length and width by an equal amount in order to double its area. What are the dimensions of the new pen?

NUMBER THEORY Use a quadratic equation to find two real numbers that satisfy each situation, or show that no such numbers exist.

51. Their sum is −17 and their product is 72.
52. Their sum is 7 and their product is 14.
53. Their sum is −9 and their product is 24.
54. Their sum is 12 and their product is −28.

Assignment 4

Exercises

● = **Step-by-Step Solutions** begin on page R29.

Evaluate. (Example 1)

1. $-\sqrt{169}$
2. $\sqrt{-100}$
3. $\sqrt[3]{\frac{216}{125}}$
4. $\sqrt[3]{-\frac{64}{343}}$
5. $\sqrt[4]{-81}$
6. $\sqrt[4]{625}$
7. $\sqrt[5]{243}$
8. $\sqrt[5]{-1024}$

Simplify. (Example 2)

9. $\sqrt[3]{-27x^9}$
10. $\sqrt[4]{16a^{20}}$
11. $\sqrt[8]{8y^{16}}$
12. $\sqrt[3]{54x^{17}}$
13. $\sqrt{20x^{16}}$
14. $\sqrt{121(z-2)^{14}}$
15. $\sqrt[4]{a^{12}b^9}$
16. $\sqrt[7]{-q^{13}r^{16}}$

Simplify. (Example 3)

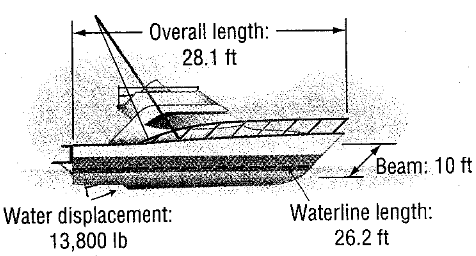
17. $\dfrac{b^{\frac{5}{4}} \cdot b^{\frac{3}{4}}}{b^{\frac{1}{4}}}$
18. $\left(2x^{\frac{1}{4}}y^{\frac{1}{3}}\right)\left(3x^{\frac{1}{4}}y^{\frac{2}{3}}\right)$
19. $\sqrt[6]{640a^3}$
20. $\sqrt[6]{128b^4}$
21. $\dfrac{\sqrt[3]{16}}{\sqrt[5]{4}}$
22. $\dfrac{\sqrt[4]{27}}{\sqrt[3]{81}}$

23. **BOATING** The motion comfort ratio M of a boat is given by

$$M = \frac{D}{0.65(B)^{\frac{4}{3}}(0.7W + 0.3A)},$$

where D is the water displacement of the boat in pounds, B is the boat's beam or width in feet, W is the boat's length in feet at the waterline, and A is the boat's overall length in feet. The higher the ratio, the greater the level of comfort experienced by those on board as the boat encounters waves. (Example 3)

a. Find the motion comfort ratio of the boat shown below.



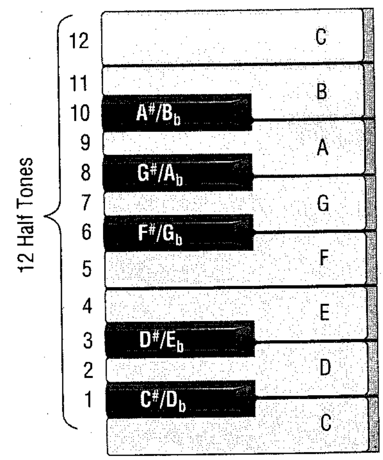
b. Find the beam of a boat to the nearest foot with a comfort ratio of 27 that displaces 15,000 pounds of water, has a waterline length of 30.4 feet, and an overall length of 32.3 feet.

24. **CARS** The value of a car depreciates or declines over the course of its useful life. The new value V and the original value v of a car are related by the formula $V = v(1 - r)^n$, where r is the rate of depreciation per year and n is the number of years. Suppose the current value of a used car is \$12,000. What would be the value of the car after 18 months at an annual depreciation rate of 20%? (Example 3)

Evaluate.

25. $216^{\frac{1}{3}}$
26. $4096^{\frac{1}{4}}$
27. $49^{-\frac{1}{2}}$
28. $27^{-\frac{1}{3}}$

29. **MUSIC** The note progression of the twelve tone scale is comprised of a series of half tones. In order for an instrument to be "in tune," the frequency of each note has an optimum ratio with the frequency of middle C, called the perfect 1st.



The optimum frequency ratio r can be calculated using $r = (\sqrt[12]{2})^n$, where n is the number of half tones the note is above the perfect 1st, including the note itself. (Example 1)

a. Approximate the optimum frequency ratio of the middle 3rd with the perfect 1st.

b. Without the use of a calculator, approximate the optimum frequency ratio of the perfect 8th and the perfect 1st. Justify your answer.

Simplify.

30. $\sqrt[3]{-250r^{11}t^6u^5}$
31. $\sqrt[3]{128a^9b^7c^4}$
32. $\sqrt[4]{96a^8b^6c^{20}}$
33. $\sqrt[6]{64x^7y^6z^{18}}$
34. $\sqrt[4]{a^2b^3c^4d^5}$
35. $\sqrt[5]{w^6x^8y^{10}z^{13}}$

Assignment 5

Exercises

● = **Step-by-Step Solutions** begin on page R29.

Solve each system of equations by graphing. (Example 1)

1. $y = 5x - 2$
$y = -2x + 5$

2. $y = 2x - 5$
$y = 0.5x + 1$

3. $x + y = -2$
$3x - y = 10$

4. $y = -3$
$2x = 8$

5. $3y = 4x + 6$
$2y = x - 1$

6. $x = 5$
$4x + 5y = 20$

Use substitution to solve each system of equations. (Example 2)

7. $5x - y = 16$
$2x + 3y = 3$

8. $3x - 5y = -8$
$x + 2y = 1$

9. $y = 6 - x$
$x = 4.5 + y$

10. $x = 2y - 8$
$2x - y = -7$

11. $4x - 5y = 6$
$x + 3 = 2y$

12. $x - 3y = 6$
$2x + 4y = -2$

13. JOBS Connor works at a movie rental store earning $8 per hour. He also walks dogs for $10 per hour on the weekends. Connor worked 13 hours this week and made $110. How many hours did he work at the movie rental store? How many hours did he walk dogs over the weekend?

Use elimination to solve each system of equations. (Example 3)

14. $7x + y = 9$
$5x - y = 15$

15. $2x - 3y = 1$
$4x - 5y = 7$

16. $-3x + 10y = 5$
$2x + 7y = 24$

17. $2x + 3y = 3$
$12x - 15y = -4$

18. $3x + 4y = -1$
$6x - 2y = 3$

19. $5x - 6y = 10$
$-2x + 3y = -7$

Solve each system of equations. (Example 4)

20. $x + 2y + 3z = 5$
$3x + 2y - 2z = -13$
$5x + 3y - z = -11$

21. $x - y - z = 7$
$-x + 2y - 3z = -12$
$3x - 2y + 7z = 30$

22. $7x + 5y + z = 0$
$-x + 3y + 2z = 16$
$x - 6y - z = -18$

23. $3x - 5y + z = 9$
$x - 3y - 2z = -8$
$5x - 6y + 3z = 15$

24. $4x + 2y + z = 7$
$2x + 2y - 4z = -4$
$x + 3y - 2z = -8$

25. $x - 3z = 7$
$2x + y - 2z = 11$
$-x - 2y + 2z = 6$

26. $8x - z = 4$
$y + z = 5$
$11x + y = 15$

27 $4x - 2y + z = -5$
$5x + y + 3z = 6$
$-2x + 3y + 2z = -4$

Solve each system of equations. State whether the system is *consistent and independent, consistent and dependent,* or *inconsistent.* (Example 5)

28. $8x - 5y = -11$
$-8x + 9y = 7$

29. $x - y = 2$
$2x = 2y + 10$

30. $5x + 4y = 2$
$6x + 5y = 4$

31. $12x - 9y = 3$
$4x - 3y = 1$

32. $1.5x + y = 3.5$
$3x + 2y = 7$

33. $10x - 3y = -4$
$-8x + 5y = 11$

34. $2x - 2y + 3z = 2$
$2x - 3y + 7z = -1$
$4x - 3y + 2z = 0$

35. $-3x + 2y + z = -23$
$4x + 2y + z = 5$
$5x + 3y + 3z = 11$

36. CAMPING The Mountaineers Club held two camping trips during the summer. The club rented 5 tents and 1 cabin for the 30 members who went on the first trip. The club rented 4 tents and 2 cabins for the 36 members who went on the second trip. If the tents and cabins were filled to capacity on both trips, how many people can each tent and each cabin accommodate? (Example 5)

Solve each system of inequalities. If the system has no solution, state *no solution.* (Examples 6 and 7)

37. $y \geq x - 3$
$y \leq 2x + 1$

38. $y + x < 1$
$y > -x - 1$

39. $x + 2y \geq 12$
$x - y \geq 3$

40. $y \leq \frac{1}{3}x - 7$
$3y \geq x + 6$

41. $y + 5 < 4x$
$2y > -2x + 10$

42. $y \leq -x + 8$
$y \geq 0.5x - 4$

43. $8y \leq -2x - 1$
$4y + x \geq 3$

44. $y + 7 < 3x$
$2y + 5x > 8$

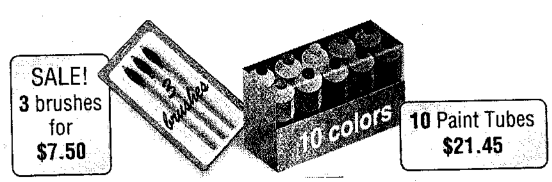
45. $-6y \geq -5x + 6$
$y \leq -3x - 1$

46. $y + 4 \leq \frac{4}{3}x$
$3y \geq 4x + 9$

47. $y \leq 2x + 1$
$y \geq 2x - 2$
$3x + y \leq 9$

48. $x - 3y > 2$
$2x - y < 4$
$2x + 4y \geq -7$

49. ART Charlie can spend no more than $225 on the art club's supply of brushes and paint. He needs at least 20 brushes and 56 tubes of paint. Graph the region that shows how many packages of each item can be purchased. (Example 6)



CHAPTER 0

Posttest

Use set notation to write the elements of each set. Then determine whether the statement about the set is *true* or *false*.

1. M is the set of natural number multiples of 5 that are less than 50. $12 \in M$
2. S is the set of integers that are less than -40 but greater than -50. $-49 \in S$

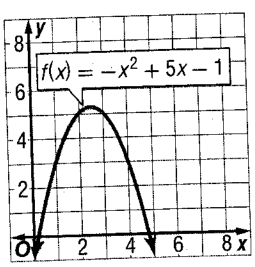
Let $B = \{0, 1, 2, 3\}$, $C = \{0, 1, 2, 3, 4, 5, 6\}$, $D = \{1, 3, 5, 7, 9\}$, $E = \{0, 2, 4, 6, 8, 10\}$, and $F = \{0, 10\}$. Find each of the following.

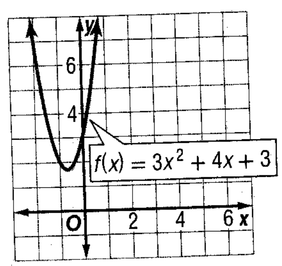
3. $D \cap C$
4. $D \cap F$
5. $E \cup B$
6. $D \cup F$

Simplify.

7. $(1 + 4i) + (-2 - 3i)$
8. $(2 + 4i) - (-1 + 5i)$
9. $(6 + 7i)(-5 + 3i)$
10. $(-1 + i)(-6 + 2i)$
11. $\dfrac{2 + 3i}{1 - 3i}$
12. $\dfrac{1 + 2i}{1 - 2i}$

Determine whether each function has a *maximum* or *minimum* value. Then find the value of the maximum or minimum, and state the domain and range of the function.

13. 

14. 

Solve each equation.

15. $x^2 - x - 72 = 0$
16. $x^2 - 6x + 4 = 0$
17. $2x^2 - 5x + 4 = 0$
18. $2x^2 - x - 3 = 0$

19. **RECREATION** The current value C and the original value v of a recreational vehicle are related by $C = v(1 - r)^n$, where r is the rate of depreciation per year and n is the number of years. If the current value of a recreational vehicle is \$47,500, what would be the value of the vehicle after 75 months at an annual depreciation rate of 15%?

Simplify each expression.

20. $\sqrt[6]{x^{18}y^{20}}$
21. $\sqrt[5]{a^{10}b^7}$
22. $\sqrt{16t^8u^{16}}$
23. $\sqrt[5]{243x^{10}y^{25}z^6}$

Simplify.

24. $\dfrac{y^{\frac{3}{4}} \cdot y^{\frac{2}{3}}}{y^{\frac{5}{12}}}$
25. $\sqrt[9]{512x^{10}y^{28}}$
26. $\sqrt[4]{m^{21}n^{18}}$
27. $\dfrac{\sqrt[12]{25}}{\sqrt[9]{125}}$

28. **JOBS** Leah babysits during the day for \$3 per hour and at night for \$5 per hour. If she worked 5 hours and earned \$19, how many hours did she babysit during the day? How many at night?

Solve each system of equations. State whether the system is *consistent and independent*, *consistent and dependent*, or *inconsistent*.

29. $15x - 4.5y = 15$
    $6x - 3y = 10$
30. $5x + y = 2$
    $x - y = 22$
31. $9x - 3y + 12z = 39$
    $12x - 4y + 16z = 54$
    $3x - 8y + 12z = 23$
32. $6x + 2y + 4z = 2$
    $3x + 4y - 8z = -3$
    $-3x - 6y + 12z = 5$

Solve each system of inequalities. If the system has no solution, state *no solution*.

33. $y \geq x - 3$
    $y \leq 3x + 1$
34. $y + x < 6$
    $y > -3x + 2$
35. $3x + 2y \geq 6$
    $4x - y \geq 2$
36. $2x + 5y \leq -15$
    $y > -\frac{2}{5}x + 2$

Find each of the following for $A = \begin{bmatrix} 3 & 0 \\ 2 & -1 \\ -6 & -5 \end{bmatrix}$, $B = \begin{bmatrix} 1 & -7 \\ -8 & 4 \\ 10 & 2 \end{bmatrix}$, and $C = \begin{bmatrix} 2 & 2 \\ -7 & 8 \\ -1 & -3 \end{bmatrix}$.

37. $A + B + C$
38. $B - C$
39. $2A - B$

Find each permutation or combination.

40. ${}_{10}C_3$
41. ${}_{10}P_3$
42. ${}_6P_6$
43. ${}_6C_6$
44. ${}_8P_4$
45. ${}_8C_4$

46. **CARDS** Four cards are randomly drawn from a standard deck of 52 cards. Find each probability.
    a. P(1 ace and 3 kings)
    b. P(2 odd and 2 face cards)

Find the mean, median, and mode for each set of data. Then find the range, variance, and standard deviation for each population.

47. $\{1, 1, 1, 2, 2, 3\}$
48. $\{0.8, 0.9, 0.4, 0.8, 0.6, 0.8, 0.6\}$