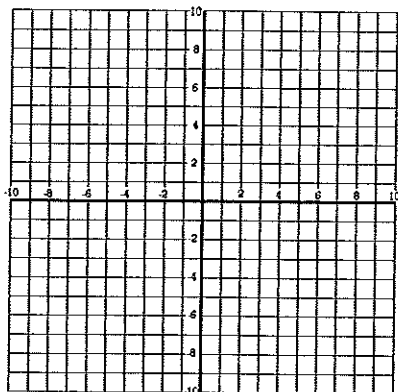


Pre-Calculus Piecewise Worksheet 1

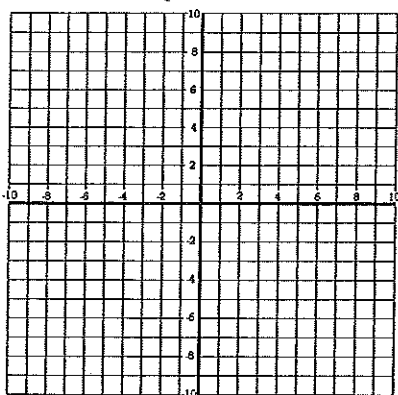
Name \_\_\_\_\_

Graph each function and state the domain.

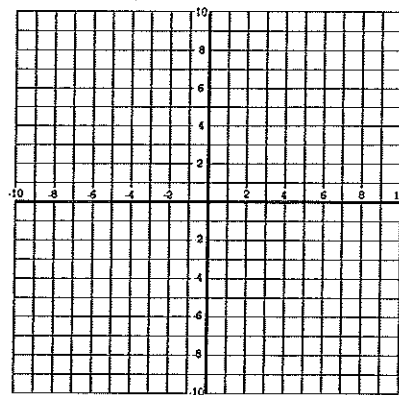
$$f(x) = \begin{cases} x & x < 1 \\ -x & x \geq 1 \end{cases}$$



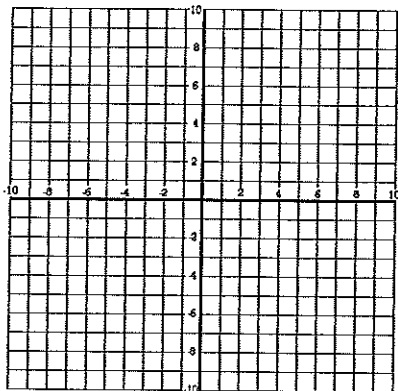
$$f(x) = \begin{cases} x^2 & x < -1 \\ 2x & x \geq -1 \end{cases}$$



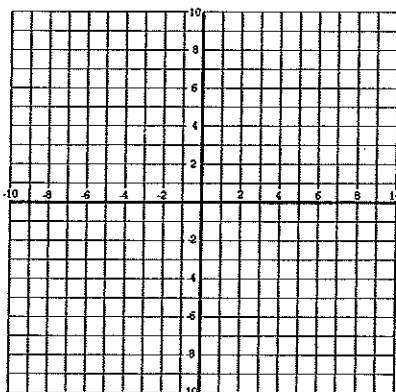
$$f(x) = \begin{cases} x-2 & x < 0 \\ -2x+1 & x \geq 0 \end{cases}$$



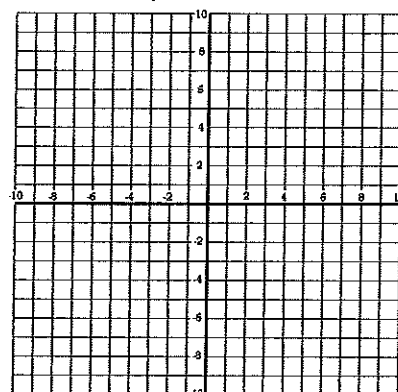
$$f(x) = \begin{cases} x & x < -1 \\ 2 & -1 \leq x < 1 \\ -x & x \geq 1 \end{cases}$$



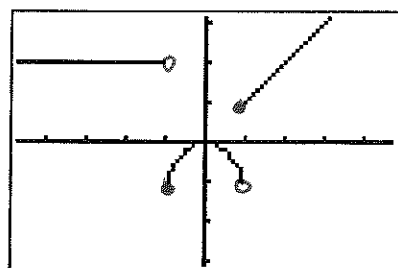
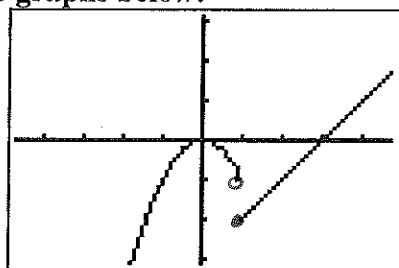
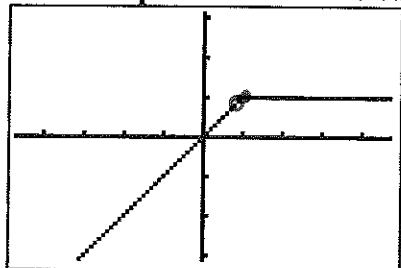
$$f(x) = \begin{cases} -x-2 & x < -1 \\ -x^2 & -1 \leq x < 1 \\ x-2 & x \geq 1 \end{cases}$$



$$f(x) = \begin{cases} 1/x & x < -1 \\ x^3 & -1 \leq x < 1 \\ \ln x & x \geq 1 \end{cases}$$



State the piecewise function for the graphs below:



Graph each function.

$$5. f(x) = \begin{cases} 2x & \text{if } 0 \leq x \leq 4 \\ 8 & \text{if } 4 < x \leq 7 \end{cases}$$

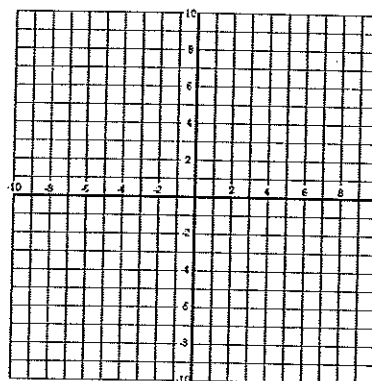
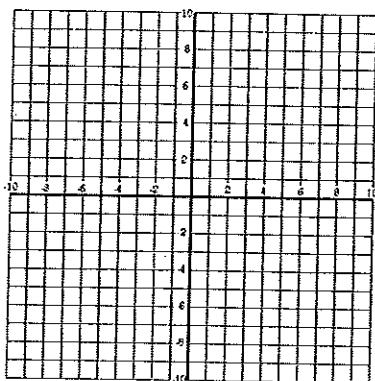
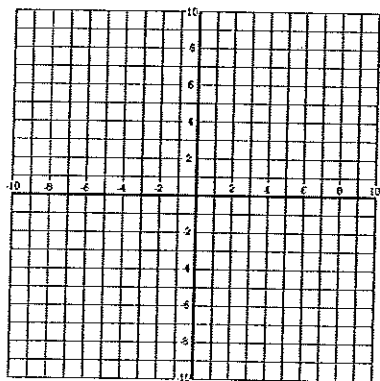
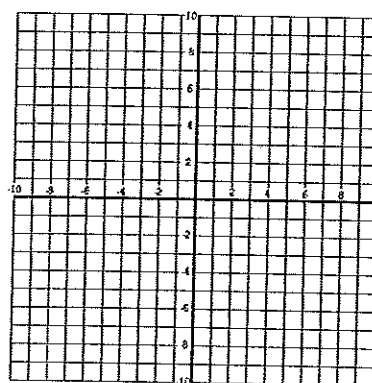
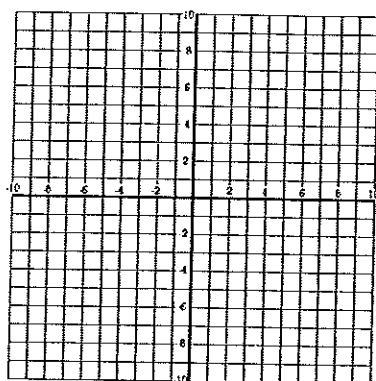
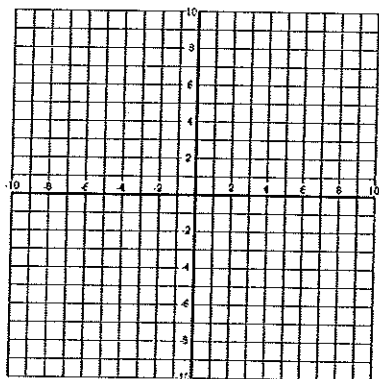
$$7. f(x) = -\lfloor x \rfloor$$

$$11. f(x) = \begin{cases} 2x + 1 & \text{if } x < 0 \\ 2x - 1 & \text{if } x \geq 0 \end{cases}$$

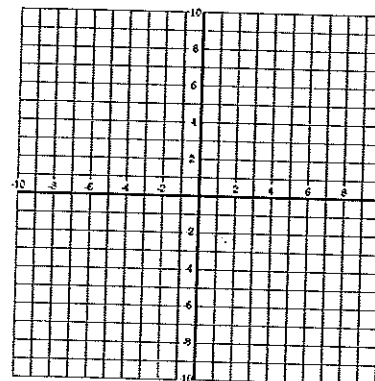
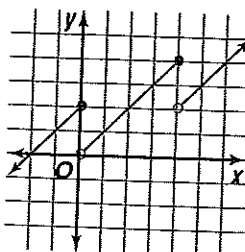
$$6. f(x) = \begin{cases} 6 & \text{if } x \leq -6 \\ |x| & \text{if } -6 < x < 6 \\ 6 & \text{if } x > 6 \end{cases}$$

$$8. f(x) = |x - 3|$$

$$12. g(x) = |x - 5|$$

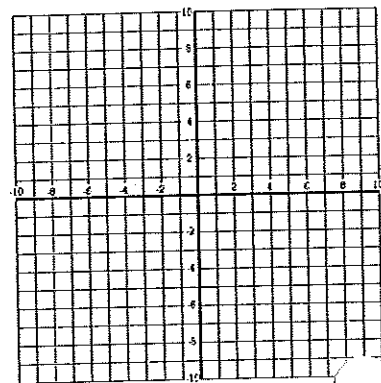


3. Write the function that is represented by the graph.



10. **Consumerism** Guillermo Lujan is flying from Denver to Dallas for a convention. He can park his car in the Denver airport long-term parking lot at the terminal or in the shuttle parking facility closeby. In the long-term lot, it costs \$1.00 per hour or any part of an hour with a maximum charge of \$6.00 per day. In shuttle facility, he has to pay \$4.00 for each day or part of a day. Which parking lot is less expensive if Mr. Lujan returns after 2 days and 3 hours?

9. **Business** Identify the type of function that models the labor cost for repairing a computer if the charge is \$50 per hour or fraction thereof. Then write and graph a function for the situation. *For hours 0 to 5 and graph*



6. For all  $x$ ,  $(10x^4 - x^2 + 2x - 8) - (3x^4 + 3x^3 + 2x + 9) = ?$

A  $7x^4 - 3x^3 - x^2 - 17$

B  $7x^4 - 4x^2 - 17$

C  $7x^4 + 3x^3 - x^2 + 4x$

D  $7x^4 + 2x^2 + 4x$

E  $13x^4 - 3x^3 + x^2 + 4x$

7. If  $\frac{n}{8}$  has a remainder of 5, then which of the following has a remainder of 7?

A  $\frac{n+1}{8}$

B  $\frac{n+2}{8}$

C  $\frac{n+3}{8}$

D  $\frac{n+5}{8}$

E  $\frac{n+7}{8}$

8. If  $x > 0$ , then  $\frac{\sqrt{100x^2 + 600x + 900}}{x+3} = ?$

A 9

B 10

C 30

D 40

- E It cannot be determined from the information given.

9. What is the value of  $c$ ?

Given:  $a + b = c$

$a - c = 5$

$b - c = 3$

A -10

B -8

C -5

D -3

E 3

10. **Grid-In** If  $4x + 2y = 24$  and  $\frac{7y}{2x} = 7$ , then  $x = ?$

Graph each function.

14.  $g(x) = |2x + 3|$

16.  $h(x) = \begin{cases} 3 & \text{if } -1 \leq x \leq 1 \\ 4 & \text{if } 1 < x \leq 4 \\ x & \text{if } x > 4 \end{cases}$

18.  $f(x) = \lfloor -3x \rfloor$

20.  $f(x) = \begin{cases} -2x & \text{if } x < 1 \\ 3 & \text{if } x = 1 \\ 4x & \text{if } x > 1 \end{cases}$

22.  $g(x) = |9 - 3|x||$

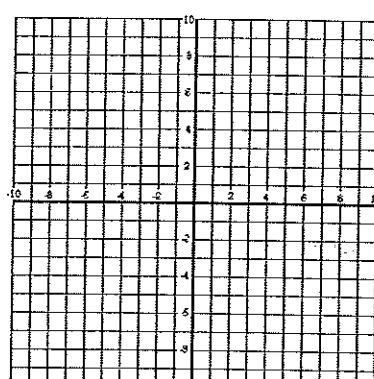
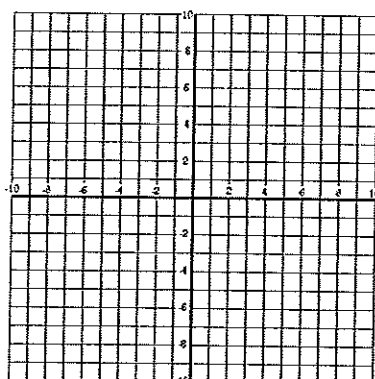
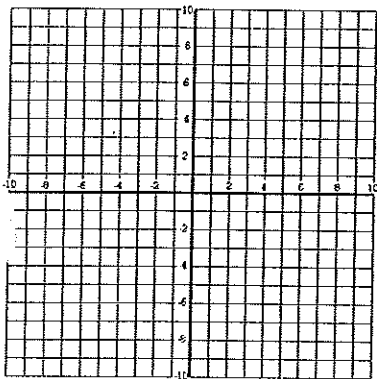
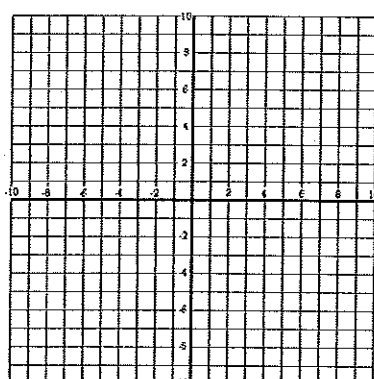
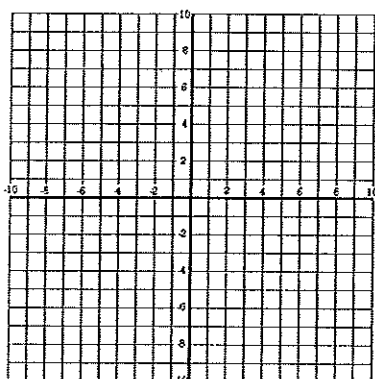
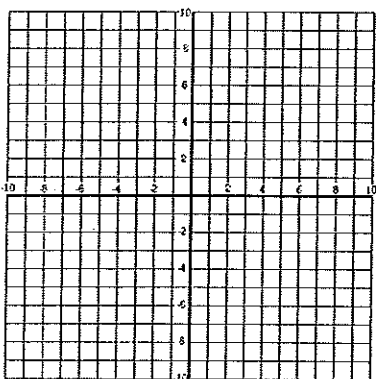
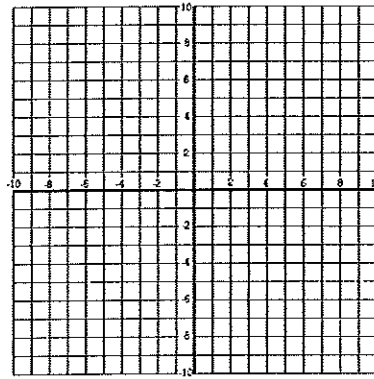
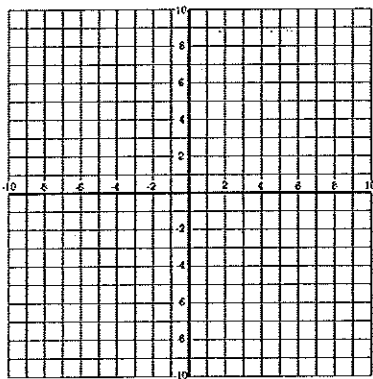
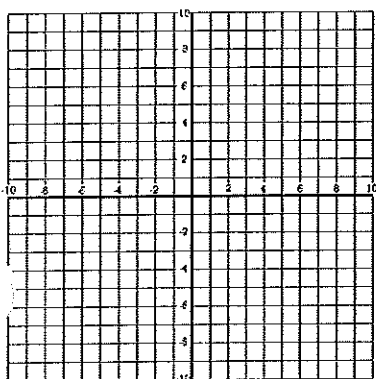
13.  $h(x) = x^3 + 2$

15.  $f(x) = \begin{cases} x & \text{if } x < -1 \\ x^2 & \text{if } x \geq -1 \end{cases}$

17.  $g(x) = 2|x - 3|$

19.  $h(x) = \begin{cases} x + 3 & \text{if } x \leq 0 \\ 3 - x & \text{if } 1 < x \leq 3 \\ 3x & \text{if } x > 3 \end{cases}$

21.  $j(x) = \frac{2}{\lfloor x \rfloor}$



29. **Accounting** The income tax brackets for the District of Columbia are listed in the tax table.

Income	Tax Bracket
up to \$10,000	6%
more than \$10,000, but no more than \$20,000	8%
more than \$20,000	9.5%

- What type of function is described by the tax rates?
- Write the function if  $x$  is income and  $t(x)$  is the tax rate.
- Graph the tax brackets for different taxable incomes.
- Alicia Davis lives in the District of Columbia. In which tax bracket is Ms. Davis if she made \$36,000 last year?

34. **Business** For a company, the revenue  $r(x)$  in dollars, from selling  $x$  items is  $r(x) = 400x - 0.2x^2$ . The cost for making and selling  $x$  items is  $c(x) = 0.1x + 200$ . Write the profit function  $p(x) = (r - c)(x)$ . (Lesson 1-2)

35. **Retail** Winston bought a sweater that was on sale 25% off. The original price of the sweater was \$59.99. If sales tax in Winston's area is 6.5%, how much did the sweater cost including sale tax? (Lesson 1-2)

36. State the domain and range of the relation  $\{(0, 2), (4, -2), (9, 3), (-7, 11), (-2, 0)\}$ . Is the relation a function? Explain. (Lesson 1-1)

37. **SAT Practice** Which of the following expressions is *not* larger than  $5 \times 6^{12}$ ?

- A  $5 + 6^{12}$
- B  $7 \times 6^{12}$
- C  $5 \times 8^{12}$
- D  $5 \times 6^{14}$
- E  $10^{13}$

45. **SAT/ACT Practice**  $\sqrt{\frac{\sqrt{25}}{5}} =$

A 1

B  $\sqrt{2}$

C 2

D 5

E  $5\sqrt{2}$

Solve each system of equations by

SUBSTITUTION

$$\begin{aligned} 5. \quad y &= 5x - 2 \\ y &= -2x + 5 \end{aligned}$$

$$\begin{aligned} 6. \quad x - y &= 2 \\ 2x &= 2y + 10 \end{aligned}$$

$$\begin{aligned} 21. \quad 5x - y &= 16 \\ 2x + 3y &= 3 \end{aligned}$$

$$\begin{aligned} 22. \quad 3x - 5y &= -8 \\ x + 2y &= 1 \end{aligned}$$

$$\begin{aligned} 23. \quad y &= 6 - x \\ x &= 4.5 + y \end{aligned}$$

Solve each system of equations algebraically. BY ELIMINATION

$$\begin{aligned} 7. \quad 7x + y &= 9 \\ 5x - y &= 15 \end{aligned}$$

$$\begin{aligned} 8. \quad 3x + 4y &= -1 \\ 6x - 2y &= 3 \end{aligned}$$

$$\begin{aligned} 9. \quad \frac{1}{3}x - \frac{3}{2}y &= -4 \\ 5x - 4y &= 14 \end{aligned}$$

$$\begin{aligned} 24. \quad 2x + 3y &= 3 \\ 12x - 15y &= -4 \end{aligned}$$

$$\begin{aligned} 25. \quad -3x + 10y &= 5 \\ 2x + 7y &= 24 \end{aligned}$$

$$\begin{aligned} 26. \quad x &= 2y - 8 \\ 2x - y &= -7 \end{aligned}$$

Solve each system of equations algebraically.

27.  $2x + 5y = 4$

$3x + 6y = 5$

28.  $\frac{3}{5}x - \frac{1}{6}y = 1$

$\frac{1}{5}x + \frac{5}{6}y = 11$

29.  $4x + 5y = -8$

$3x - 7y = 10$

**32. Sports** Spartan Stadium at San Jose State University in California has a seating capacity of about 30,000. A newspaper article states that the Spartans get four times as many tickets as the visiting team. Suppose  $S$  represents the number of tickets for the Spartans and  $V$  represents the number of tickets for the visiting team's fans.

a. Which system could be used by a newspaper reader to determine how many tickets each team gets?

A  $4S + 4V = 30,000$

$S = 4V$

B  $S - 4V = 0$

$S + V = 30,000$

C  $S + V = 30,000$

$V - 4S = 0$

b. Solve the system to find how many tickets each team gets.

**33. Geometry** Two triangles have the same perimeter of 20 units. One triangle is an isosceles triangle. The other triangle has a side 6 units long. Its other two sides are the same lengths as the base and leg of the isosceles triangle.

a. What are the dimensions of each triangle?

b. What type of triangle is the second triangle?

Solve each system of equations.

4.  $4x + 2y + z = 7$

$2x + 2y - 4z = -4$

$x + 3y - 2z = -8$

5.  $x - y - z = 7$

$-x + 2y - 3z = -12$

$3x - 2y + 7z = 30$

11.  $3x - 5y + z = 9$

$x - 3y - 2z = -8$

$5x - 6y + 3z = 15$

8.  $x + 2y + 3z = 5$

$3x + 2y - 2z = -13$

$5x + 3y - z = -11$

9.  $7x + 5y + z = 0$

$-x + 3y + 2z = 16$

$x - 6y - z = -18$

10.  $x - 3z = 7$

$2x + y - 2z = 11$

$-x - 2y + 9z = 13$



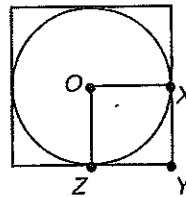
19. **Finance** Ana Colón asks her broker to divide her 401K investment of \$2000 among the International Fund, the Fixed Assets Fund, and company stock. She decides that her investment in the International Fund should be twice her investment in company stock. During the first quarter, the International Fund earns 4.5%, the Fixed Assets Fund earns 2.6%, and the company stock falls 0.2%. At the end of the first quarter, Ms. Colón receives a statement indicating a return of \$58 on her investment. How did the broker divide Ms. Colón's initial investment?

22. **Critical Thinking** Suppose you are using elimination to solve a system of equations.

- How do you know that a system has no solution?
- How do you know when it has an infinite number of solutions?

28. **SAT/ACT Practice** In the figure, the area of square  $OXYZ$  is 2. What is the area of the circle?

- A  $\frac{\pi}{4}$       B  $\pi\sqrt{2}$       C  $2\pi$   
 D  $4\pi$       E  $8\pi$



Solve each system of equations.

$$\begin{aligned} 6. \quad & 2x - 2y + 3z = 6 \\ & 2x - 3y + 7z = -1 \\ & 4x - 3y + 2z = 0 \end{aligned}$$

$$\begin{aligned} 12. \quad & 8x - z = 4 \\ & y + z = 5 \\ & 11x + y = 15 \end{aligned}$$

$$\begin{aligned} 13. \quad & 4x - 3y + 2z = 12 \\ & x + y - z = 3 \\ & -2x - 2y + 2z = 5 \end{aligned}$$

$$\begin{aligned} 14. \quad & 36x - 15y + 50z = -10 \\ & 2x + 25y = 40 \\ & 54x - 5y + 30z = -160 \end{aligned}$$

$$\begin{aligned} 15. \quad & -x - 3y + z = 54 \\ & 4x + 2y - 3z = -32 \\ & 2y + 8z = 78 \end{aligned}$$

$$\begin{aligned} 16. \quad & 1.8x - z = 0.7 \\ & 1.2y + z = -0.7 \\ & 1.5x - 3y = 3 \end{aligned}$$

18. What is the solution of  $\frac{1}{8}x - \frac{2}{3}y + \frac{5}{6}z = -8$ ,  $\frac{3}{4}x + \frac{1}{6}y - \frac{1}{3}z = -12$ , and  $\frac{3}{16}x - \frac{5}{8}y - \frac{7}{12}z = -25$ ? If there is no solution, write *impossible*.

21. **Physics** Each year the Punkin' Chunkin' contest is held in Lewes, Delaware. The object of the contest is to propel an 8- to 10-pound pumpkin as far as possible. Steve Young of Hopewell, Illinois, set the 1998 record of 4026.32 feet. Suppose you build a machine that fires the pumpkin so that it is at a height of 124 feet after 1 second, the height at 3 seconds is 272 feet, and the height at 8 seconds is 82 feet. Refer to the formula in Exercise 7 to find the acceleration, the initial velocity, and the initial height of the pumpkin.

23. **Number Theory** Find all of the ordered triples  $(x, y, z)$  such that when any one of the numbers is added to the product of the other two, the result is 2.

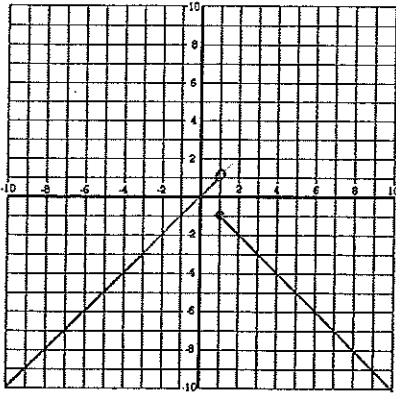
24. Solve the system of equations,  $3x + 4y = 375$  and  $5x + 2y = 345$ . (*Lesson 2-1*)

Pre-Calculus Piecewise Worksheet 1

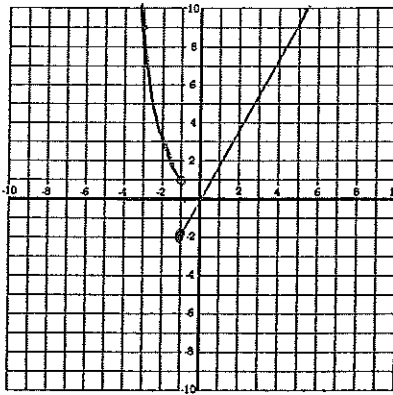
Name DETERS, KEI

Graph each function and state the domain.

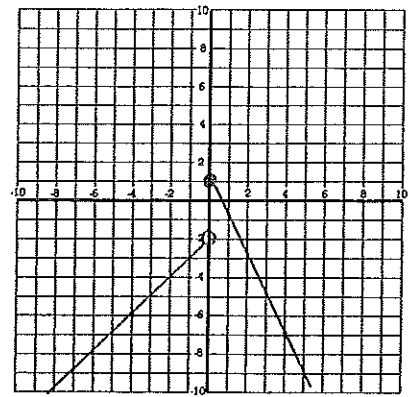
$$f(x) = \begin{cases} x & x < 1 \\ -x & x \geq 1 \end{cases}$$



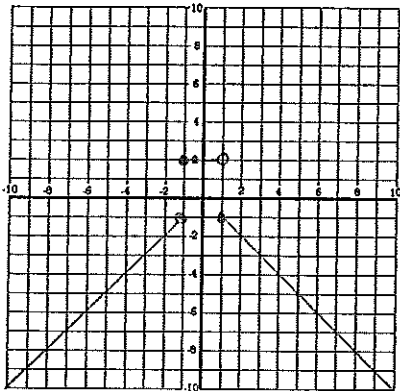
$$f(x) = \begin{cases} x^2 & x < -1 \\ 2x & x \geq -1 \end{cases}$$



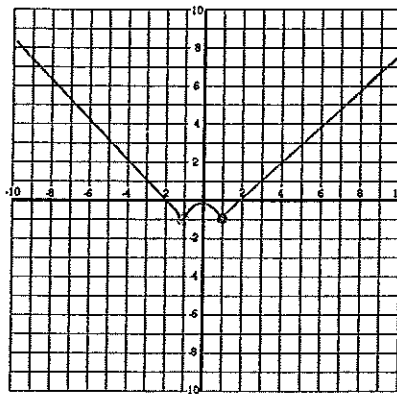
$$f(x) = \begin{cases} x-2 & x < 0 \\ -2x+1 & x \geq 0 \end{cases}$$



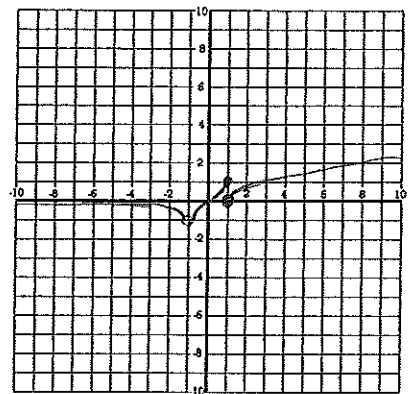
$$f(x) = \begin{cases} x & x < -1 \\ 2 & -1 \leq x < 1 \\ -x & x \geq 1 \end{cases}$$



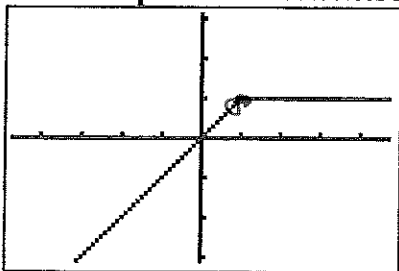
$$f(x) = \begin{cases} -x-2 & x < -1 \\ -x^2 & -1 \leq x < 1 \\ x-2 & x \geq 1 \end{cases}$$



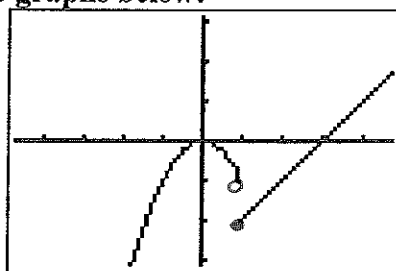
$$f(x) = \begin{cases} 1/x & x < -1 \\ x^3 & -1 \leq x < 1 \\ \ln x & x \geq 1 \end{cases}$$



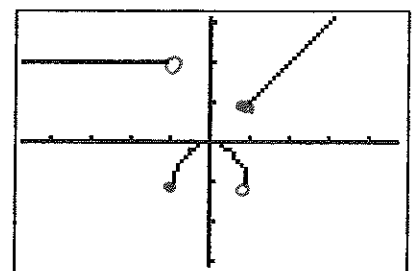
State the piecewise function for the graphs below:



$$f(x) = \begin{cases} x & \text{if } x < 1 \\ 1 & \text{if } x \geq 1 \end{cases}$$



$$f(x) = \begin{cases} -x^2 & \text{if } x < 1 \\ x-3 & \text{if } x \geq 1 \end{cases}$$



$$f(x) = \begin{cases} 2 & \text{if } x < -1 \\ -x^2 & \text{if } -1 \leq x < 1 \\ x & \text{if } x \geq 1 \end{cases}$$

Graph each function.

$$5. f(x) = \begin{cases} 2x & \text{if } 0 \leq x \leq 4 \\ 8 & \text{if } 4 < x \leq 7 \end{cases}$$

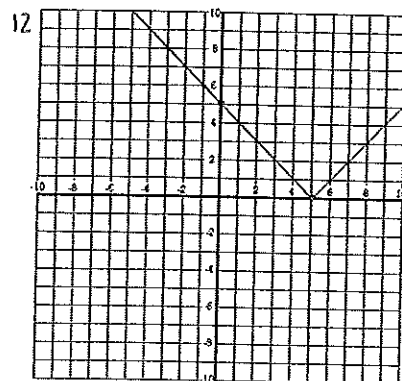
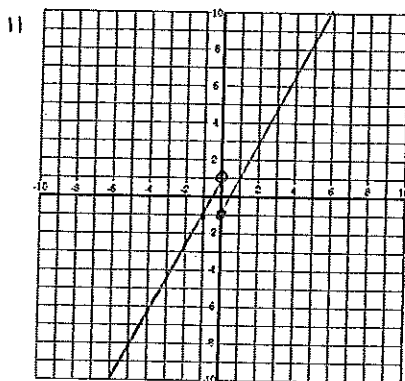
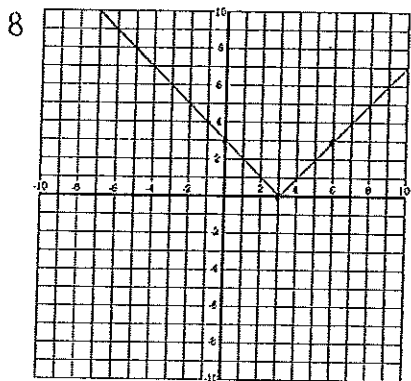
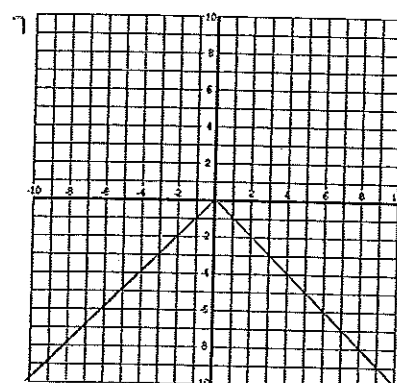
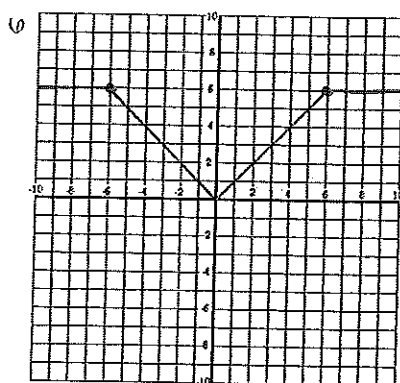
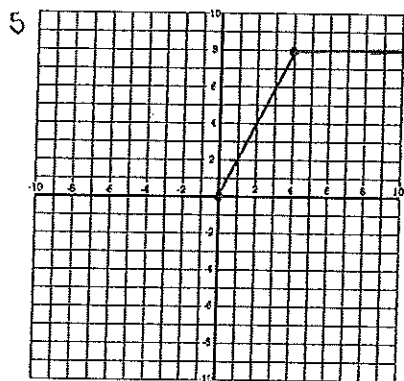
$$7. f(x) = -|x|$$

$$11. f(x) = \begin{cases} 2x + 1 & \text{if } x < 0 \\ 2x - 1 & \text{if } x \geq 0 \end{cases}$$

$$6. f(x) = \begin{cases} 6 & \text{if } x \leq -6 \\ |x| & \text{if } -6 < x < 6 \\ 6 & \text{if } x > 6 \end{cases}$$

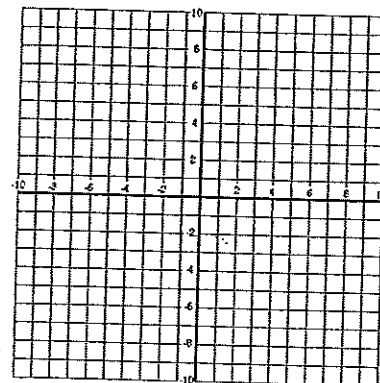
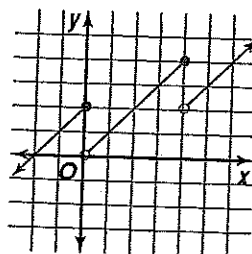
$$8. f(x) = |x - 3|$$

$$12. g(x) = |x - 5|$$



3. Write the function that is represented by the graph.

$$f(x) = \begin{cases} x+2 & \text{if } x \leq 0 \\ x & \text{if } 0 < x \leq 3 \\ x-2 & \text{if } x > 3 \end{cases}$$



(10) **Consumerism** Guillermo Lujan is flying from Denver to Dallas for a convention. He can park his car in the Denver airport long-term parking lot at the terminal or in the shuttle parking facility closeby. In the long-term lot, it costs \$1.00 per hour or any part of an hour with a maximum charge of \$6.00 per day. In shuttle facility, he has to pay \$4.00 for each day or part of a day. Which parking lot is less expensive if Mr. Lujan returns after 2 days and 3 hours?

long term:  $y = 6x + 3z$   
 $6(2) + 3(1) = \$15$

z = hours  
 x = days

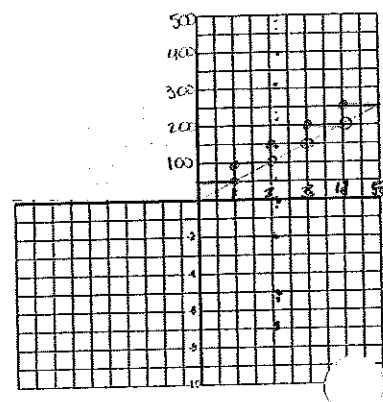
shuttle:  $y = 4x$   
 $4(3) = \$12$

∴ the shuttle is the better option

9. **Business** Identify the type of function that models the labor cost for repairing a computer if the charge is \$50 per hour or fraction thereof. Then write and graph a function for the situation. For Hours 0 to 5 And Graph

$y = 50x$

$f(x) = \begin{cases} 50 & 0 < x \leq 1 \\ 100 & 1 < x \leq 2 \\ 150 & 2 < x \leq 3 \\ 200 & 3 < x \leq 4 \\ 250 & 4 < x \leq 5 \end{cases}$



$10x^4 - 3x^4 - 3x^3 - x^2 + 2x - 2x - 8 - 9$   
 $7x^4 - 3x^3 - x^2 - 17$

6. For all  $x$ ,  $(10x^4 - x^2 + 2x - 8) - (3x^4 + 3x^3 + 2x + 9) = ?$
- (A)  $7x^4 - 3x^3 - x^2 - 17$
  - B  $7x^4 - 4x^2 - 17$
  - C  $7x^4 + 3x^3 - x^2 + 4x$
  - D  $7x^4 + 2x^2 + 4x$
  - E  $13x^4 - 3x^3 + x^2 + 4x$

8. If  $x > 0$ , then  $\frac{\sqrt{100x^2 + 600x + 900}}{x + 3} = ?$
- A 9
  - (B) 10
  - C 30
  - D 40
  - E It cannot be determined from the information given.

7. If  $\frac{n}{8}$  has a remainder of 5, then which of the following has a remainder of 7?
- A  $\frac{n+1}{8}$
  - (B)  $\frac{n+2}{8}$
  - C  $\frac{n+3}{8}$
  - D  $\frac{n+5}{8}$
  - E  $\frac{n+7}{8}$

9. What is the value of  $c$ ?

Given:  $a + b = c$   
 $a - c = 5$   
 $b - c = 3$

$a = c + 5$   
 $b = c + 3$

$(c+5) + (c+3) = c$   
 $2c + 8 = c$   
 $-c = -8$   
 $c = 8$

A -10  
 (B) -8  
 C -5  
 D -3  
 E 3

$a = -3$   
 $b = -5$

10. **Grid-In** If  $4x + 2y = 24$  and  $\frac{7y}{2x} = 7$ , then  $x = ?$

$2y = 24 - 4x$   
 $y = 12 - 2x$

$\frac{7(12-2x)}{2x} = 7$   
 $84 - 14x = 14x$   
 $84 = 28x$   
 $3 = x$

Graph each function.

14.  $g(x) = |2x + 3|$

16.  $h(x) = \begin{cases} 3 & \text{if } -1 \leq x \leq 1 \\ 4 & \text{if } 1 < x \leq 4 \\ x & \text{if } x > 4 \end{cases}$

18.  $f(x) = \lfloor -3x \rfloor$

20.  $f(x) = \begin{cases} -2x & \text{if } x < 1 \\ 3 & \text{if } x = 1 \\ 4x & \text{if } x > 1 \end{cases}$

22.  $g(x) = |9 - 3|x||$

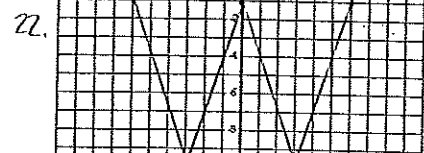
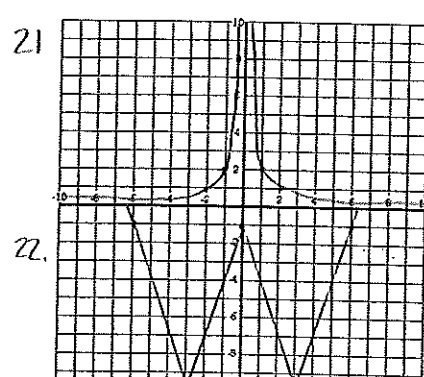
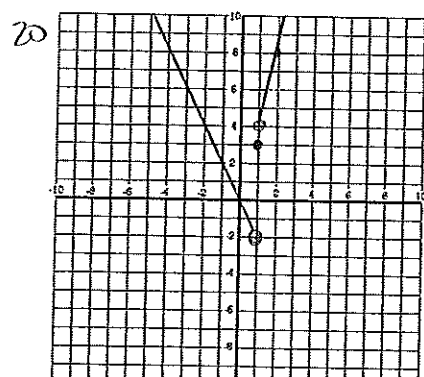
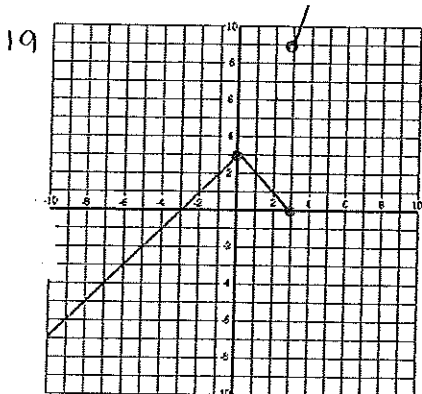
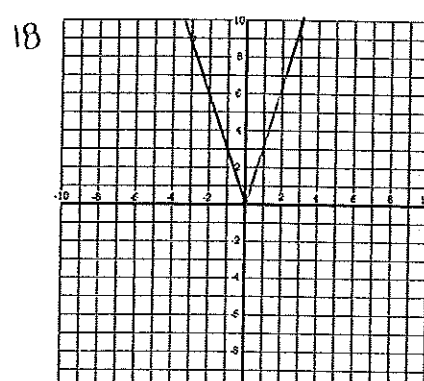
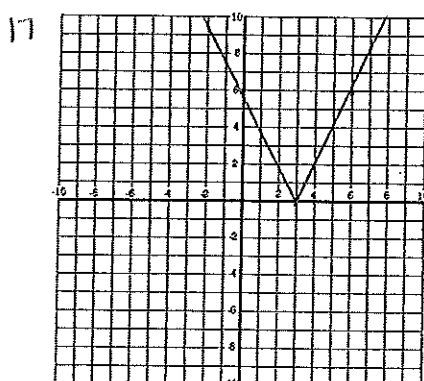
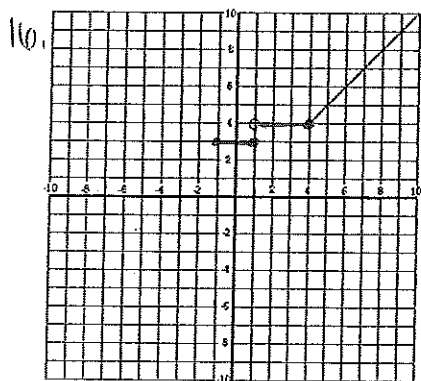
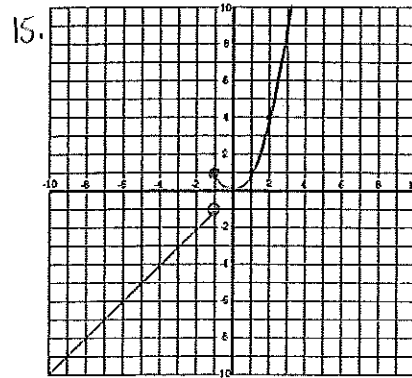
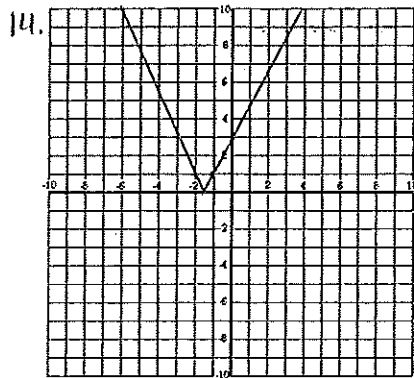
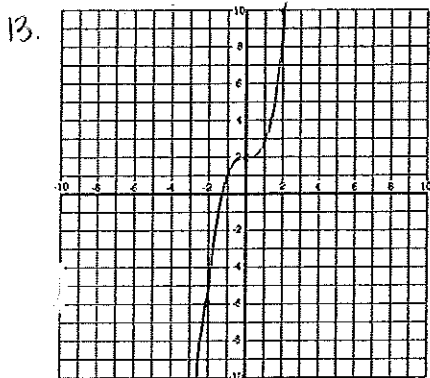
13.  $h(x) = x^3 + 2$

15.  $f(x) = \begin{cases} x & \text{if } x < -1 \\ x^2 & \text{if } x \geq -1 \end{cases}$

17.  $g(x) = 2|x - 3|$

19.  $h(x) = \begin{cases} x + 3 & \text{if } x \leq 0 \\ 3 - x & \text{if } 1 < x \leq 3 \\ 3x & \text{if } x > 3 \end{cases}$

21.  $j(x) = \frac{2}{\lfloor x \rfloor}$

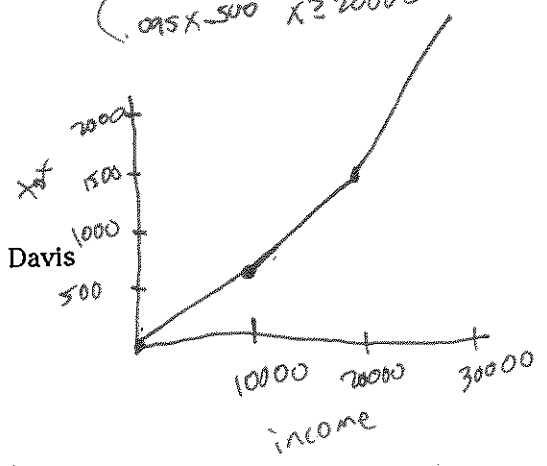


29. **Accounting** The income tax brackets for the District of Columbia are listed in the tax table.

Income	Tax Bracket
up to \$10,000	6%
more than \$10,000, but no more than \$20,000	8%
more than \$20,000	9.5%

tax  
0-600  
600-1400  
1400-∞

$$f(x) = \begin{cases} .06x & x < 10000 \\ .08x - 200 & 10000 \leq x \leq 20000 \\ .095x - 500 & x > 20000 \end{cases}$$



- a. What type of function is described by the tax rates? *piecewise*  
 b. Write the function if  $x$  is income and  $t(x)$  is the tax rate.  
 c. Graph the tax brackets for different taxable incomes.  
 d. Alicia Davis lives in the District of Columbia. In which tax bracket is Ms. Davis if she made \$36,000 last year?

*9.5%*  
 $.095(36000) - 500 = \$2920$

34. **Business** For a company, the revenue  $r(x)$  in dollars, from selling  $x$  items is  $r(x) = 400x - 0.2x^2$ . The cost for making and selling  $x$  items is  $c(x) = 0.1x + 200$ . Write the profit function  $p(x) = (r - c)(x)$ . (Lesson 1-2)

$$p(x) = (400x - .2x^2) + (-.1x + 200)$$

$$p(x) = -.2x^2 + 399.9x - 200$$

35. **Retail** Winston bought a sweater that was on sale 25% off. The original price of the sweater was \$59.99. If sales tax in Winston's area is 6.5%, how much did the sweater cost including sale tax? (Lesson 1-2)

$$59.99 \cdot .75 = 44.9925 \cdot 1.065 = \$47.92$$

36. State the domain and range of the relation  $\{(0, 2), (4, -2), (9, 3), (-7, 11), (-2, 0)\}$ . Is the relation a function? Explain. (Lesson 1-1)

D:  $\{-7, -2, 0, 4, 9\}$   
 R:  $\{-2, 0, 2, 3, 11\}$   
*yes, this is a function*

37. **SAT Practice** Which of the following expressions is *not* larger than  $5 \times 6^{12}$ ?

- (A)  $5 + 6^{12}$
- B  $7 \times 6^{12}$
- C  $5 \times 8^{12}$
- D  $5 \times 6^{14}$
- E  $10^{13}$

45. **SAT/ACT Practice**  $\sqrt{\frac{\sqrt{25}}{5}} =$

- (A) 1
- B  $\sqrt{2}$
- C 2
- D 5
- E  $5\sqrt{2}$



Solve each system of equations by:

**SUBSTITUTION**

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

$5x - 2 = -2x + 5$   $y = 5(1) - 2$   
 $7x = 7$   $y = 3$

$x = 1$   
 $(1, 3)$

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

$2(2 + y) = 2y + 10$   
 $4 + 2y = 2y + 10$   
 $4 \neq 10$

False, no solution

21.  $5x - y = 16$   $y = 5x - 16$   
 $2x + 3y = 3$

$2x + 3(5x - 16) = 3$

$2x + 15x - 48 = 3$

$17x = 51$

$x = 3$   $(3, -1)$

$2(3) + 3y = 3$

$6 + 3y = 3$

$3y = -3$

$y = -1$

22.  $3x - 5y = -8$   
 $x + 2y = 1$   $x = 1 - 2y$

$3(1 - 2y) - 5y = -8$

$3 - 6y - 5y = -8$

$-11y = -11$

$y = 1$

$x + 2(1) = 1$

$x + 2 = 1$

$x = -1$   $(-1, 1)$

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

$x = 4.5 + (6 - x)$

$2x = 10.5$

$x = 5.25 = \frac{21}{4}$

$y = 6 - 5.25 = \frac{3}{4}$   $(\frac{21}{4}, \frac{3}{4})$

$y = \frac{3}{4}$

Solve each system of equations algebraically. **BY ELIMINATION**

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

$12x = 24$

$x = 2$

$7(2) + y = 9$

$14 + y = 9$

$y = -5$

$(2, -5)$

8.  $3x + 4y = -1$

$2(6x - 2y = 3)$

$12x - 4y = 6$

$15y = 5$

$x = \frac{1}{3}$

$3(\frac{1}{3}) + 4y = -1$

$1 + 4y = -1$

$4y = -2$

$y = -\frac{1}{2}$

$(\frac{1}{3}, -\frac{1}{2})$

9.  $(\frac{1}{3}x - \frac{3}{2}y = -4) \cdot \frac{8}{3}$

$5x - 4y = 14$

$-\frac{9}{8} \cdot \frac{-8}{9}x + \frac{4}{9}y = \frac{32}{3} \cdot \frac{-9}{8}$

$x = -12$

$5(-12) - 4y = 14$

$-60 - 4y = 14$

$-4y = 74$

$y = -18.5$

$(-12, -18.5)$

24.  $(2x + 3y = 3) \cdot 5$   
 $12x - 15y = -4$

$10x + 15y = 15$

$22x = 11$

$x = \frac{1}{2}$

$2(\frac{1}{2}) + 3y = 3$

$1 + 3y = 3$

$3y = 2$

$y = \frac{2}{3}$

$(\frac{1}{2}, \frac{2}{3})$

25.  $(-3x + 10y = 5) \cdot 2$   
 $(2x + 7y = 24) \cdot 3$

$-6x + 20y = 10$

$6x + 21y = 72$

$41y = 82$

$y = 2$

$2x + 7(2) = 24$

$2x + 14 = 24$

$2x = 10$

$x = 5$

$(5, 2)$

26.  $x = 2y - 8$   
 $(2x - y = -7) \cdot 2$

$2x - x = 8$

$-2x + 4y = -14$

$3x = -6$

$y = -2$

$-2 = 2y - 8$

$6 = 2y$

$3 = y$

$(-2, 3)$

Solve each system of equations algebraically.

27.  $(2x + 5y = 4) \cdot 3$

$(3x + 6y = 5) \cdot 2$

$$\begin{array}{r} 6x + 15y = 12 \\ -6x - 12y = -10 \\ \hline 3y = 2 \\ \boxed{y = \frac{2}{3}} \end{array}$$

$3x + 6(\frac{2}{3}) = 5$

$3x + 4 = 5$

$3x = 1$   
 $\boxed{x = \frac{1}{3}}$   $(\frac{1}{3}, \frac{2}{3})$

28.  $(\frac{3}{5}x - \frac{1}{6}y = 1) \cdot 5$

$\frac{1}{5}x + \frac{5}{6}y = 11$

$3x - \frac{5}{6}y = 5$

$\frac{10}{5}x = 110 \cdot \frac{5}{10}$

$\boxed{x = 5}$

$\frac{1}{5}(5)x + \frac{5}{6}y = 11$

$1 + \frac{5}{6}y = 11$

$\frac{5}{6} \cdot \frac{5}{6}y = 10 \cdot \frac{6}{5}$

$(5, 12) \quad \boxed{y = 12}$

29.  $(4x + 5y = -8) \cdot 3$

$(3x - 7y = 10) \cdot -4$

$12x + 15y = -24$   
 $-12x + 28y = -40$

$43y = -64$

$\boxed{y = \frac{-64}{43}}$

$4x + 5(\frac{-64}{43}) = -8$

$4x + \frac{-320}{43} = -8$

$4x = \frac{-24}{43}$

$\boxed{x = \frac{-6}{43}}$

$(\frac{-6}{43}, \frac{-64}{43})$

32. **Sports** Spartan Stadium at San Jose State University in California has a seating capacity of about 30,000. A newspaper article states that the Spartans get four times as many tickets as the visiting team. Suppose  $S$  represents the number of tickets for the Spartans and  $V$  represents the number of tickets for the visiting team's fans.

$4S + V = 30,000$

a. Which system could be used by a newspaper reader to determine how many tickets each team gets?

A  $4S + 4V = 30,000$   
 $S = 4V$

B  $S - 4V = 0$   
 $S + V = 30,000$

C  $S + V = 30,000$   
 $V - 4S = 0$

b. Solve the system to find how many tickets each team gets.

$S - 4V = 0$

$S = 4V$

$(4V) + V = 30,000$

$5V = 30,000$

$\boxed{V = 6,000}$

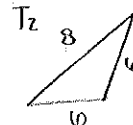
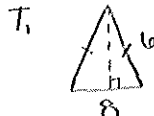
$S + 6000 = 30,000$

$\boxed{S = 24,000}$

33. **Geometry** Two triangles have the same perimeter of 20 units. One triangle is an isosceles triangle. The other triangle has a side 6 units long. Its other two sides are the same lengths as the base and leg of the isosceles triangle.

- a. What are the dimensions of each triangle?
- b. What type of triangle is the second triangle?

isosceles, they are the same exact triangle.



- ~~1+15~~
- ~~2+12~~
- ~~3+11~~
- ~~4+10~~
- ~~5+9~~
- 6+8
- ~~7+7~~

Solve each system of equations.

4.  $4x + 2y + z = 7$   
 $2x + 2y - 4z = -4$   
 $x + 3y - 2z = -8$   
 $(3, -3, 1)$

$z = -4x - 2y + 7$

$2x + 2y - 4(-4x - 2y + 7) = -4$   
 $2x + 2y + 16x + 8y - 28 = -4$   
 $18x + 10y = 24$

$x + 3y - 2(-4x - 2y + 7) = -8$   
 $x + 3y + 8x + 4y - 14 = -8$   
 $9x + 7y = 6$

$\frac{18x + 10y = 24}{-2} \rightarrow -9x - 5y = -12$   
 $\frac{9x + 7y = 6}{+} \rightarrow -2y = -18$   
 $2y = 18$   
 $y = 9$

$9x + 7(9) = 6$   
 $9x - 63 = 6$   
 $9x = 69$   
 $x = 7.67$

5.  $x - y - z = 7$   
 $-x + 2y - 3z = -12$   
 $3x - 2y + 7z = 30$   
 $(7, -1, 1)$

$x = y + z + 7$

$-(y + z + 7) + 2y - 3z = -12$   
 $-y - z - 7 + 2y - 3z = -12$   
 $y - 4z = 5$

$3(y + z + 7) - 2y + 7z = 30$   
 $3y + 3z + 21 - 2y + 7z = 30$   
 $y + 10z = 9$

$-1(y - 4z = 5)$   
 $-y + 4z = -5$   
 $\frac{y + 10z = 9}{+} \rightarrow 14z = 14$   
 $z = 1$

$y - 4(1) = 5$   
 $y - 4 = 5$   
 $y = 9$

$x - (9) - (1) = 7$   
 $x - 10 = 7$   
 $x = 17$

11.  $3x - 5y + z = 9$   
 $x - 3y - 2z = -8$   
 $5x - 6y + 3z = 15$   
 $(-6, -4, 7)$

$z = -3x + 5y + 9$

$x - 3y - 2(-3x + 5y + 9) = -8$   
 $x - 3y + 6x - 10y - 18 = -8$   
 $7x - 13y = 10$

$5x - 6y + 3(-3x + 5y + 9) = 15$   
 $5x - 6y - 9x + 15y + 27 = 15$   
 $-4x + 9y = -12$

$4(7x - 13y = 10) \rightarrow 28x - 52y = 40$   
 $7(-4x + 9y = -12) \rightarrow -28x + 63y = -84$   
 $\frac{28x - 52y = 40}{+} \rightarrow 11y = -44$   
 $y = -4$

$-4x + 9(-4) = -12$   
 $-4x - 36 = -12$   
 $-4x = 24$   
 $x = -6$

$3(-6) - 5(-4) + z = 9$   
 $-18 + 20 + z = 9$   
 $2 + z = 9$   
 $z = 7$

8.  $x + 2y + 3z = 5$   
 $3x + 2y - 2z = -13$   
 $5x + 3y - z = -11$   
 $(1, -4, 4)$

$x = -2y - 3z + 5$

$3(-2y - 3z + 5) + 2y - 2z = -13$   
 $-6y - 9z + 15 + 2y - 2z = -13$   
 $-4y - 11z = -28$

$5(-2y - 3z + 5) + 3y - z = -11$   
 $-10y - 15z + 25 + 3y - z = -11$   
 $-7y - 16z = -36$

$-7(-4y - 11z = -28) \rightarrow 28y + 77z = 196$   
 $4(-7y - 16z = -36) \rightarrow -28y - 64z = -144$   
 $\frac{28y + 77z = 196}{+} \rightarrow 13z = 52$   
 $z = 4$

$-4y - 11(4) = -28$   
 $-4y - 44 = -28$   
 $-4y = 16$   
 $y = -4$

$x + 2(-4) + 3(4) = 5$   
 $x - 8 + 12 = 5$   
 $x + 4 = 5$   
 $x = 1$

9.  $7x + 5y + z = 0$   
 $-x + 3y + 2z = 16$   
 $x - 6y - z = -18$   
 $(-2, 2, 4)$

$z = -7x - 5y$   
 $-x + 3y + 2(-7x - 5y) = 16$   
 $-x + 3y - 14x - 10y = 16$   
 $-15x - 7y = 16$

$x - 6y - (-7x - 5y) = -18$   
 $x - 6y + 7x + 5y = -18$   
 $8x - y = -18$

$-1(-15x - 7y = 16) \rightarrow 15x + 7y = -16$   
 $7(8x - y = -18) \rightarrow 56x - 7y = -126$   
 $\frac{15x + 7y = -16}{+} \rightarrow 71x = -142$   
 $x = -2$

$8(-2) - y = -18$   
 $-16 - y = -18$   
 $-y = -2$   
 $y = 2$

$7(-2) + 5(2) + z = 0$   
 $-14 + 10 + z = 0$   
 $-4 + z = 0$   
 $z = 4$

10.  $x - 3z = 7$   
 $2x + y - 2z = 11$   
 $-x - 2y + 9z = 13$   
 $(10, -7, 1)$

$x = 3z + 7$   
 $2(3z + 7) + y - 2z = 11$   
 $6z + 14 + y - 2z = 11$   
 $4z + y = -3$

$-3z - 7 - 2y + 9z = 13$   
 $6z - 2y = 20$

$2(4z + y = -3) \rightarrow 8z + 2y = -6$   
 $\frac{6z - 2y = 20}{+} \rightarrow 14z = 14$   
 $z = 1$

$x - 3(1) = 7$   
 $x - 3 = 7$   
 $x = 10$

$2(10) + y - 2(1) = 11$   
 $20 + y - 2 = 11$   
 $18 + y = 11$   
 $y = -7$

19. **Finance** Ana Colón asks her broker to divide her 401K investment of \$2000 among the International Fund, the Fixed Assets Fund, and company stock. She decides that her investment in the International Fund should be twice her investment in company stock. During the first quarter, the International Fund earns 4.5%, the Fixed Assets Fund earns 2.6%, and the company stock falls 0.2%. At the end of the first quarter, Ms. Colón receives a statement indicating a return of \$58 on her investment. How did the broker divide Ms. Colón's initial investment?

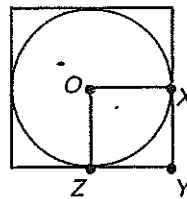
$$\begin{aligned}
 .045x + .026y - .002z &= 58 & x &= 2z & (1200, 200, 600) \\
 x & & - & 2z & = 0 \\
 x + & y + z & = & 2000
 \end{aligned}$$

22. **Critical Thinking** Suppose you are using elimination to solve a system of equations.

- How do you know that a system has no solution? both  $x$  &  $y$  disappear & the solution is not equal
- How do you know when it has an infinite number of solutions? both  $x$  &  $y$  disappear & the solution is equal

28. **SAT/ACT Practice** In the figure, the area of square  $OXYZ$  is 2. What is the area of the circle?

- A  $\frac{\pi}{4}$  <sup>.25</sup>    B  $\pi\sqrt{2}$  <sup>1.41</sup>    C  $2\pi$  <sup>1.41</sup>  
 D  $4\pi$     E  $8\pi$



$$\pi r^2$$