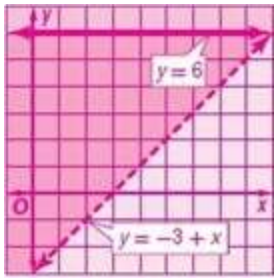
3-2 Solving Systems of Inequalities by Graphing

Solve each system of inequalities by graphing.

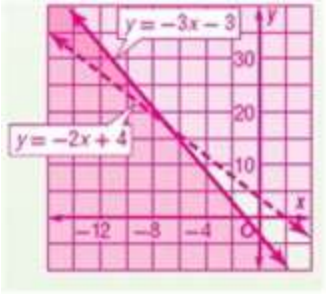
1. $y \le 6$
$y > -3 + x$

ANSWER:



3. $y > -2x + 4$
$y \le -3x - 3$

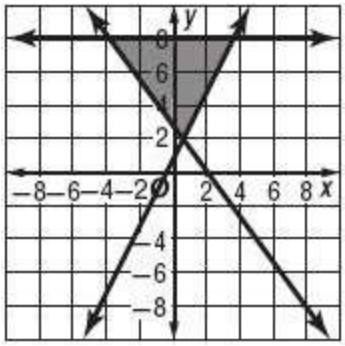
ANSWER:



Find the coordinates of the vertices of the triangle formed by each system of inequalities.

5. $y \ge 2x + 1$
$y \le 8$
$4x + 3y \ge 8$

ANSWER:

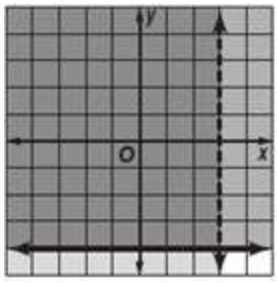


(3.5, 8), (–4, 8), (0.5, 2)

Solve each system of inequalities by graphing.

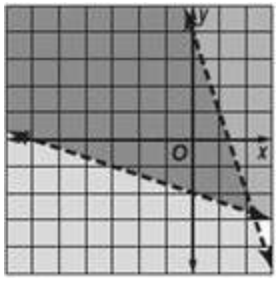
7. $x < 3$
$y \ge -4$

ANSWER:



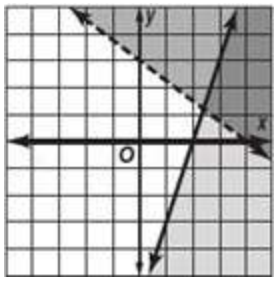
9. $y < -3x + 4$
$3y + x > -6$

ANSWER:



11. $6x - 2y \ge 12$
$3x + 4y > 12$

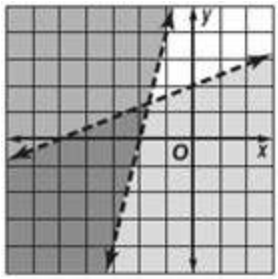
ANSWER:



3-2 Solving Systems of Inequalities by Graphing

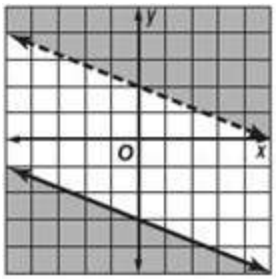
13. $5y < 2x + 10$
$y - 4x > 8$

ANSWER:



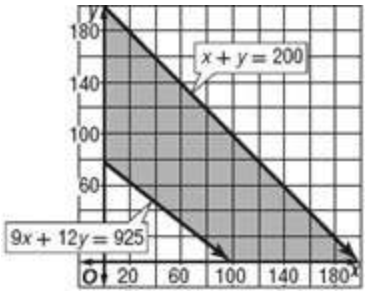
15. $y > -\frac{2}{5}x + 2$
$5y \le -2x - 15$

ANSWER:



17. **SUMMER TRIP** Rondell has to save at least $925 to go to Rome with his Latin class in 8 weeks. He earns $9 an hour working at the Pizza Palace and $12 an hour working at a car wash. By law, he cannot work more than 25 hours per week. Graph two inequalities that Rondell can use to determine the number of hours he needs to work at each job if he wants to make the trip.

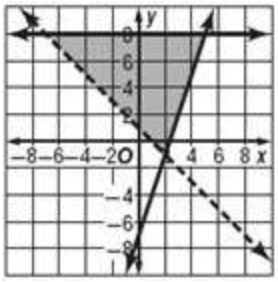
ANSWER:



Find the coordinates of the vertices of the triangle formed by each system of inequalities.

19. $y \ge 3x - 7$
$y \le 8$
$x + y > 1$

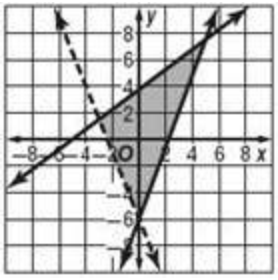
ANSWER:



(2, –1), (5, 8), (–7, 8)

21. $-3x + 4y \le 15$
$2y + 5x > -12$
$10y + 60 \ge 27x$

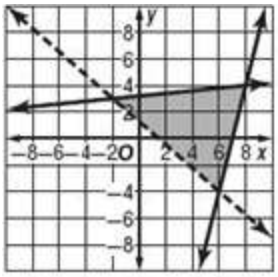
ANSWER:



(–3, 1.5), (5, 7.5), (0, –6)

23. $6y - 24x \ge -168$
$8y + 7x > 10$
$20y - 2x \le 64$

ANSWER:



(8, 4), (6, –4), (–2, 3)

25. **CELL PHONES** Dale has a maximum of 800 minutes on his cell phone plan that he can use each month. Daytime minutes cost $0.15, and nighttime minutes cost $0.10. Dale plans to use at least twice as many daytime minutes as nighttime minutes. If Dale uses at least 200 nighttime minutes and does not go over his limit, what is his maximum bill? his minimum bill?

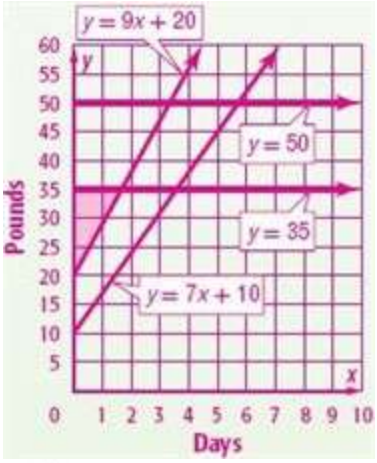
ANSWER:

maximum = $110, minimum = $80

27. **CCSS REASONING** On a camping trip, Jessica needs at least 3 pounds of food and 0.5 gallon of water per day. Marc needs at least 5 pounds of food and 0.5 gallon of water per day. Jessica's equipment weighs 10 pounds, and Marc's equipment weighs 20 pounds.
A gallon of water weighs approximately 8 pounds. Each of them carries their own supplies, and Jessica is capable of carrying 35 pounds while Marc can carry 50 pounds.
a. Graph the inequalities that represent how much they can carry.
b. How many days can they camp, assuming that they bring all their supplies in at once?
c. Who will run out of supplies first?

ANSWER:

a.



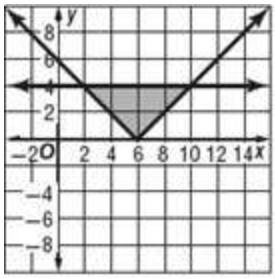
b. $3\frac{1}{3}$ days

c. Marc; Jessica could last about a quarter of a day longer than Marc.

Solve each system of inequalities by graphing.

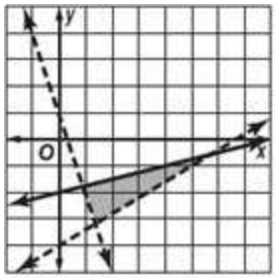
29. $y \geq |6 - x|$
$|y| \leq 4$

ANSWER:



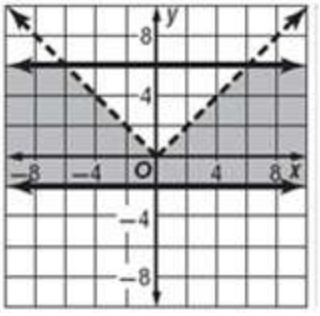
31. $y > -3x + 1$
$4y \leq x - 8$
$3x - 5y < 20$

ANSWER:



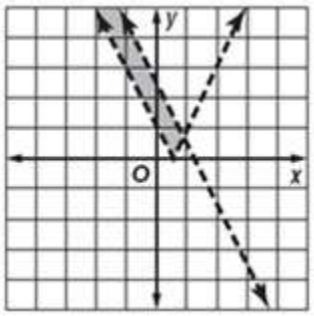
33. $|x| > y$
$y \leq 6$
$y \geq -2$

ANSWER:



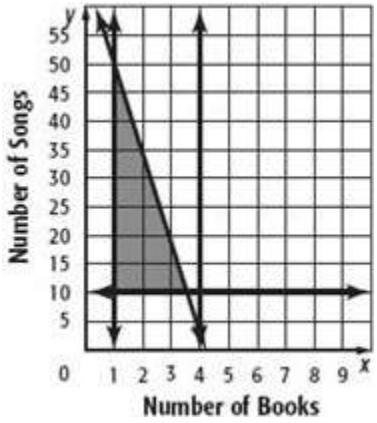
35. $8x + 4y < 10$
$y > |2x - 1|$

ANSWER:



37. **MUSIC** Steve is trying to decide what to put on his MP3 player. Audio books are 3 hours long and songs are 2.5 minutes long. Steve wants no more than 4 audio books on his MP3 player, but at least ten songs and one audio book. Each book costs $15.00 and each song costs $0.95. Steve has $63 to spend on books and music. Graph the inequalities to show possible combinations of books and songs that Steve can have.

ANSWER:



39. **TIME MANAGEMENT** Ramir uses his spare time to write a novel and to exercise. He has budgeted 35 hours per week. He wants to exercise at least 7 hours a week but no more than 15. He also hopes to write between 20 and 25 hours per week. Write and graph a system of inequalities that represents this situation.

ANSWER:

Let w = the number of hours writing, and let e = the number of hours exercising.

$w + e \leq 35$

$7 \leq e \leq 15$

$20 \leq w \leq 25$

Find the coordinates of the vertices of the figure formed by each system of inequalities.

41. $y \geq -x - 8$
$2y \geq 3x - 20$
$4y + x \leq 24$
$y \leq 4x + 22$

ANSWER:

$(-6, -2), \left(-3\frac{13}{17}, 6\frac{16}{17}\right), \left(9\frac{1}{7}, 3\frac{5}{7}\right), (0.8, -8.8)$

43. **FINANCIAL LITERACY** Mr. Hoffman is investing $10,000 in two funds. One fund will pay 6% interest, and a riskier second fund will pay 10% interest. What is the least amount Mr. Hoffman can invest in the risky fund and still earn at least $740 after one year?

ANSWER:

$3500

45. **CHALLENGE** Find the area of the region defined by the following inequalities.

$y \geq -4x - 16$

$4y \leq 26 - x$

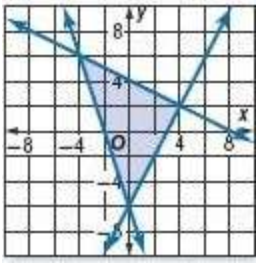
$3y + 6x \leq 30$

$4y - 2x \geq -10$

ANSWER:

75 square units

47. **CHALLENGE** Write a system of inequalities to represent the solution shown. How many points with integer coordinates are solutions of the system?



ANSWER:

$y \geq 2x - 6;$

Sample answer: $y \leq -0.5x + 4;$; 47

$y \geq -3x - 6$

49. **WRITING IN MATH** Write a how-to manual for determining where to shade when graphing a system of inequalities.

ANSWER:

Sample answer: Shade each inequality in its standard way, by shading above the line if $y >$ and shading below the line if $y <$ (or you can use test points). Once you determine where to shade for each inequality, the area where every inequality needs to be shaded is the actual solution. This is only the shaded area.

51. To be a member of the marching band, a student must have a grade-point average of at least 2.0 and must have attended at least five after-school practices. Choose the system of inequalities that best represents this situation.

A $x \geq 2$, $y \geq 5$

B $x \leq 2$, $y \leq 5$

C $x < 2$, $y < 5$

D $x > 2$, $y > 5$

ANSWER:

A

53. **SHORT RESPONSE** If $3x = 2y$ and $5y = 6z$, what is the value of x in terms of z?

ANSWER:

$\frac{4}{5}z$

55. **GEOMETRY** Find the coordinates of the vertices of the parallelogram whose sides are contained in the lines with equations $y = 3, y = 7, y = 2x,$ and $y = 2x - 13.$

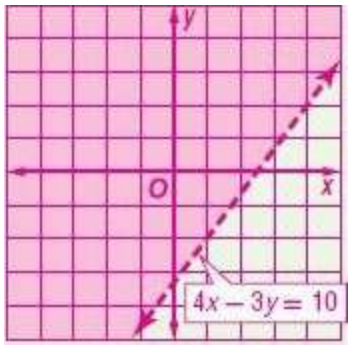
ANSWER:

$(1.5, 3), (3.5, 7), (8, 3), (10, 7)$

Graph each inequality.

57. $4x - 3y < 10$

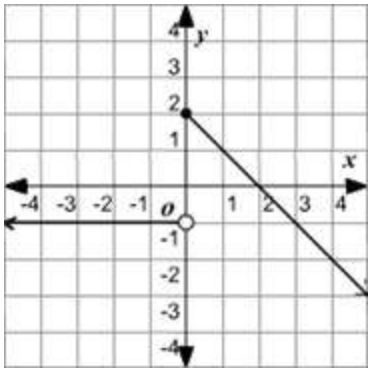
ANSWER:



Graph each function. Identify the domain and range.

59. $g(x) = \begin{cases} 0 \text{ if } x < 0 \\ -x + 2 \text{ if } x \geq 0 \end{cases}$

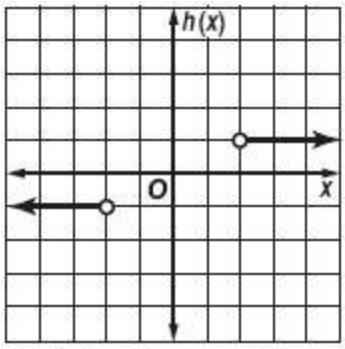
ANSWER:



D = {all real numbers},
$R = \{g(x) | g(x) \leq 2\}$

61. $h(x) = \begin{cases} -1 \text{ if } x < -2 \\ 1 \text{ if } x > 2 \end{cases}$

ANSWER:



$D = \{x | x < -2 \text{ or } x > 2\}$, $R = \{-1, 1\}$

Find each value if $f(x) = 2x + 5$ and $g(x) = 3x - 4$.

63. $f(-3)$

ANSWER:
–1

65. $f(-1)$

ANSWER:
3

67. $f(-0.25)$

ANSWER:
4.5