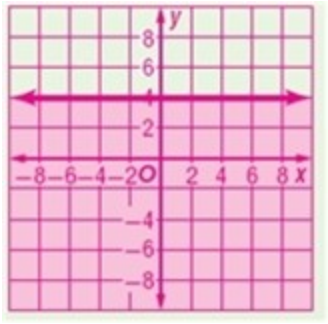
2-8 Graphing Linear and Absolute Value Inequalities

Graph each inequality.

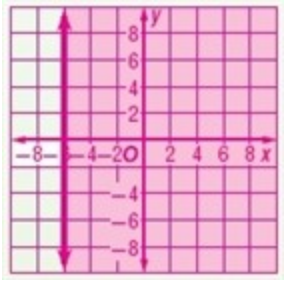
1. $y \leq 4$

ANSWER:



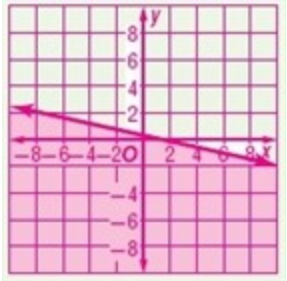
2. $x \geq -6$

ANSWER:



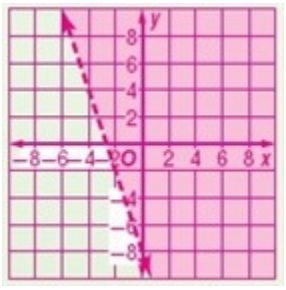
3. $x + 4y \leq 2$

ANSWER:



4. $3x + y > -8$

ANSWER:



5. **CCSS MODELING** Gregg needs to buy gas and oil for his car. Gas costs $3.45 a gallon, and oil costs $2.41 a quart. He has $50 to spend.

a. Write an inequality to represent the situation, where g is the number of gallons of gas he buys and q is the number of quarts of oil.

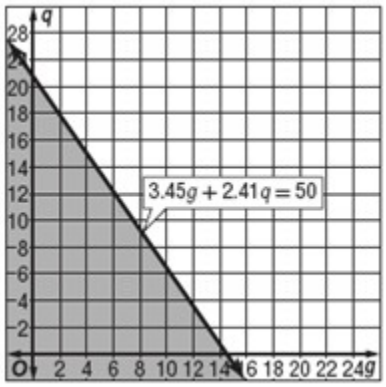
b. Graph the inequality.

c. Can Gregg buy 10 gallons of gasoline and 8 quarts of oil? Explain.

ANSWER:

a. $3.45g + 2.41q \leq 50$

b.



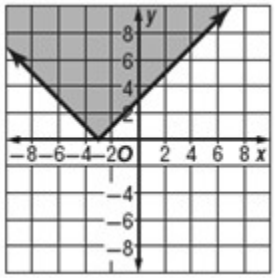
c. No; (10, 8) is not in the shaded region.

2-8 Graphing Linear and Absolute Value Inequalities

Graph each inequality.

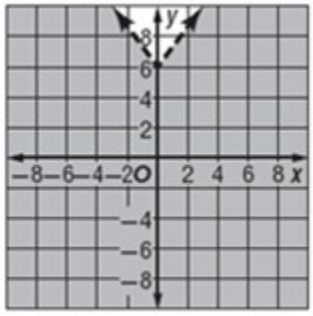
6. $y \geq |x+3|$

ANSWER:



7. $y-6<|x|$

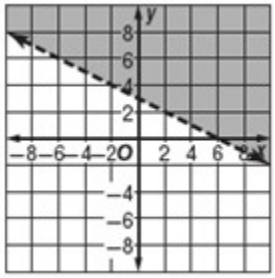
ANSWER:



Graph each inequality.

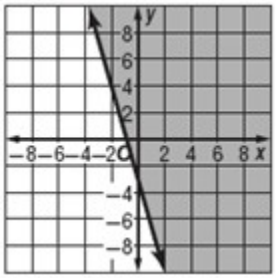
8. $x+2y>6$

ANSWER:



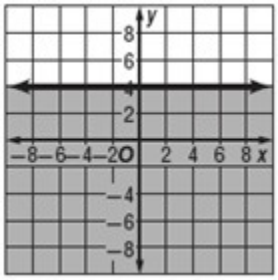
9. $y \geq -3x-2$

ANSWER:



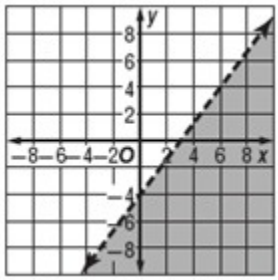
10. $2y+3 \leq 11$

ANSWER:



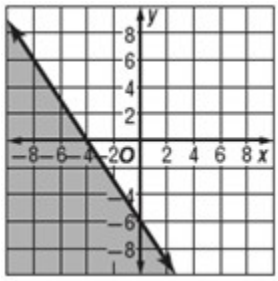
11. $4x-3y>12$

ANSWER:



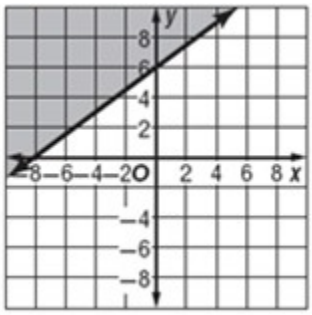
12. $6x + 4y \le -24$

ANSWER:



13. $y \ge \frac{3}{4}x + 6$

ANSWER:



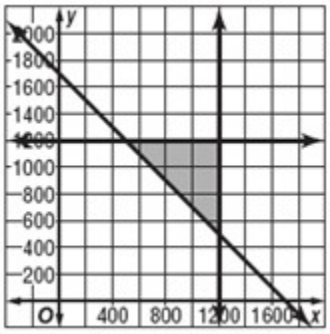
14. **COLLEGE** April's guidance counselor says that she needs a combined score of at least 1700 on her college entrance exams to be eligible for the college of her choice. The highest possible score is 2400—1200 on the math portion and 1200 on the verbal portion.

a. The inequality $x + y \ge 1700$ represents this situation, where x is the verbal score and y is the math score. Graph this inequality.

b. Refer to your graph. If she scores a 680 on the math portion of the test and 910 on the verbal portion of the test, will April be eligible for the college of her choice?

ANSWER:

a.

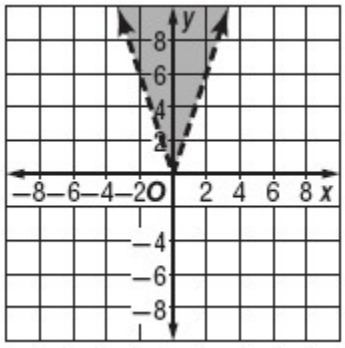


b. no

Graph each inequality.

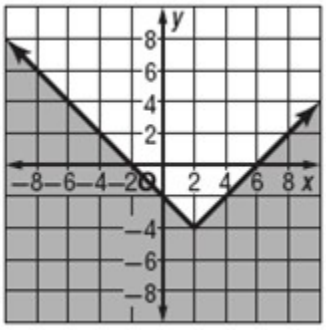
15. $y > |3x|$

ANSWER:



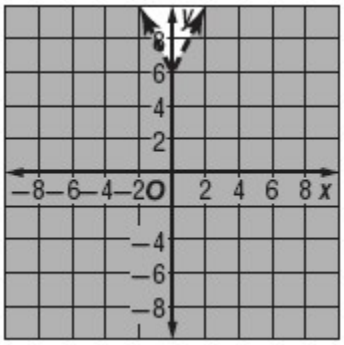
16. $y + 4 \leq |x - 2|$

ANSWER:



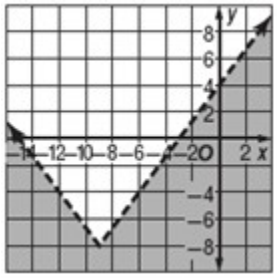
17. $y - 6 < |-2x|$

ANSWER:



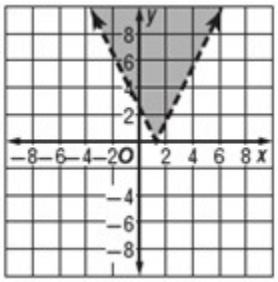
18. $y + 8 < 2\left|\frac{2}{3}x + 6\right|$

ANSWER:



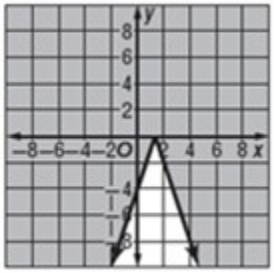
19. $2y > |4x - 5|$

ANSWER:



20. $-y \leq |3x - 4|$

ANSWER:



21. **SCHOOL DANCE** Carlos estimates that he will need to earn at least $700 to take his girlfriend to the prom. Carlos works two jobs as shown in the table.

a. Write an inequality to represent this situation.

b. Graph the inequality.

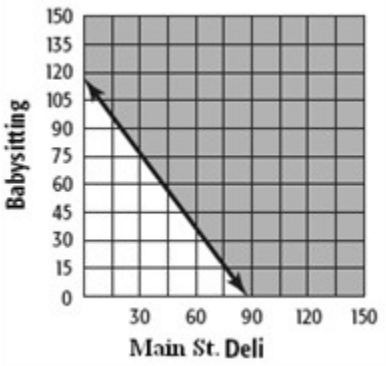
c. Will he make enough working 50 hours at each job?

Job	Pay
Main St. Deli	$8 an hour
Babysitting	$6 an hour

ANSWER:

a. $8a + 6b \geq 700$

b.

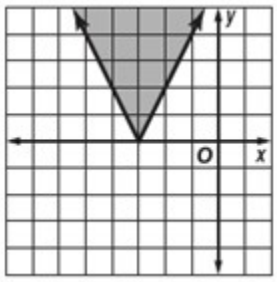


c. yes

Graph each inequality.

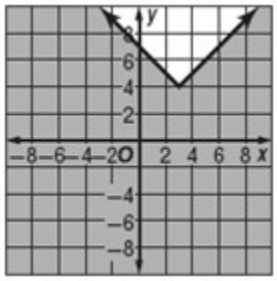
22. $y \geq |-2x - 6|$

ANSWER:



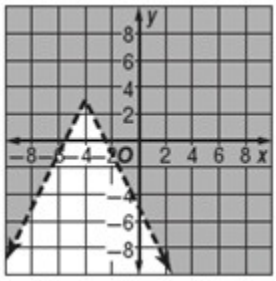
23. $y \leq |x - 3| + 4$

ANSWER:



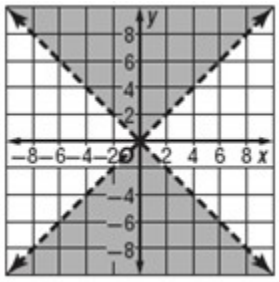
24. $y - 3 > -2|x + 4|$

ANSWER:



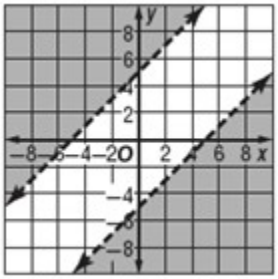
25. $|y| > |x|$

ANSWER:



26. $|x - y| > 5$

ANSWER:



27. $|x + 3y| \geq -2$

ANSWER:

all ordered pairs of real numbers (The graph would be shaded everywhere.)

28. **CCSS MODELING** Mei is making necklaces and bracelets to sell at a craft show. She has enough beads to make 50 pieces. Let x represent the number of bracelets and y represent the number of necklaces.

a. Write an inequality that shows the possible number of necklaces and bracelets Mei can make.

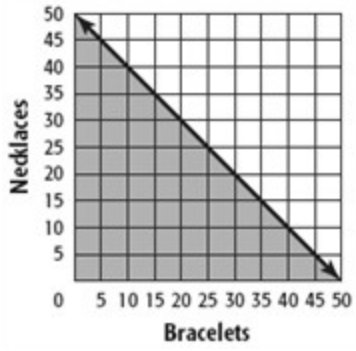
b. Graph the inequality.

c. Give three possible solutions for the number of necklaces and bracelets that can be made.

ANSWER:

a. $x + y \leq 50$

b.



c. Sample answers: 0 bracelets and 50 necklaces, 25 necklaces and 25 bracelets, or 30 bracelets and 20 necklaces

29. **GIFT CARDS** Susan received a gift card from an electronics store for $400. She wants to spend the money on DVDs, which cost $20 each, and CDs, which cost $15 each.

a. Let *d* equal the number of DVDs, and let *c* equal the number of CDs. Write an inequality that shows the possible combinations of DVDs and CDs that Susan can purchase.

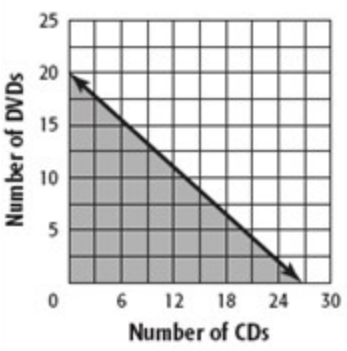
b. Graph the inequality.

c. Give three possible solutions for the number of DVDs and CDs she can buy.

ANSWER:

a. $20d + 15c \leq 400$

b.

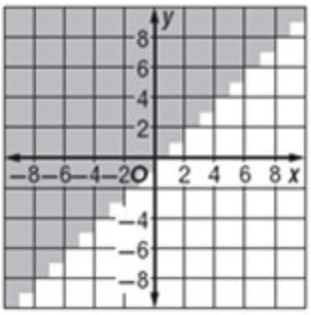


c. Sample answer: 18 CDs and 5 DVDs, 12 CDs and 10 DVDs, or 6 CDs and 15 DVDs

Graph each inequality.

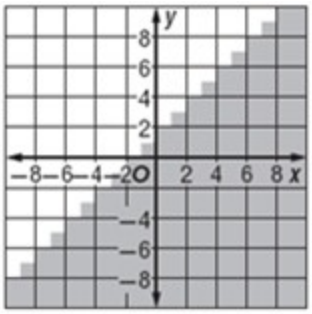
30. $y \geq [\![x]\!]$

ANSWER:



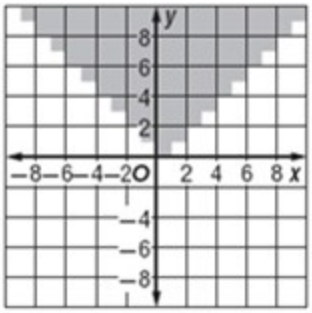
31. $y < [\![x + 2]\!]$

ANSWER:



32. $y \geq |[\![x]\!]|$

ANSWER:



33. **OPEN ENDED** Create an absolute value inequality in which none of the possible solutions fall in the second or third quadrant.

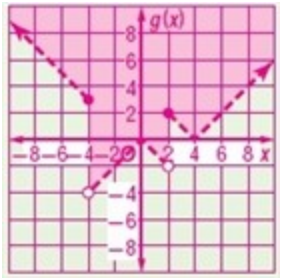
ANSWER:

Sample answer: $|y| < x$

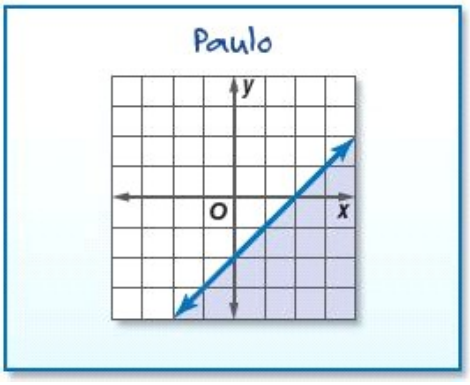
34. **CHALLENGE** Graph the following inequality.

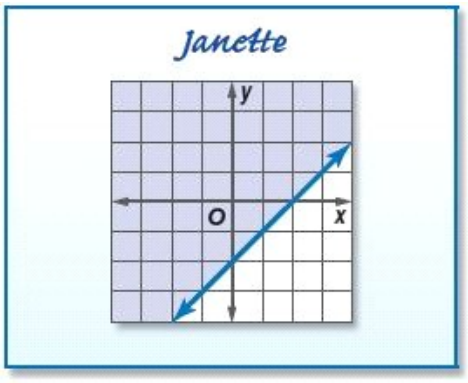
$$g(x) > \begin{cases} |x+1| \text{ if } x \le -4 \\ -|x| \text{ if } -4 < x < 2 \\ |x-4| \text{ if } x \ge 2 \end{cases}$$

ANSWER:



35. **ERROR ANALYSIS** Paulo and Janette are graphing $x - y \ge 2$. Is either of them correct? Explain your reasoning.





ANSWER:

Paulo; $x - y \ge 2$ can be written as $y \le x - 2$.

36. **REASONING** When will it be possible to shade two different areas when graphing a linear absolute value inequality? Explain your reasoning.

ANSWER:

Sample answer: It will be possible when we have a situation where y and x are both inside an absolute value. An example is $|y| = |x|$.

When this happens, positive and negative values of y will need to be considered, as well as the positive and negative values of x.

37. **WRITING IN MATH** Describe a situation in which there are no solutions to an absolute value inequality. Explain your reasoning.

ANSWER:

Sample answer: One possibility is when $|y| < 0$. In order for there to be a solution, the absolute value of *y* will need to be less than 0, and, by definition of absolute value, this is impossible.

38. **EXTENDED RESPONSE** Craig scored 85%, 96%, 79%, and 81% on his first four math tests. He hopes to score high enough on the final test to earn a 90% average.

If the final test is worth twice as much as one of the other tests, determine if Craig can earn a 90% average. If so, what score does Craig need to get on the final test to accomplish this? Explain how you found your answer.

ANSWER:

Sample answer: Craig can earn a 90% average by scoring a 99.5% or higher on his last test. This was determined by finding the sum of the first 4 tests. By making each original test worth 100 points, then so far he has 341 out of 400 points. If the last test is worth twice as much, then it is worth 200, so overall he has 600 possible points. In order to earn a 90%, he needs $0.90 \cdot 600$ or 540 points. So, Craig needs 540 – 341 or 199 out of 200 on the last test: 99.5%.

39. Which of the following sets of numbers represents an infinite set?

A {2, 4, 6}

B {whole numbers between –50 and 50}

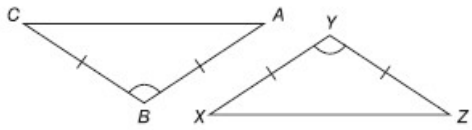
C {integers}

D $\left\{\frac{1}{2}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}\right\}$

ANSWER:

C

40. **SHORT RESPONSE** Which theorem of congruence should be used to prove $\Delta ABC \cong \Delta XYZ$?



ANSWER:

SAS

41. **ACT/SAT** For which function is the range $\{y \mid y \leq 0\}$?

F $f(x) = -x$

G $f(x) = [\![x]\!]$

H $f(x) = [\![-x]\!]$

J $f(x) = |x|$

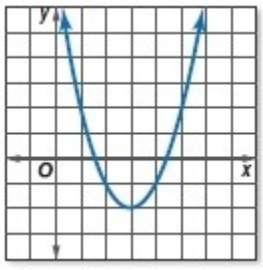
K $f(x) = -|x|$

ANSWER:

K

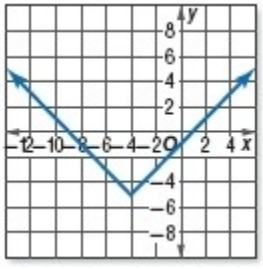
2-8 Graphing Linear and Absolute Value Inequalities

Write an equation for each graph.

42. 

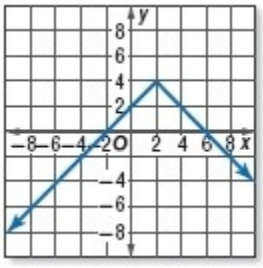
ANSWER:

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

43. 

ANSWER:

$y = |x+4| - 5$

44. 

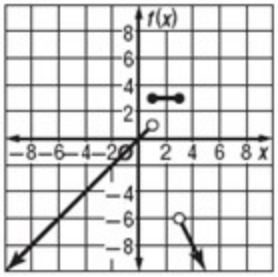
ANSWER:

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

Graph each function.

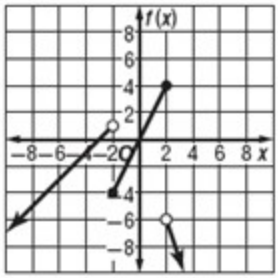
45. $f(x) = \begin{cases} x \text{ if } x < 1 \\ 3 \text{ if } 1 \le x \le 3 \\ -2x \text{ if } x > 3 \end{cases}$

ANSWER:



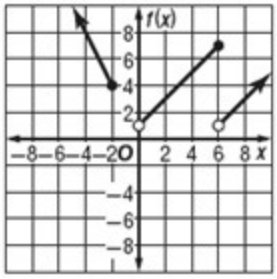
46. $f(x) = \begin{cases} x+3 \text{ if } x < -2 \\ 2x \text{ if } -2 \le x \le 2 \\ -3x \text{ if } x > 2 \end{cases}$

ANSWER:



47. $f(x) = \begin{cases} -2x \text{ if } x \le -2 \\ x+1 \text{ if } 0 < x \le 6 \\ x-5 \text{ if } x > 6 \end{cases}$

ANSWER:



Write each equation in standard form. Identify *A*, *B*, and *C*.

48. $-6y = 8x - 3$

ANSWER:

$8x + 6y = 3$;
$A = 8$,
$B = 6$,
$C = 3$

49. $12y + x = -3y + 5x - 6$

ANSWER:

$4x - 15y = 6$;
$A = 4$,
$B = -15$,
$C = 6$

50. $\frac{x+3}{4} + \frac{y-1}{2} = 3$

ANSWER:

$x + 2y = 11$
$A = 1$
$B = 2$
$C = 11$

51. **TENNIS** Sixteen players signed up for tennis lessons. The instructor plans to use 50 tennis balls for every player and have 200 extra. How many tennis balls are needed for the lessons?

ANSWER:

1000

Multiply.

52. $(3x - 4)(2x + 1)$

ANSWER:

$6x^2 - 5x - 4$

53. $(6x + 5)(-x - 3)$

ANSWER:

$-6x^2 - 23x - 15$

54. $(5x + 2)(-2x + 3)$

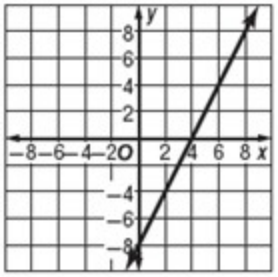
ANSWER:

$-10x^2 + 11x + 6$

Graph each linear equation.

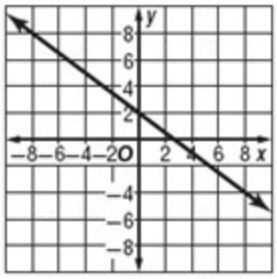
55. $y = 2x - 8$

ANSWER:



56. $y = -\frac{3}{4}x + 2$

ANSWER:



57. $3y - 4x = 24$

ANSWER: