FRQ: 21 …..Solve multi-step linear inequalities

6 to 33	354

Translate each sentence into an inequality. Then solve the inequality and graph the solution on a number line.

6. Five times a number minus one is greater than or equal to negative eleven.

7. Twenty-one is greater than the sum of fifteen and two times a number.

8. Negative nine is greater than or equal to the sum of two-fifths times a number and seven.

9. A number divided by eight minus thirteen is greater than negative six.

10. The sum of the opposite of a number and six is less than or equal to five.

11. Thirty-seven is less than the difference of seven and ten times a number.

12. Eight minus a number divided by three is greater than or equal to eleven.

13. Negative five-fourths times a number plus six is less than twelve.

14. The difference of three times a number and six is greater than or equal to the sum of fifteen and twenty-four times a number.

15. The sum of fifteen times a number and thirty is less than the difference of ten times a number and forty-five.

Solve each inequality. Then graph the solution on a number line.

16. $-3(7n + 3) < 6n$

17. $21 \geq 3(a - 7) + 9$

18. $2y + 4 > 2(3 + y)$

19. $3(2 - b) < 10 - 3(b - 6)$

20. $7 + t \leq 2(t + 3) + 2$

21. $8a + 2(1 - 5a) \leq 20$

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Solve each inequality. Check your solution.

22. $2(x - 4) \leq 2 + 3(x - 6)$

23. $\frac{2x - 4}{6} \geq -5x + 2$

24. $5.6z + 1.5 < 2.5z - 4.7$

25. $0.7(2m - 5) \geq 21.7$

26. $2(-3m - 5) \geq -28$

27. $-6(w + 1) < 2(w + 5)$

USE TOOLS **Use a graphing calculator to solve each inequality.**

28. $3x + 7 > 4x + 9$

29. $13x - 11 \leq 7x + 37$

30. $2(x - 3) < 3(2x + 2)$

31. $\frac{1}{2}x - 9 < 2x$

32. $2x - \frac{2}{3} \geq x - 22$

33. $\frac{1}{3}(4x + 3) \geq \frac{2}{3}x + 2$

MCQ: 15 …..Solve and graph linear inequalities containing the word

1 to 26	363, 364

Solve each compound inequality. Then graph the solution set.

1. $f - 6 < 5$ and $f - 4 \geq 2$

2. $n + 2 \leq -5$ and $n + 6 \geq -6$





Structure -2

3. $y - 1 \geq 7$ or $y + 3 < -1$

4. $t + 14 \geq 15$ or $t - 9 < -10$

5. $-5 < 3p + 7 \leq 22$

6. $-3 \leq 7c + 4 < 18$

7. $5h - 4 \geq 6$ and $7h + 11 < 32$

8. $22 \geq 4m - 2$ or $5 - 3m \leq -13$

9. $-y + 5 \geq 9$ or $3y + 4 < -5$

10. $-4a + 13 \geq 29$ and $10 < 6a - 14$

11. $3b + 2 < 5b - 6 \leq 2b + 9$

12. $-2a + 3 \geq 6a - 1 > 3a - 10$

13. $10m - 7 < 17m$ or $-6m > 36$

14. $5n - \ 1 < -16$ or $-3n - 1 < 8$

15. $m + 3 \geq 5$ and $m + 3 < 7$

16. $y - 5 < -4$ or $y - 5 \geq 1$

17. **STORE SIGNS** In Randy's town, all stand-alone signs must be exactly 8 feet high. When mounted atop a pole, the combined height of the sign and pole must be less than 20 feet or greater than 35 feet so that they do not interfere with the power and phone lines.



a. Write a compound inequality to represent the possible above-ground height of the poles, x.

b. Solve the inequality. Explain any restrictions.

c. Graph the inequality.

18. **HEALTH** The human heart circulates from 770,000 to 1,600,000 gallons of blood through a person's body every year.

a. Write a compound inequality to represent the number of gallons of blood that the heart circulates through the body in one day, x.

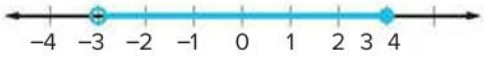
b. Solve the inequality. Round to the nearest whole gallon.

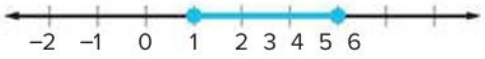
c. Graph the inequality.

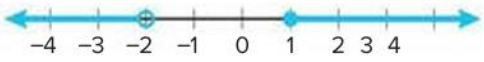
Structure -3

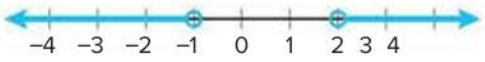
Al-NAEEM SCHOOL 406

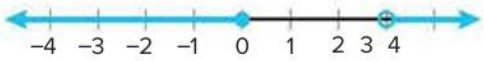
Write a compound inequality that describes each graph.

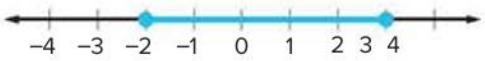
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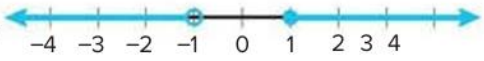
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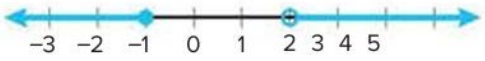
21.


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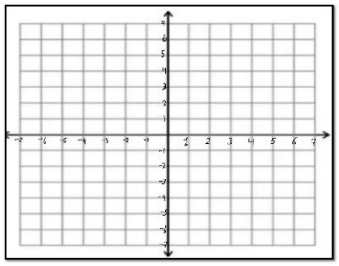
FRQ: 20 …..Write equations of lines in point-slope form **1 to 20** | **303, 304**

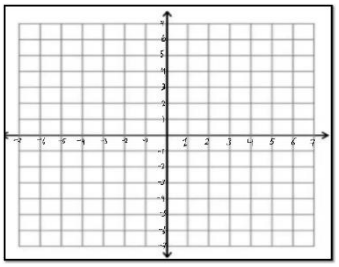
Write an equation in point-slope form for the line that passes through each point with the given slope. Then graph the equation.

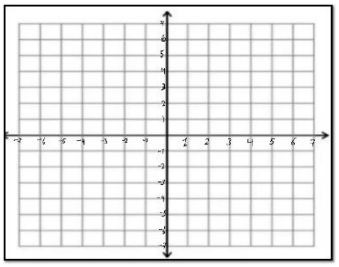
1. $(-6, -3)$, $m = -1$

2. $(-7, 6)$, $m = 0$

3. $(-2, 11)$, $m = \frac{4}{5}$







Write an equation in point-slope form for the line that passes through the given points.

4. $(-4, 6)$, $(-2, 22)$

5. $(1, -3)$, $(4, -15)$

6. $(4, -6)$, $(6, -4)$

7. $(3, 3)$, $(6, 7)$

Write each equation in slope-intercept form.

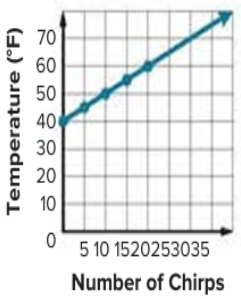
8. $y - 1 = \frac{4}{5}(x + 5)$

9. $y + 5 = -6(x + 7)$

10. $y + 6 = -\frac{3}{4}(x + 8)$

11. $y + 2 = \frac{1}{6}(x - 4)$

12. NATURE The frequency of a male cricket's chirp is related to the outdoor temperature. The relationship is expressed by the graph, where y is the temperature in degrees Fahrenheit and x is the number of chirps the cricket makes in 14 seconds. Write an equation for the line in point-slope form.



13. CANOEING Geoff paddles his canoe at an average speed of 3.5 miles per hour. After 5 hours of canoeing, Geoff has traveled 18 miles. Write an equation in point-slope form to find the total distance y Geoff travels after x hours.

14. GEOMETRY The perimeter of a square is four times the length of one side. If the side length of a square is 1 centimeter, then the perimeter of the square is 4 centimeters. Write an equation in point-slope form to find the perimeter y of a square with side length x.

Write each equation in standard form.

15. $y - 10 = 2(x - 8)$

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

17. $2y + 3 = -\frac{1}{3}(x - 2)$

18. $4y - 5x = 3(4x - 2y + 1)$

19. $y = x + 1$

20. $y = \frac{1}{3}x - 10$

FRQ: 19 …..Construct arithmetic sequences

1 to 18	255

ARGUMENTS **Determine whether each sequence is an arithmetic sequence. Justify your reasoning.**

1. $-3, 1, 5, 9, \ldots$

2. $\frac{1}{2}, \frac{3}{4}, \frac{5}{8}, \frac{7}{16}, \ldots$

3. $-10, -7, -4, 1, \ldots$

4. $-12.3, -9.7, -7.1, -4.5, \ldots$

5. $4, 7, 9, 12, \ldots$

6. $15, 13, 11, 9, \ldots$

7. $7, 10, 13, 16, \ldots$

8. $-6, -5, -3, -1, \ldots$

Find the common difference of each arithmetic sequence. Then find the next three terms.

9. $0.02, 1.08, 2.14, 3.2, \ldots$

10. $6, 12, 18, 24, \ldots$

11. $21, 19, 17, 15, \ldots$

12. $-\frac{1}{2}, 0, \frac{1}{2}, 1, \ldots$

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13. $2\frac{1}{3}, 2\frac{2}{3}, 3, 3\frac{1}{3}, \ldots$ **14.** $\frac{7}{12}, 1\frac{1}{12}, 2\frac{1}{6}, 2\frac{5}{12}, \ldots$ **15.** 3, 7, 11, 15, ... **16.** 22, 19.5, 17, 14.5, ...

17. −13, −11, −9, −7, ... **18.** −2, −5, −8, −11, ...

Use the given arithmetic sequence to write an equation and then find the 7th term of the sequence.

19. −3, −8, −13, −18, ... **20.** −2, 3, 8, 13, ... **21.** −11, −15, −19, −23, ... **22.** −0.75, −0.5, −0.25, 0, ...

FRQ: 18 .....Calculate and interpret slope

11 to 45	226

Find the slope of the line that passes through each pair of points.

11. (4, 3), (−1, 6) **12.** (8, −2), (1, 1) **13.** (2, 2), (−2, −2) **14.** (6, −10), (6, 14) **15.** (5, −4), (9, −4)

16. (11, 7), (−6, 2) **17.** (−3, 5), (3, 6) **18.** (−3, 2), (7 , 2) **19.** (8, 10), (−4, −6) **20.** (−12, 15), (18, −13)

21. (−8, 6), (−8, 4) **22.** (−8, −15), (−2, 5) **23.** (2, 5), (3, 6) **24.** (6, 1), (−6, 1) **25.** (4, 6), (4, 8)

26. (−5, −8), (−8, 1) **27.** (2, 5), (−3, −5) **28.** (9, 8), (7 , −8) **29.** (5, 2), (5, −2) **30.** (10, 0), (−2, 4)

31. (17 , 18), (18, 17) **32.** (−6, −4), (4, 1) **33.** (−3, 10), (−3, 7) **34.** (2, −1), (−8, −2)

35. (5, −9), (3, −2) **36.** (12, 6), (3, −5) **37.** (−4, 5), (−8, −5)

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Find the value of r so the line that passes through each pair of points has the given slope.

38. (12, 10), (−2, r), $m = -4$

39. (r, −5), (3, 13), $m = 8$

40. (3, 5), (−3, r), $m = \frac{3}{4}$

41. (−2, 8), (r, 4), $m = -\frac{1}{2}$

42. (r, 3), (5, 9), $m = 2$

43. (5, 9), (r, −3), $m = -4$

44. (r, 2), (6, 3), $m = \frac{1}{2}$

45. (r, 4), (7 , 1), $m = \frac{3}{4}$

FRQ: 17 …..Calculate and interpret slope

1 to 22	124, 125

Solve each equation or formula for the variable indicated.

1. $x - 2y = 1$, for y

2. $d + 3n = 1$, for n

3. $7f + g = 5$, for f

4. $3c - 8d = 12$, for c

9. $7a - b = 15a$, for a

5. $7t = x$, for t

6. $r = wp$, for p

7. $q - r = r$, for r

8. $4m - t = m$, for m

10. $-5c + d = 2c$, for c

Solve each equation or formula for the variable indicated.

11. $u = vw + z$, for v

12. $x = b - cd$, for c

13. $fg - 9h = 10j$, for g

14. $10m - p = -n$, for m

15. $r = \frac{2}{3}t + v$, for t

16. $\frac{5}{9}v + w = z$, for v

17. $\frac{10ac - x}{11} = -3$, for a

18. $\frac{df + 10}{6} = g$, for f

19. RECTANGLES The formula $P = 2\ell + 2w$ represents the perimeter of a rectangle. In this formula, ℓ is the length of the rectangle and w is the width.

a. Solve the formula for ℓ.

b. Find the length when the width is 4 meters and the perimeter is 36 meters.

20. BASEBALL The formula $a = \frac{h}{b}$ can be used to find the batting average a of a batter who has h hits in b times at bat.

a. Solve the formula for b.

b. If a batter has a batting average of 0.325 and has 39 hits, how many times has the player been at bat?

21. SHOPPING Thomas went to the store to buy videogames for $13.50 each and controllers. The total amount Thomas spent can be represented by $c = 13.50g + p$, where c is the total cost, g is the number of games he bought, and p is the cost of the controllers. The controllers cost $55 and Thomas spent $136 total.

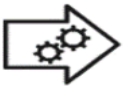
a. Solve the equation for g.

b. Find how many games Thomas bought.

22. GEOMETRY The volume of a box V is given by the formula $V = \ell wh$, where ℓ is the length, w is the width, and h is the height.

a. Solve the formula for h.

b. What is the height of a box with a volume of 50 cubic meters, length of 10 meters, and width of 2 meters?



FRQ: 16 ….. Solve proportions

37 to 44	114

37. BOATING Dedra's boat used 5 gallons of gasoline in 4 hours. At this rate, how many gallons of gasoline will the boat use in 10 hours?

38. WATER A dripping faucet wastes 3 cups of water every 24 hours. How much water is wasted in a week?

39. PRECISION In November 2010 the average cost of 5 gallons of regular unleaded gasoline in the United States was $14.46. What was the average cost for 16 gallons of gasoline?

40. SHOPPING Stevenson's Market is selling 3 packs of stylus pens for $5.00. How much will 10 packs of stylus pens cost at this price?

41. STATE YOUR ASSUMPTION During basketball practice, Brent made 36 free throws in 3 minutes.

a. How many free throws will Brent make in 5 minutes?

b. What assumption did you make in part **a**? Explain.

42. NAILS Human fingernails grow at an average rate of 3.47 millimeters per month. How much will they grow in 20 months?

43. PICTURE Jasmine enlarged the size of a picture to a height of 15 inches. What is the new width of the picture if it was originally 6 inches wide by 4 inches tall?

44. TRAVEL Roscoe is exchanging $121 for Euros for his upcoming trip to Germany. If $2 can be exchanged for 1.78 Euros, how many Euros will Roscoe have?

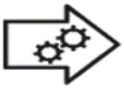
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45. FUNDRAISER Owen is organizing a fundraiser. The proceeds will be split between a charity and the expenses from the fundraiser. Owen would like the cost of the fundraiser to be 15% of the proceeds. If the fundraiser will cost $500, how much money do they need to raise at the fundraiser?

46. COFFEE A barista is mixing a house blend of coffee that is 25% light roast. If there are 8 pounds of the light roast available, how much of the blend can the barista make?

47. CHEMISTRY A chemistry teacher needs to mix an acid solution for an experiment. How much hydrochloric acid needs to be mixed with 1500 milliliters of water to make a solution that is 12% acid?

48. LEMONADE Laronda wants to make fresh lemonade. The recipe she finds online recommends that the fresh lemon juice should be 20% of the total volume. She has 18 ounces of fresh lemon juice. How much water should she mix with the lemon juice?



MCQ: 14 ….. Construct the inverses of relations

1 to 15	331

Find the inverse of each relation.

1.

x	y
−9	−1
−7	−4
−5	−7
−3	−10
−1	−13

2.

x	y
1	8
2	6
3	4
4	2
5	0

3.

x	y
−4	−2
−2	−1
0	1
2	0
4	2

4. {(−3, 2), (−1, 8), (1, 14), (3, 20)}

5. {(5, −3), (2, −9), (−1, −15), (−4, −21)}

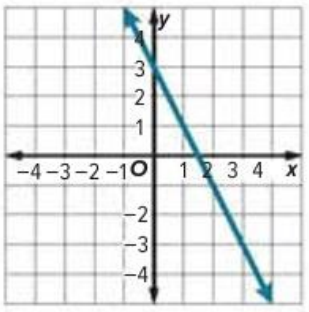
6. {(4, 6), (3, 1), (2, −4), (1, −9)}

7. {(−1, 16), (−2, 12), (−3, 8), (−4, 4)}

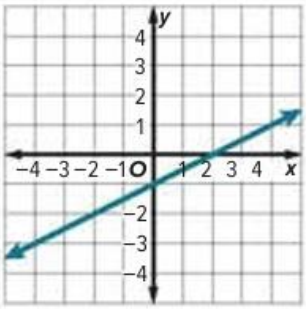
8. {(−5, 13), (6, 10.8), (3, 11.4), (−10, 14)}

9. {(−4, −49), (8, 35), (−1, −28), (4, 7)}

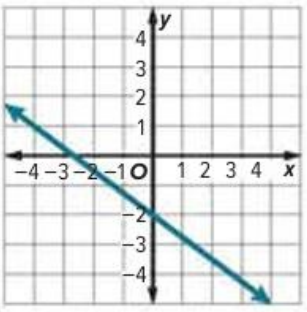
13.



14.



15.



MCQ: 13 ….. Create and identify equations of parallel or perpendicular lines

25 to 36	304

Write an equation in slope-intercept form for the line that passes through the given point and is parallel to the graph of the equation. Then write an equation for the line that passes through the given point and is perpendicular to the graph of the equation.

25. (3, −2); $y = x + 4$

26. (4, −3); $y = 3x - 5$

27. (0, 2); $y = -5x + 8$

28. (−4, 2); $y = -\frac{1}{2}x + 6$

29. (−2, 3); $y = -\frac{3}{4}x + 4$

30. (9, 12); $y = 13x - 4$

Determine whether the graphs of each pair of equations are *parallel*, *perpendicular*, or *neither*.

31. $y = 4x + 3$
$4x + y = 3$

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

33. $3x + 5y = 10$
$5x - 3y = -6$

34. $-3x + 4y = 8$
$-4x + 3y = -6$

35. $2x + 5y = 15$
$3x + 5y = 15$

36. $2x + 7y = -35$
$4x + 14y = -42$

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MCQ: 12 ….. Write an equation of a line in slope-intercept form given two points

11 to 26	291, 292

Write an equation of the line that passes through each pair of points.

11. (0, −4), (5, −4)

12. (−4, −2), (4, 0)

13. (−2, −3), (4, 5)

14. (0, 1), (5, 3)

15. (−3, 0), (1, −6)

16. (1, 0), (5, −1)

17. (9, 2), (−2, 6)

18. (−6, 5), (−6, −4)

19. (5, −2), (7, −1)

20. (5, −3), (2, 5)

21. $\left(\frac{5}{4}, 1\right), \left(-\frac{1}{4}, \frac{3}{4}\right)$

22. $\left(\frac{5}{12}, -1\right), \left(-\frac{3}{4}, \frac{1}{6}\right)$

23. GUITAR Lydia wants to purchase guitar lessons. She sees a sign that gives the prices for 7 guitar lessons and 11 guitar lessons. Write a linear equation to find the total cost C for d lessons.



24. CENSUS The population of Laredo, Texas, was about 215,500 in 2007. It was about 123,000 in 1990. If we assume that the population growth is constant, write a linear equation with an integer slope to represent p, Laredo's population t years after 1990.

25. WEATHER A meteorologist finds that the temperature at the 6000-foot level of a mountain is 76°F and the temperature at the 12,000-foot level of the mountain is 49°F. Write a linear equation to represent the temperature T at an elevation of x, where x is in thousands of feet.

26. FUNDRAISING Natalia and her friends held a bake sale to benefit a local charity. The friends sold 15 cakes on the first day and 22 cakes on the second day of the bake sale. They collected $60 on the first day and $88 on the second day. Write an equation to represent the amount R Natalia and her friends raised after selling c cakes.

MCQ: 11 ….. Graph absolute value functions. Apply translations to absolute value functions.

1 to 12	277

Describe the translation in $g(x)$ as it relates to the graph of the parent function.

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

2. $g(x) = |x + 6|$

3. $g(x) = |x - 2| + 7$

4. $g(x) = |x + 1| - 3$

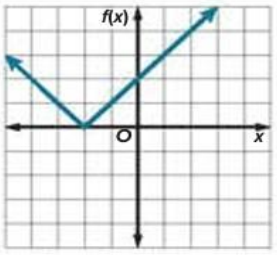
5. $g(x) = |x| + 1$

6. $g(x) = |x - 8|$

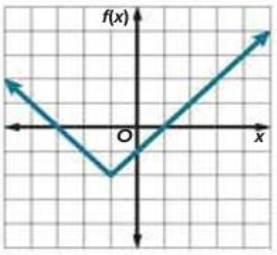
Examples 4 and 5

Use the graph of the function to write its equation.

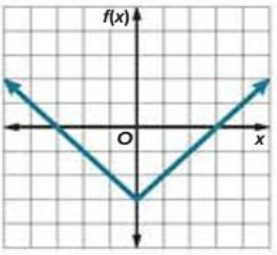
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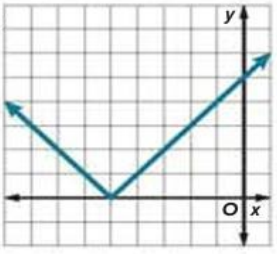
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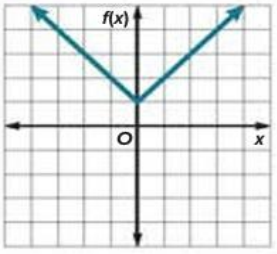
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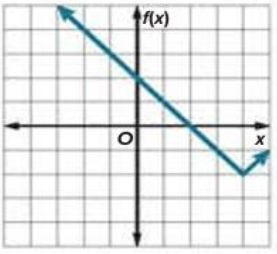
10.



11.



12.



MCQ: 10 ….. Write and graph piecewise defined functions.

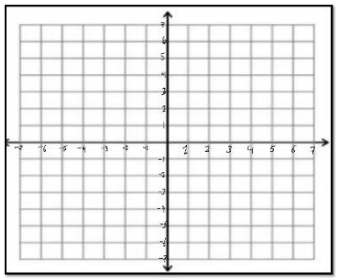
1 to 6	263
17, 20	265

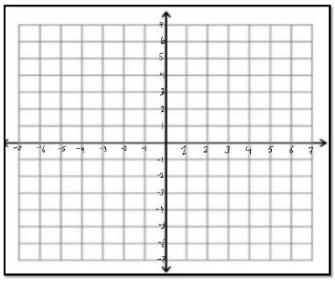
Graph each function. State the domain and range.

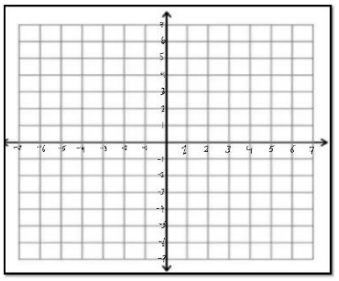
1. $f(x) = \begin{cases} \frac{1}{2}x - 1 \text{ if } x > 3 \\ -2x + 3 \text{ if } x \le 3 \end{cases}$

2. $f(x) = \begin{cases} 2x - 5 \text{ if } x > 1 \\ 4x - 3 \text{ if } x \le 1 \end{cases}$

3. $f(x) = \begin{cases} 2x + 3 \text{ if } x \ge -3 \\ -\frac{1}{3}x + 1 \text{ if } x < -3 \end{cases}$





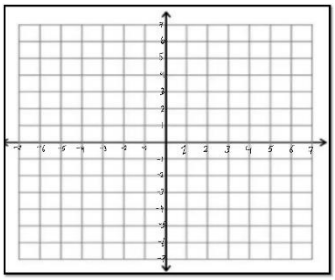


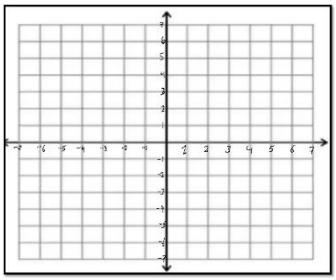
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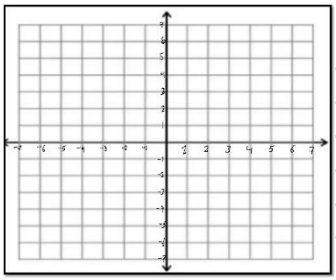
4. $f(x) = \begin{cases} 3x + 4 \text{ if } x \ge 1 \\ x + 3 \text{ if } x < 1 \end{cases}$

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

6. $f(x) = \begin{cases} 2x + 1 \text{ if } x < -2 \\ -3x - 1 \text{ if } x \ge -2 \end{cases}$

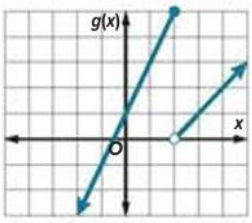






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17. REASONING Write a piecewise function that represents the graph.



18. STRUCTURE Suppose $f(x) = 2[\![x - 1]\!]$.

a. Find $f(1.5)$.

b. Find $f(2.2)$.

c. Find $f(9.7)$.

d. Find $f(-1.25)$.

19. RENTAL CARS Mr. Aronsohn wants to rent a car on vacation. The rate the car rental company charges is $19 per day. If any fraction of a day is counted as a whole day, how much would it cost for Mr. Aronsohn to rent a car for 6.4 days?

20. USE A MODEL A roadside fruit and vegetable stand determines rates for selling produce, with every fraction of a pound rounded up to the next pound. The table shows the cost of tomatoes by weight in pounds.

a. Write a piecewise-linear function representing the cost of purchasing tomatoes that weigh no more than 5 pounds, where C is the cost in dollars and p is the number of pounds.

Weight (pounds)	Rate (dollars)
1	3.50
2	7.00
3	10.50
4	14.00
5	17.50

b. Graph the function.

c. State the domain and range.

d. What would be the cost of purchasing 8.3 pounds of tomatoes at the roadside stand?

MCQ: 9 ….. Apply the arithmetic sequence formula..

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26. VIDEO DOWNLOADING Brian is downloading episodes of his favorite TV show to play on his personal media device. The cost to download 1 episode is $1.99. The cost to download 2 episodes is $3.98. The cost to download 3 episodes is $5.97.

a. Create a function to represent the arithmetic sequence.

b. Graph the function.

c. What is the cost to download 9 episodes?

MCQ: 8 ….. Graph and interpret linear functions.

19 to 30	235, 236

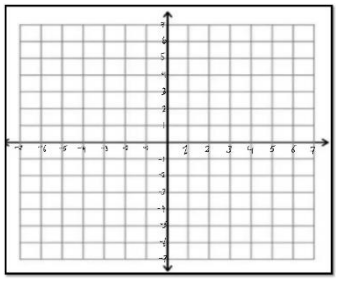
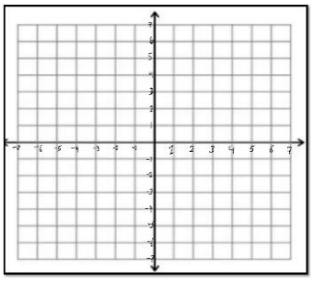
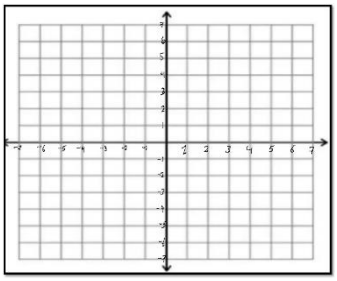
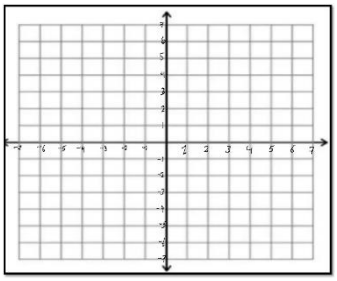
Graph a linear equation with the given slope and *y*-intercept.

19. slope: 5, *y*-intercept: 8

20. slope: 3, *y*-intercept: 10

21. slope: −4, *y*-intercept: 6

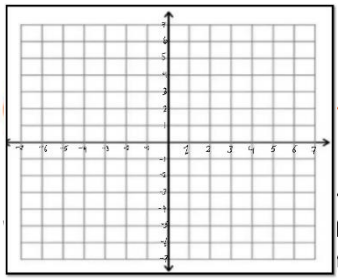
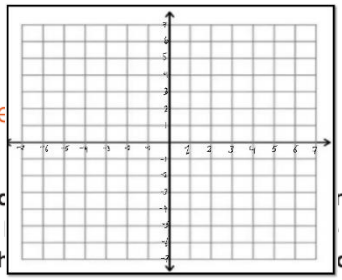
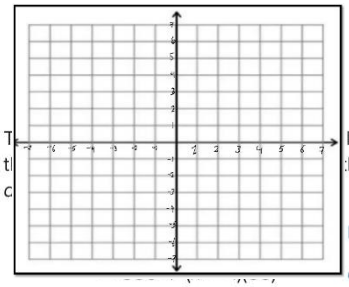
22. slope: −2, *y*-intercept: 8

23. $5x + 2y = 8$

24. $4x + 9y = 27$

25. $y = 7$

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food,
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she adds the same amount to her account using the money she earns at her after school job. From her bank statement, Laniqua can write a function that represents the balance of her savings account.

Laniqua Jones — Account Number 922194075

Current Balance as of 03/01/2019	$ 690
Balance as of 02/01/2019	$ 635
Balance as of 01/01/2019	$ 580
Starting Balance as of 12/01/2018	$ 525

End of Statement

Part A Create a function to represent the sequence.

First, find the common difference.

525 +55 580 +55 635 +55 690

T let a_1= 580. Notice that
tl think of this starting point as
c

Formula for the nth term.

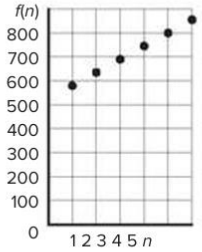
a_1= 580 and d = 55

$= 580 + 55n - 55$ Simplify.

$= 55n + 525$

Part B Graph the function and determine its domain.

n	*f*(*n*)
0	525
1	580
2	635
3	690
4	745
5	800
6	855



The domain is the number of months since Laniqua opened her savings account. The domain is {0, 1, 2, 3, 4, 5, ….}

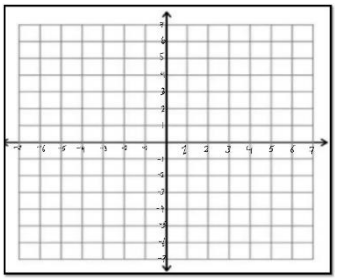
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29. STREAMING An online company charges $13 per month for the basic plan. They offer premium channels for an additional $8 per month.

a. Write an equation in slope-intercept form for the total cost c of the basic plan with p premium channels in one month.

b. Graph the equation.

c. What would the monthly cost be for a basic plan plus 3 premium channels?

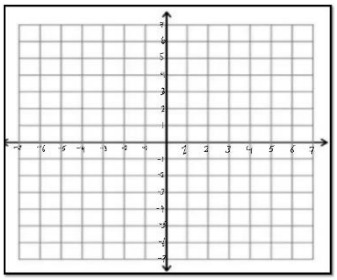


30. CAR CARE Suppose regular gasoline costs $2.76 per gallon. You can purchase a car wash at the gas station for $3.

a. Write an equation in slope-intercept form for the total cost y of purchasing a car wash and x gallons of gasoline.

b. Graph the equation.

c. Find the cost of purchasing a car wash and 8 gallons of gasoline.



MCQ: 7 ….. Rewrite linear equations in slope-intercept form.

1 to 18	235

Write an equation of a line in slope-intercept form with the given slope and y-intercept.

1. slope: 5, y-intercept: -3

2. slope: -2, y-intercept: 7

3. slope: -6, y-intercept: -2

4. slope: 7, y-intercept: 1

5. slope: 3, y-intercept: 2

6. slope: -4, y-intercept: -9

7. slope: 1, y-intercept: -12

8. slope: 0, y-intercept: 8

Write each equation in slope-intercept form.

9. $-10x + 2y = 12$

10. $4y + 12x = 16$

11. $-5x + 15y = -30$

12. $6x - 3y = -18$

13. $-2x - 8y = 24$

14. $-4x - 10y = -7$

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15. SAVINGS Wade's grandmother gave him $100 for his birthday. Wade wants to save his money to buy a portable game console that costs $275. Each month, he adds $25 to his savings. Write an equation in slope-intercept form to represent Wade's savings y after x months.

16. FITNESS CLASSES Toshelle wants to take strength training classes at the community center. She has to pay a one-time enrollment fee of $25 to join the community center, and then $45 for each class she wants to take. Write an equation in slope-intercept form for the cost of taking x classes.

17. EARNINGS Macario works part time at a clothing store in the mall. He is paid $9 per hour plus 12% commission on the items he sells in the store. Write an equation in slope-intercept form to represent Macario's hourly wage y.

18. ENERGY From 2002 to 2005, U.S. consumption of renewable energy increased an average of 0.17 quadrillion BTUs per year. About 6.07 quadrillion BTUs of renewable power were produced in the year 2002. Write an equation in slope-intercept form to find the amount of renewable power P in quadrillion BTUs produced in year y between 2002 and 2005.

1 to 10	225, 226

MCQ: 6….. Calculate and interpret rate of change

Find the rate of change of the function by using two points from the table.

1.

x	y
5	2
10	3
15	4
20	5

2.

x	y
1	15
2	9
3	3
4	−3

3. POPULATION DENSITY The table shows the population density for the state of Texas in various years. Find the average annual rate of change in the population density from 2000 to 2009.

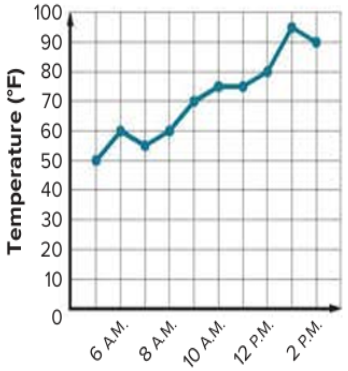
Population Density	
Year	People Per Square Mile
1930	22.1
1960	36.4
1980	54.3
2000	79.6
2009	96.7

Source: Bureau of the Census, U.S. Dept. of Commerce

4. BAND In 2012, there were approximately 275 students in the Delaware High School band. In 2018, that number increased to 305. Find the annual rate of change in the number of students in the band.

Example 2

5. TEMPERATURE The graph shows the temperature in a city during different hours of one day.



a. Find the rate of change in temperature between 6 A.M. and 7 A.M. and describe its meaning in the context of the situation.

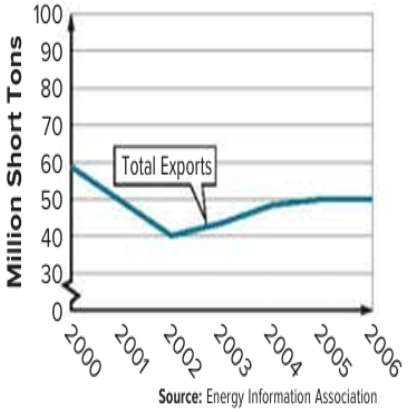
b. Find the rate of change in temperature from 1 P.M. and 2 P.M. and describe its meaning in the context of the situation.

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6. COAL EXPORTS The graph shows the annual coal exports from U.S. mines in millions of short tons.

a. Find the rate of change in coal exports between 2000 and 2002 and describe its meaning in the context of the situation.

b. Find the rate of change in coal exports between 2005 and 2006 and describe its meaning in the context of the situation.



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Determine whether the function is linear. If it is, state the rate of change.

7.

x	4	2	0	−2	−4
y	−1	1	3	5	7

8.

x	−7	−5	−3	−1		0
y	11	14	17	20	23	

9.

x	−0.2	0	0.2	0.4	0.6
y	0.7	0.4	0.1	0.3	0.6

10.

x	$\frac{1}{2}$	$\frac{3}{2}$	$\frac{5}{2}$	$\frac{7}{2}$	$\frac{9}{2}$
y	$\frac{1}{2}$	1	$\frac{3}{2}$	2	$\frac{5}{2}$

MCQ: 5….. Graph linear functions by using the x- and y-intercepts

17 to 28	217

Graph each equation.

17. $1.25x + 7.5 = y$

x	y

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

x	y

19. $3y - 7 = 4x + 1$

x	y

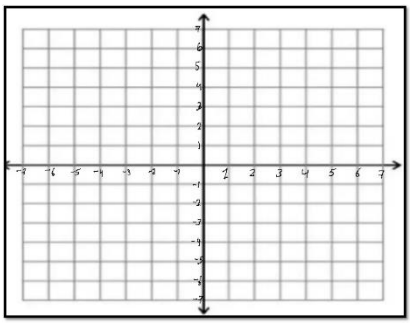
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Find the *x*-intercept and *y*-intercept of the graph of each equation.

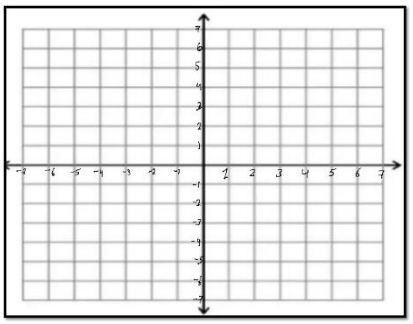
20. $5x + 3y = 15$

x	y



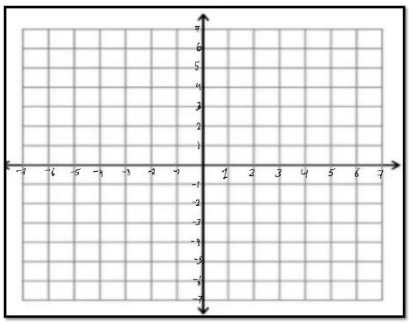
21. $2x - 7y = 14$

x	y



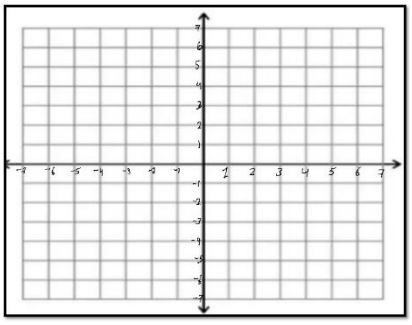
22. $2x - 3y = 5$

x	y



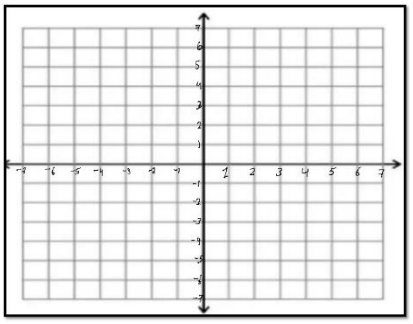
23. $6x + 2y = 8$

x	y



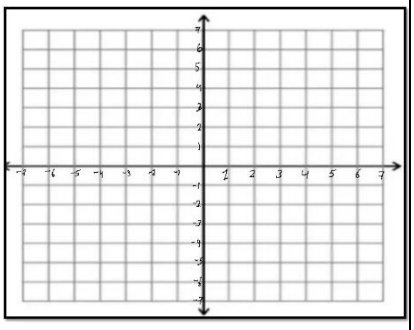
24. $y = \frac{1}{4}x - 3$

x	y



25. $y = \frac{2}{3}x + 1$

x	y



26. **HEIGHT** The height of a woman can be predicted by the equation $h = 81.2 + 3.34r$, where h is her height in centimeters and r is the length of her radius bone in centimeters.

a. Is this a linear function? Explain.

b. What are the r- and h-intercepts of the equation? Do they make sense in the situation? Explain.

c. Graph the equation by using the intercepts.

d. Use the graph to find the approximate height of a woman whose radius bone is 25 centimeters long.

27. **TOWING** Pick-M-Up Towing Company charges $40 to hook a car and $1.70 for each mile that it is towed. Write an equation that represents the total cost y for x miles towed. Graph the equation. Find the y-intercept, and interpret its meaning in the context of the situation.

28. **USE A MODEL** Elias has $18 to spend on peanuts and pretzels for a party. Peanuts cost $3 per pound and pretzels cost $2 per pound. Write an equation that relates the number of pounds of pretzels y and the number of pounds of peanuts x. Graph the equation. Find the x- and y-intercepts. What does each intercept represent in terms of context?

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19. ENGINEERING *Tolerance* is an allowance made for imperfections in a manufactured object. The manufacturer of an oven specifies a temperature tolerance of ±15°F. This means that the temperature inside the oven will be within 15°F of the temperature to which it is set. Write and solve an absolute value equation to find the maximum and minimum temperatures inside the oven when the thermostat is set to 400°F.

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20. POLLS Candidate A and Candidate B are running for mayor. A poll was taken to determine which candidate would likely win the election. The poll is accurate within ±5%. Write and solve an absolute value equation to find the maximum and minimum percent of voters who will vote for Candidate A if 38% of the voters in the poll voted for Candidate A.

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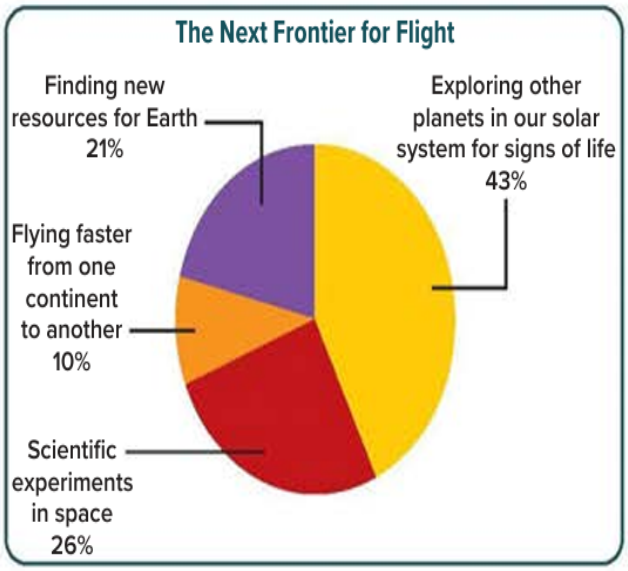
21. STATISTICS The most familiar statistical measure is the arithmetic mean, or average. A second important statistical measure is the standard deviation, which is a measure of how far the data are from the mean. For example, the mean score on the Wechsler IQ test is 100 and the standard deviation is 15. This means that people within one standard deviation of the mean have IQ scores that are 15 points higher or lower than the mean.

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a. One year, the mean mathematics score on the ACT test was 20.9 with a standard deviation of 5.3. Write an absolute value equation to find the maximum and minimum scores within one standard deviation of the mean.

b. What is the range of ACT mathematics scores within one standard deviation of the mean? within two standard deviations of the mean?

22. AVIATION The graph shows the results of a survey that asked 4300 students ages 7 to 18 what they thought would be the most important benefit of air travel in the future. There are about 40 million students in the United States. If the margin of error is ±3%, what is the range of the number of students ages 7 to 18 who would likely say that "finding new resources for Earth" is the most important benefit of future flight?



Source: *The World Almanac*

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23. MANUFACTURING A hardware store sells bags of rock salt that are labeled as weighing 35 pounds. The equipment used to package the salt produces bags with a weight that is within 8 ounces of the label weight. Write and solve an absolute value equation to determine the maximum and minimum weights for the bag of rock salt. Justify each step in the solution.

MCQ: 3….. Solve equations by applying the Distributive Property

1 to 16	97, 98
21 to 24	

Solve each equation. Check your solution.

1. $7c + 12 = -4c + 78$

2. $2m - 13 = -8m + 27$

3. $9x - 4 = 2x + 3$

4. $6 + 3t = 8t - 14$

5. $\frac{b-4}{6} = \frac{b}{2}$

6. $\frac{3v+12}{6} = \frac{4v}{3}$

7. $2(r + 6) = 4(r + 4)$

8. $6(n + 5) = 3(n + 16)$

9. $5(g + 8) - 7 = 117 - g$

10. $12 - \frac{4}{5}(x + 15) = \left(\frac{2}{5}x + 6\right)$

11. $3(3m - 2) = 2(3m + 3)$

12. $6(3a + 1) - 30 = 3(2a - 4)$

13. $7n + 6 = 4n - 9$

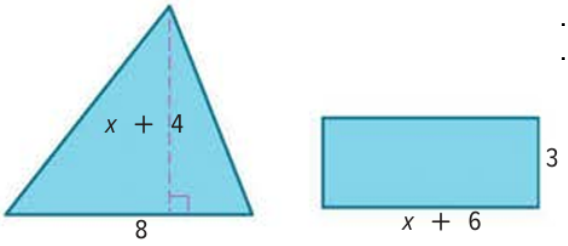
14. $-6(2r + 8) = -10(r - 3)$

15. $5 - 3(w + 4) = w - 7$

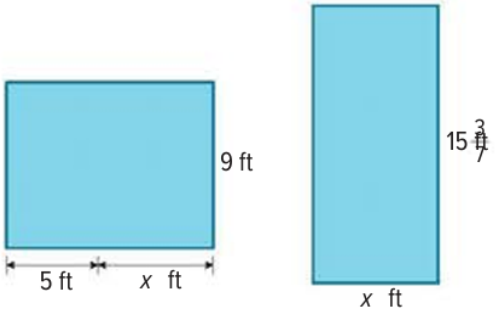
16. $2x - 5(x - 3) = 2(x - 10)$

21. GEOMETRY Supplementary angles are two angles with measures that have a sum of 180°. Complementary angles are two angles with measures that have a sum of 90°. The measure of the supplement of an angle is 10° more than twice the measure of the complement of the angle. Let $90 - x$ equal the degree measure of the complement angle and $180 - x$ equal the degree measure of the supplement angle. Write and solve an equation to find the measure of the angle.

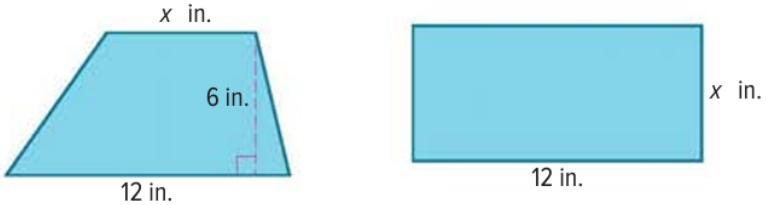
22. GEOMETRY Write and solve an equation to find the value of x so that the figures have the same area.



23. GEOMETRY Write and solve an equation to find the value of x so that the figures have the same area.



24. GEOMETRY Write and solve an equation to find the value of x so that the figures have the same area. The area of a trapezoid is $\frac{1}{2}h(b_1 + b_2)$.



AI-NAEEM SCHOOL 406

MCQ: 2….. Solve equations by using multiplication and division

1 to 54	81

1. $v - 9 = 14$

2. $44 = t - 72$

3. $-61 = d + (-18)$

4. $18 + z = 40$

5. $-4a = 48$

6. $12t = -132$

7. $18 - (-f) = 91$

8. $-16 - (-t) = -45$

9. $\frac{1}{3}v = -5$

10. $\frac{u}{8} = -4$

11. $\frac{a}{6} = -9$

12. $-\frac{k}{5} = \frac{7}{5}$

13. $\frac{3}{4} = w + \frac{2}{5}$

14. $-\frac{1}{2} + a = \frac{5}{8}$

15. $-\frac{t}{7} = \frac{1}{15}$

16. $-\frac{5}{7} = y - 2$

17. $v + 914 = -23$

18. $447 + x = -261$

19. $-\frac{1}{7}c = 21$

20. $-\frac{2}{3}v = -22$

21. $\frac{3}{5}q = -15$

22. $\frac{n}{8} = -\frac{1}{4}$

23. $\frac{c}{4} = -\frac{9}{8}$

24. $\frac{2}{3} + r = -\frac{4}{9}$

25. $y - 7 = 8$

26. $w + 14 = -8$

27. $p - 4 = 6$

28. $-13 = 5 + x$

29. $98 = b + 34$

30. $y - 32 = -1$

31. $n + (-28) = 0$

32. $y + (-10) = 6$

33. $-1 = t + (-19)$

34. $j - (-17) = 36$

35. $14 = d + (-10)$

36. $u + (-5) = -15$

37. $11 = -16 + y$

38. $c - (-3) = 100$

39. $47 = w - (-8)$

40. $x - (-74) = -22$

41. $4 - (-h) = 68$

42. $-56 = 20 - (-j)$

43. $12z = 108$

44. $-7t = 49$

45. $18f = -216$

46. $-22 = 11v$

47. $-6d = -42$

48. $96 = -24a$

49. $\frac{c}{4} = 16$

50. $\frac{a}{16} = 9$

51. $-84 = \frac{d}{3}$

52. $-\frac{d}{7} = -13$

53. $\frac{t}{4} = -13$

54. $31 = -\frac{1}{6}n$

AI-NAEEM SCHOOL 406

MCQ: 1….. Translate sentences into equations

1 to 14	71

Write an equation for each sentence.

1. Two added to three times a number m is the same as 18.

2. The product of five and the sum of a number x and three is twelve.

3. The quotient of 24 and x equals 14 minus 2 times x.

4. Nine times a number y subtracted from 85 is seven times the sum of four and y.

Example 2

5. WALKING Lily has walked 2 miles. Her goal is to walk 6 miles. Lily plans to reach her goal by walking 3 miles each hour h for the rest of her walk. Write an equation to find the number of hours it will take Lily to reach her goal.

6. MATH Paulina has completed 24 of the 42 math problems she was assigned for homework. She plans to finish her homework by completing 9 math problems each hour h. Write an equation to find the number of hours it will take Paulina to complete her math homework assignment.

7. ATHLETICS Of 107 athletes surveyed about what sport they play, some play basketball. Of those that play basketball, 48 play baseball and the remaining 33 do not play baseball. Write an equation to find the number of athletes surveyed who do not play basketball.

8. SALES Cars and trucks are the most popular vehicles. Last year, the number of cars sold was 39,000 more than three times the number of trucks sold. There were 216,000 cars sold last year. Write an equation that can be used to find the number of trucks, t, sold last year.

Example 3

Translate each sentence into an equation or formula.

9. Twice a increased by the cube of a equals b.

10. Seven less than the sum of p and t is as much as 6.

11. The sum of x and its square is equal to y times z.

12. Four times the sum of f and g is identical to six times g.

13. The area A of a square is the length of a side ℓ squared.

14. The perimeter P of a triangle is equal to the sum of the lengths of sides a, b, and c.