

Write Linear Functions (Approximately 6 questions on STAAR)

Write Linear Equations (A2C)

Write linear equations in two variables given a **table of values**, a **graph**, and a **verbal description**

Notes:

Table

x	y
-3	12
-1	4
2	-8
5	-20

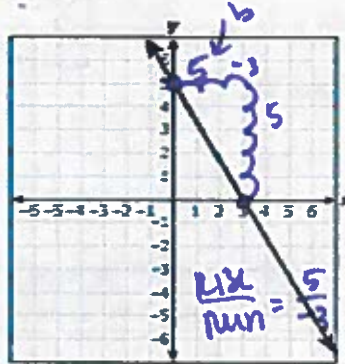
- Lists & Spreadsheets
- Stat Calculations
- 3 Linear Regression

$$y = mx + b$$

$$y = -4x + 0$$

$y = -4x$

Graph



- Find slope (m) Rise
Run
- Find y-int (b) (where it crosses y axis)

$$y = mx + b$$

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

2 points

Example: $(-4, 8)$ and $(32, -1)$

x	y
-4	8
32	-1

$$y = mx + b$$

$y = -.25x + 7$

Point-Slope Equation

Example: $y - 4 = \frac{1}{2}(x + 3)$

\leftarrow m
 \leftarrow opposite of #
 \leftarrow x₁

$$y - y_1 = m(x - x_1)$$

Slope
Ordered pair

given to you on STAAR

Point: $(-3, 4)$ slope: $\frac{1}{2}$

Verbal Description:

Example: A painter charges a fee of \$50 to do an estimate on the paint job. He then charges \$65 per hour. Write the equation that represents this situation.

change \rightarrow $y = mx + b$ \leftarrow beginning

\uparrow how it changes \uparrow beginning

$y = 65x + 50$

Sample Questions

(70%)

5 The table represents some points on the graph of a linear function.

Lists spreadsheets

x	-7.5	-3.5	-1	2	3.5
y	12	0	-7.5	-16.5	-21

Put these into graph table

Which function represents the same relationship?

A $h(x) = -3x - 10.5$

B $h(x) = -x - 3.5$

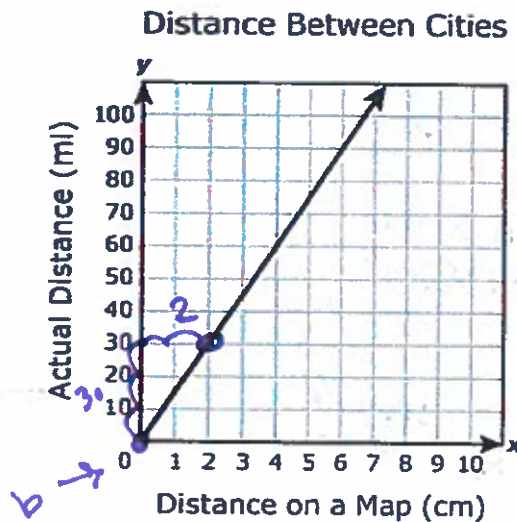
C $h(x) = 3x - 10.5$

D $h(x) = x - 3.5$

Y = mx + b
Y = -3x - 10.5

x	y
-7.5	12
-3.5	0
-1	-7.5
2	-16.5
3.5	-21

The graph shows the relationship between the actual distance between two cities in miles and the distance between the same two cities in centimeters on a map.



rise/run = 30/2 = 15

Which function can be represented by the graph?

A $y = \frac{x}{2}$

B $y = 2x$

C $y = \frac{x}{15}$

D $y = 15x$

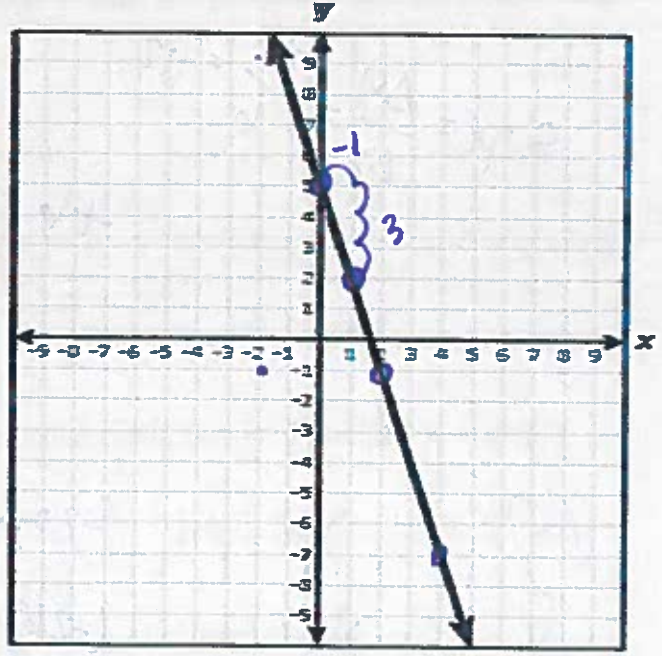
Y = mx + b
Y = 15x + 0

rise/run
y-int

(5970)

43 The graph of a linear function is shown on the grid.

slope = $\frac{\text{rise}}{\text{run}} = \frac{3}{-1} = -3$



Which equation is best represented by this graph?

- A $y + 7 = -3(x - 4)$ pt $\rightarrow (4, -7)$ ✓
- B $y + 1 = -3(x + 2)$ pt $\rightarrow (-2, -1)$
- C $y - 4 = \cancel{3}(x + 7)$ pt $\rightarrow (-7, 4)$
- D $y - 2 = \cancel{3}(x - 1)$ pt $\rightarrow (1, 2)$

(849)

1 At a restaurant jars of tomato sauce are stored in boxes in the pantry. Each box contains 8 jars of tomato sauce. A cook uses 2 jars from 1 of the boxes.

beginning \rightarrow

Which function shows the relationship between y , the total number of jars of tomato sauce remaining in the pantry, and x , the number of boxes in the pantry?

- A $y = 8x + 6$
- B $y = 8x$
- C $y = 8x - 2$
- D $y = 6x$

$y = mx + b$
 $y = -2x + 8$
Same thing \leftarrow

(53%)

50 The table represents some points on the graph of a linear function.

slope = $\frac{\Delta y}{\Delta x} = \frac{72}{6} = 12$

x	y
-20	-268
-14	-196
-8	-124
-1	-40

+6 < > +72

Which equation represents the same relationship?

F $y + 268 = \frac{1}{12}(x + 20)$ (-20, -268) ✓

G $y + 20 = \frac{1}{12}(x + 268)$ (-268, -20)

H $y + 268 = 12(x + 20)$ (-20, -268)

J $y + 20 = 12(x + 268)$ (-268, -20)

(73%)

33 Researchers in Antarctica discovered a warm sea current under a glacier that is causing the glacier to melt. The ice shelf of the glacier had a thickness of approximately 450 m when it was first discovered. The thickness of the ice shelf is decreasing at an average rate of 0.06 m per day.

beginning

-0.06

Which function can be used to find the thickness of the ice shelf in meters x days since the discovery?

A $t(x) = 450 - 0.06x$

B $t(x) = -0.06(x + 450)$

C $t(x) = 450 + 0.06x$

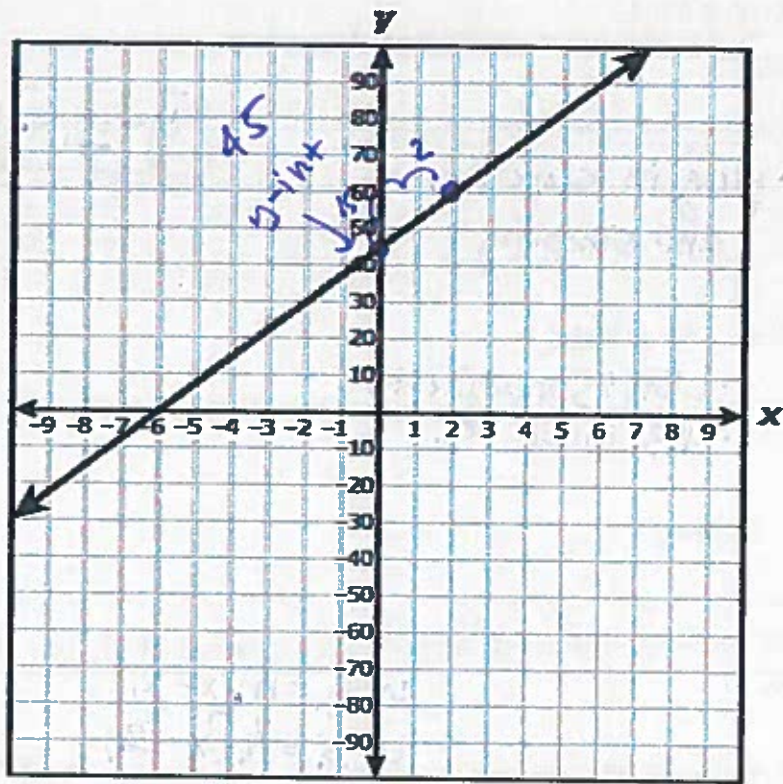
D $t(x) = 0.06(x + 450)$

same thing

$y = mx + b$

$y = -0.06x + 450$

Which linear function is graphed on the grid?



Rise = $\frac{15}{2}$
Run

A $g(x) = \frac{2}{15}x - 6$

B $g(x) = \frac{2}{15}x + 45$

C $g(x) = \frac{15}{2}x - 6$

D $g(x) = \frac{15}{2}x + 45$

$y = mx + b$ ← y-int
 $y = \frac{15}{2}x + 45$

Write Linear Equations (Point-Slope Form) (A2B)

Write linear equations in two variables in various forms, including, $y = mx + b$, $Ax + By = C$, and $y - y_1 = m(x - x_1)$ given one point and the slope and given two points

Notes:

Given one point and a slope:

- plug in slope & pt and simplify

$y - y_1 = m(x - x_1)$

Given on STAAR

Given two points:

- Lists & Spreadsheets
- #3 Linear Reg.

Examples:

Write the slope-intercept form of the equation of the line through the given point with the given slope.

1) through: $(2, 5)$, slope = $\frac{7}{2}$

2) through: $(-5, -1)$, slope = 0

A) $y = -x - 2$ B) $y = 1$
 C) $y = x - 2$ D) $y = -1$

Handwritten work:
 $y - y_1 = m(x - x_1)$
 $y - 5 = \frac{7}{2}(x - 2)$
 $y - 5 = \frac{7}{2}x - 7$
 $y = \frac{7}{2}x - 2$

Handwritten work for problem 2:
 $y - y_1 = m(x - x_1)$
 $y - (-1) = 0(x - (-5))$
 $y + 1 = 0x + 0$
 $y = -1$

Write the standard form of the equation of the line through the given point with the given slope.

3) through: $(2, -5)$, slope = -1

A) $x - 2y = 6$ B) $x + 2y = -3$
 C) $x - 2y = -3$ D) $x + y = -3$

Handwritten work for problem 3:
 $y - y_1 = m(x - x_1)$
 $y - (-5) = -1(x - 2)$
 $y + 5 = -1x + 2$
 $y = -1x - 3$

Handwritten work for problem A:
 $1x - 2y = 6$
 $-x \quad -2y \quad | \quad -1x + 6$
 $\frac{-2y}{-2} \quad | \quad \frac{-1x + 6}{-2}$
 $y = \frac{1}{2}x - 3$

Handwritten work for problem B:
 $1x + 2y = -3$
 $-1x \quad +2y \quad | \quad -1x - 3$
 $\frac{2y}{2} \quad | \quad \frac{-1x - 3}{2}$
 $y = \frac{1}{2}x - \frac{3}{2}$

Handwritten work for problem C:
 $1x - 2y = -3$
 $-1x \quad -2y \quad | \quad -1x - 3$
 $\frac{-2y}{-2} \quad | \quad \frac{-1x - 3}{-2}$
 $y = \frac{1}{2}x + \frac{3}{2}$

Handwritten work for problem D:
 $1x + y = -3$
 $-1x \quad +y \quad | \quad -1x - 3$
 $\frac{y}{1} \quad | \quad \frac{-1x - 3}{1}$
 $y = -1x - 3$

Sample Problems

Write the slope-intercept form of the equation of the line through the given points.

4) through $(-2, 4)$ and $(-3, -4)$

LISTS: Spreadsheets

A) $y = 8x + 20$

B) $y = -3x + 20$

C) $y = 3x + 20$

D) $y = -8x + 20$

x	y
-2	4
-3	-4

What is the equation in slope-intercept form of the line that passes through the points $(0, -4)$ and $(2, 0)$?

A) $y = 2x + 2$

B) $y = \frac{1}{2}x - 4$

C) $y = 2x - 4$

D) $y = \frac{1}{2}x + 2$

~~LISTS: Spreadsheets~~

x	y
0	-4
2	0

LISTS: Spreadsheets

$y = mx + b$

$y = 2x - 4$

(4390)

23 What is the equation in standard form of the line that passes through the point $(4, -8)$ and has a slope of $\frac{1}{4}$?

A) $x - 4y = 36$

B) $x - 4y = 28$

C) $x - 4y = -36$

D) $x - 4y = -28$

$$\begin{aligned} x - 4y &= 36 \\ -4y &= -x + 36 \\ -4 & \quad -1 \quad 36 \\ \hline y &= \frac{1}{4}x - 9 \checkmark \end{aligned}$$

$y - y_1 = m(x - x_1)$

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

$y + 8 = \frac{1}{4}x - \frac{1}{4}$

$y = \frac{1}{4}x - 9 \checkmark$

48 What is the equation of the line that has a slope of 0 and passes through the point $(6, -8)$?

F $x = 6$

G $y = 6$

H $x = -8$

J $y = -8$

$$y - y_1 = m(x - x_1)$$

$$y - -8 = 0(x - 6)$$

$$y + 8 = 0x + 0$$

$$y = 0x - 8$$

$$y = -8$$

(69%)

23 What is the equation in slope-intercept form of the line that passes through the points $(-4, 47)$ and $(2, -16)$?

A $y = -\frac{21}{2}x + \frac{979}{21}$

B $y = -\frac{2}{21}x + \frac{979}{21}$

C $y = -\frac{21}{2}x + 5$

D $y = -\frac{2}{21}x + 5$

x	y
-4	47
2	-16

$$y = -10.5x + 5$$

$$y = -\frac{21}{2}x + 5$$

(53%)

46 Which equation in standard form has a graph that passes through the point $(-4, 2)$ and has a slope of $\frac{9}{2}$?

F $9x - 2y = 36$

G $9x - 2y = 26$

H $9x - 2y = -40$

J $9x - 2y = -10$

OR plug point into answer choices

$$\rightarrow 9(-4) - 2(2) = 36$$

$$-40 = 36 \quad \times$$

$$\rightarrow 9(-4) - 2(2) = 26$$

$$-40 = 26 \quad \times$$

$$\rightarrow 9(-4) - 2(2) = -40$$

Write Parallel Lines (A2E)

Write the equation of a line that contains a given point and is parallel to a given line

Notes:

Definition of Parallel: lines have same slope

How to Write a Parallel Equation: look @ slopes

Sample Problems

Write the slope-intercept form of the equation of the line described.

1) through: (2, 4), parallel to $y = \frac{2}{7}x$

A) $y = -\frac{1}{7}x + \frac{24}{7}$

B) $y = \frac{2}{7}x + \frac{24}{7}$

C) $y = \frac{4}{7}x + \frac{24}{7}$

D) $y = -\frac{3}{7}x + \frac{24}{7}$

2) through: (3, 1), parallel to $y = \frac{3}{2}x - 3$

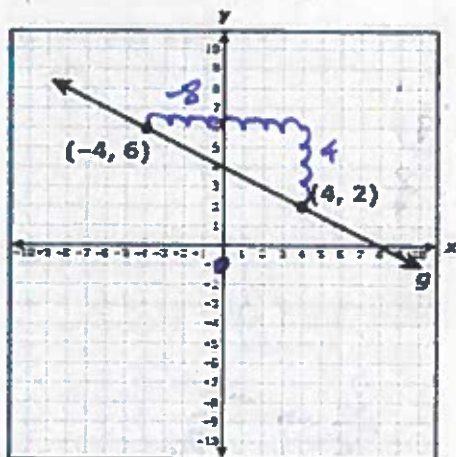
A) $y = -\frac{7}{2}x - \frac{3}{2}$

B) $y = -2x - \frac{3}{2}$

C) $y = \frac{3}{2}x - \frac{7}{2}$

D) $y = -\frac{3}{2}x - \frac{7}{2}$

25 The graph of line g is shown below.



$$\frac{4}{-8} = \left(-\frac{1}{2}\right)$$

Which equation describes a line parallel to line g that has a y -intercept at $(0, -1)$?

A $y = 2x - 1$

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

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

D $y = -2x - 1$

61

Write Perpendicular Lines (A2F)

Write the equation of a line that contains a given point and is perpendicular to a given line

Notes:

Definition of Perpendicular: *opposite reciprocal slopes*

How to Write a Perpendicular Equation:

- flip the fraction upside down
- change the sign

Sample Questions

Write the slope-intercept form of the equation of the line described.

- 1) through: $(2, -5)$, perp. to $y = \frac{1}{5}x + 4$ $\frac{1}{5} \rightarrow -\frac{5}{1} = -5$
- A) $y = -5x + 5$ B) $y = 5x - 5$
- C) $y = 5x + 5$ D) $y = x - 5$
- 2) through: $(-3, -2)$, perp. to $y = 3x + 5$ $\frac{3}{1} \rightarrow -\frac{1}{3}$
- A) $y = \frac{1}{3}x - 3$ B) $y = -\frac{1}{3}x - 3$
- C) $y = \frac{2}{3}x + \frac{1}{3}$ D) $y = -3x + \frac{1}{3}$

Write the standard form of the equation of the line described.

- 3) through: $(2, -2)$, perp. to $y = -3x + 3$
- A) $8x + 3y = 1$ B) $3x + 8y = -1$
- C) $x - 3y = 8$ D) $8x - 3y = 1$
- 4) through: $(-5, -5)$, perp. to $x = 0$
- A) $y = -5$ B) $x + 3y = 0$
- C) $x + y = 0$ D) $3x + y = -4$

(45ⁿ)

$$\begin{array}{l} \uparrow |x - 3y| = 8 \\ -1x \quad -3y \\ \hline -1x - 3y = 8 \\ -\frac{3y}{-3} \quad -\frac{1x}{-3} + \frac{8}{-3} \\ \hline y = \frac{1}{3}x - \frac{8}{3} \end{array}$$

$\frac{-3}{1} \rightarrow \frac{1}{3}$

39 What is the equation in slope-intercept form of the line that passes through the point $(2, -2)$

and is perpendicular to the line represented by $y = \frac{2}{5}x + 2$?

A) $y = \frac{5}{2}x - 7$

B) $y = \frac{5}{2}x + 7$

C) $y = -\frac{5}{2}x - 3$

D) $y = -\frac{5}{2}x + 3$

put these in graph to see if they go through

Zero and Undefined Slope (A2G)

Write an equation of a line that is parallel or perpendicular to the x or y axis and determine whether the slope of the line is zero or undefined

Notes:

Zero Slope:

horizontal line $y = \#$

Undefined Slope:

vertical line $x = \#$

Sample Questions

(46%) 36 What is the equation of the line that passes through the point $(-2, 7)$ and has a slope of zero?

~~F $x = 7$~~

G $y = -2$

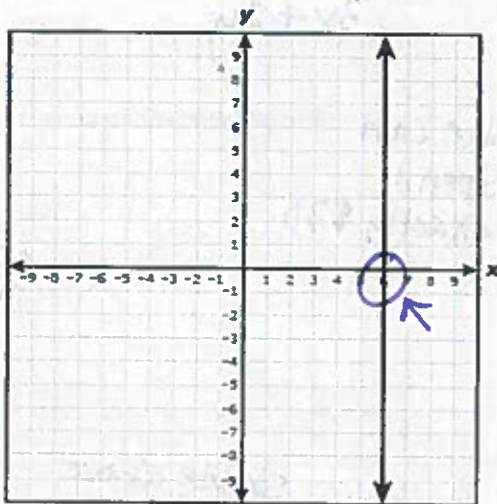
~~H $x = -2$~~

J $y = 7$

$y = \#$

32 What are the equation and slope of the line shown on the grid?

(68%)



undefined

$x = \#$
 $x = 6$

F $y = 6$; slope is $-\frac{1}{6}$.

G $x = 6$; slope is zero.

H $y = 6$; slope is 6.

J $x = 6$; slope is undefined.

Write Linear Inequalities (A2H)

Write linear inequalities in two variables given a table of values, a graph, and a verbal description

Sample Questions

- 3 Baseball fans can buy tickets for seats in the lower deck or upper deck of the stadium. Tickets for the lower deck cost \$42 each. Ticket prices for the upper deck are 75% of the cost of tickets for the lower deck. Which inequality represents all possible combinations of x , the number of tickets for the lower deck, and y , the number of tickets for the upper deck, that someone can buy for no more than \$800?

A $42x + 56y \leq 800$

B $42x + 31.5y \leq 800$

C $42x + 56y > 800$

D $42x + 31.5y > 800$

75% of 42
 $\therefore .75 \times 42 = 31.5$

$42x + 31.5y$

↑
 can't be more than \$800

- 25 A student is ordering a flower arrangement. She can choose any combination of roses and carnations for her flower arrangement, and she does not want to spend more than \$30.

If roses cost \$3 each and carnations cost \$2 each, which inequality represents all possible combinations of x roses and y carnations?

A $3x + 2y < 30$

B $3x + 2y \leq 30$

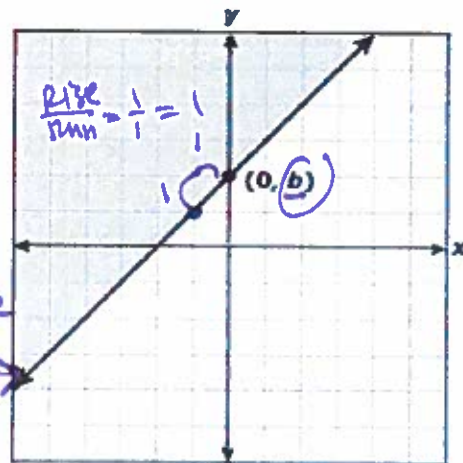
C $2x + 3y > 30$

D $2x + 3y \leq 30$

$3x + 2y$

← She can spend exactly \$30

Which inequality can be represented by the graph below?



F $y \geq x + b$

G $x - y \geq -b$

H $x + y \leq b$

J $-y \leq x + b$

$y = mx + b$
 $y = 1x + b$
 $y \geq x + b$

64