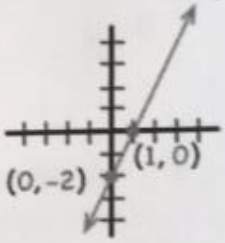
Algebra 1 – Unit 5 Guide

X- and Y-intercepts, Line of Best Fit (Linear Regression), Direct and Inverse Variation

Find X- and Y- Intercepts

Calculate x and y-intercepts

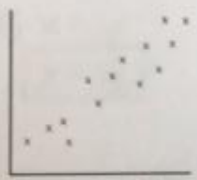
$y = 2x-2$



Set y=0:
$0=2x-2$
$2=2x$
$1=x$
$(1,0)$

Set x=0:
$y=2\cdot0-2$
$y=-2$
$(0,-2)$

Line of Best Fit (Linear Regression)



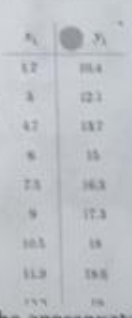
Positive Correlation
(Direct Variation)

Negative Correlation

No Correlation

Steps for Finding
Linear Regression (Line of Best Fit) Equation in Desmos

1. First click the **+**, then table, and create a table with your data:



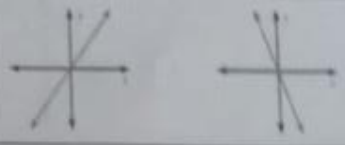
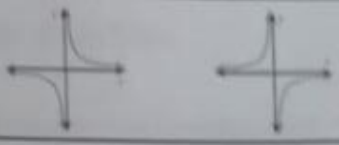
2. In another input line, type the **general regression line formula.**

$$y_1 \sim mx_1 + b$$

3. Use the PARAMETERS to write the equation.
   Plug in the values for m and b,

4. If you are asked to make a prediction, plug in the given value for the appropriate variable and solve for the missing variable.

Direct and Inverse Variation

	Constant	Equation	Graph
Direct	$k = y/x$	$y = kx$	
Inverse	$k = xy$	$y = k/x$	

Algebra 1 – Unit 5 Study Packet

X- and Y-intercepts, Line of Best Fit (Linear Regression), Direct and Inverse Variation

Skill #1 – X and Y Intercepts

1. Find the x and y intercepts:

$-2x + y = 4$

$\frac{-2x}{-2} = \frac{4}{-2}$ $\quad y = 4$

$x = -2$

x- intercept: -2 y-intercept: 4

2. Find the x and y intercepts:

$4x + 2y = -8$

$\frac{4x}{4} = \frac{-8}{4}$ $\quad \frac{2y}{2} = \frac{-8}{2}$

$x = -2$

x- intercept: -2 y-intercept: -4

3. Find the x-intercept:

$\frac{1}{2}x - 5y = 6$

$\frac{1}{2}x - 5(0) = 6$

$2 \cdot \frac{1}{2}x = 6 \cdot 2$

$\boxed{x = 12}$

4. Find the y-intercept:

$-2x - 3y + 6 = 0$

$-2(0) - 3y + 6 = 0$

$-3y + 6 = 0$

$-6 \quad -6$

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

$\boxed{y = 2}$

5. Find the y-intercept (remember, f(x) = y):

$f(x) = 8x - 4$

$y = 8(0) - 4$

$\boxed{y = -4}$

6. Find the x-intercept (remember h(x) = y):

$h(x) = \frac{1}{2}x + 6$

$y = \frac{1}{2}x + 6$

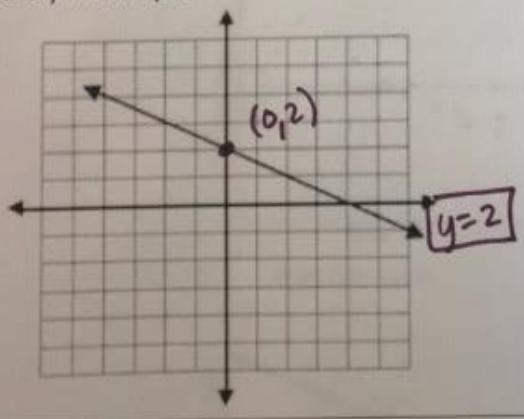
$0 = \frac{1}{2}x + 6$

$-6 \quad -6$

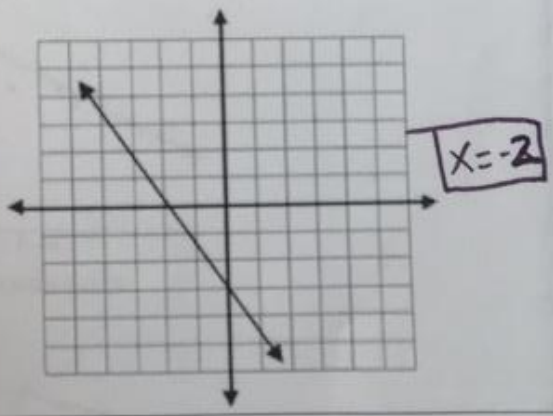
$\frac{2}{1} \cdot -6 = \frac{1}{2}x \cdot \frac{2}{1}$

$\boxed{-12 = x}$

7. Find the y-intercept:



8. Find the x-intercept:



Skill #1

- ☐ I can identify the intercepts of a function presented algebraically or graphically.
- ☐ Need more practice (IXL – S.16)

Skill #2 – Line of Best Fit (Linear Regression)

1. The points in the table lie on the graph of a linear function.

x	y
-2	5
-1	6
0	7
1	8
2	9

Which could be the curve of best fit?

A $y = -x + 7$
B $y = x + 7$
C $y = x - 7$
D $y = -x - 7$

2. The table below shows the relationship between the number of items purchased versus the total cost for the items:

Number of items purchased	Total price for the items
2	$28
6	$72
10	$116
15	$171
20	$226

Using the data shown above, which equation could be used to predict the total price for babysitting services?

A $y = 14x$
B $y = x + 26$
C $y = 4x - 6$
D $y = 11x + 6$

3. The table below shows the relation between the number of items ordered online and their shipping costs:

Number of items ordered	Shipping Cost
4	9
8	11
12	13
16	15

Using the data shown above, which equation could predict the total cost for shipping items?

A $y = \frac{1}{2}x - 7$
B $y = 7 - \frac{1}{2}x$
C $y = \frac{1}{2}x + 7$
D $y = -7 + \frac{1}{2}x$

4. The numbers in the table follow a linear pattern:

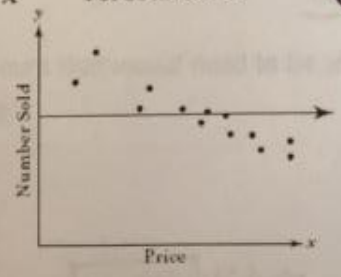
x	y
3	22
5	30
7	28
9	46
11	54
15	?

What is the missing y value?

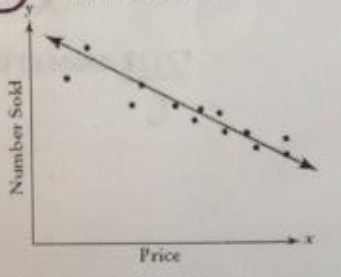
$y = 4x + 8$
$y = 4(15) + 8$
$y = 60 + 8 = 68$

5. The scatterplot below shows the relationship between the number of bags of popcorn that are sold and the price per bag. Which of the lines of best fit look most accurate. Choose one:

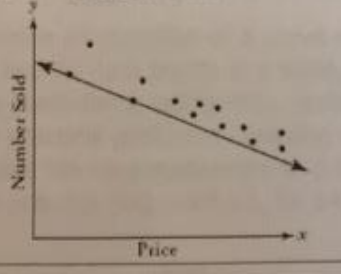
A



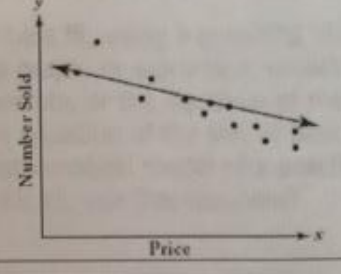
B



C



D



6. The table below shows the relation between the number of points scored in a game app and the length of the game.

Points Scored	Length of game
120	91
150	106
175	118.5
215	138.5

$y_1 \sim mx_1 + b$

$y = 0.5x + 31$

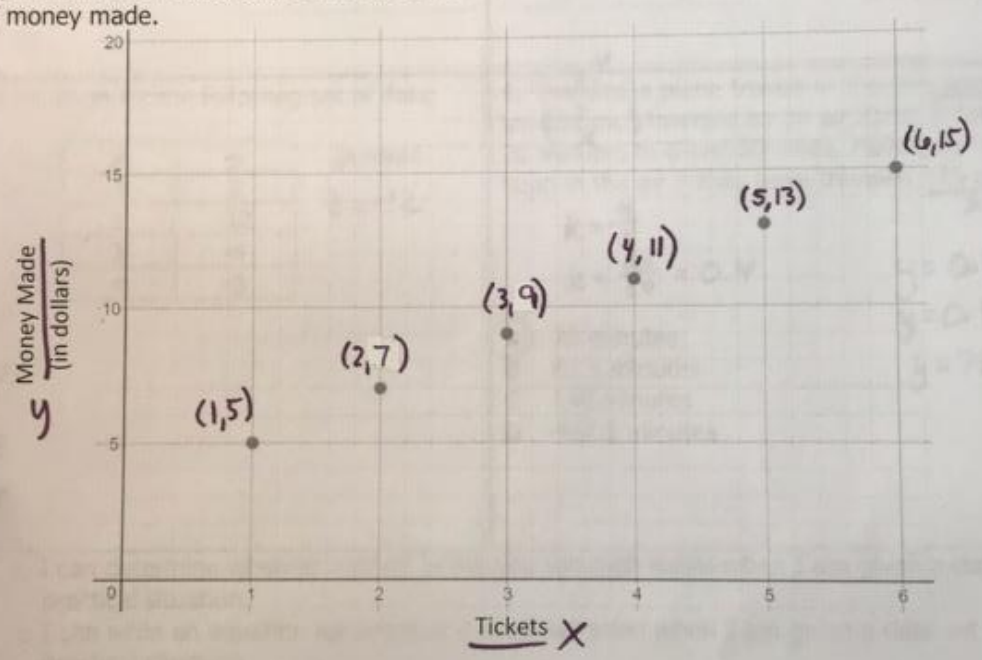
Using the data shown above, how long did the game last if there were 230 points scored?
x

$y = 0.5(230) + 31$

$y = 146$

(A) 146
B 138.5
C 103
D 159

7. The graph shows the relationship between the number of tickets sold to a group for a concert and the amount of money made.



Which is closest to the amount that would need to be sold to make $115?
y

$y_1 \sim mx_1 + b$

$y = 2x + 3$

$115 = 2x + 3$

$-3 \quad -3$

$112 = 2x$

$x = 56$ tickets

Skill #2

- □ I can determine an equation of a curve of best fit, using a graphing utility, given a set of no more than twenty data points in a table, a graph, or a practical situation.
- □ I can make predictions, using data, scatterplots, or the equation of the line of best fit.
- □ I can solve practical problems involving an equation of the line of best fit.
- □ I can evaluate the reasonableness of a mathematical model of a practical situation.
- □ Need more practice (IXL – KK.13, KK.14, KK.15, use Desmos.com)

Skill #3 – Direct and Inverse Variation

1. Which table represents an inverse variation?

A

x	y
-9	3
-6	2
-3	1

B

x	y
1	0
2	1
3	5

(C) $k = xy$

x	y
-5	4
2	-10
4	-5

$k = -20$

D

x	y
10	5
12	6
14	7

2. Which table represents direct variation?

A

x	y
1	3
2	7
4	9

(B) $k = \frac{y}{x}$

x	y
-10	4
-5	2
5	-2

$k = -\frac{2}{5}$

C

x	y
1	6
2	3
-3	-2

D

x	y
2	10
2.5	8
4	5

3. Write an equation for the following set of data:

x	y
-6	2
1	-12
3	-4
4	-3

inverse

$k = -12$

A $y = -12x$
B $y = \frac{12}{x}$
(C) $y = \frac{-12}{x}$
D $y = -6x$

4. The time (y) a plane travels in the air varies directly with the distance (x) traveled by an airplane. It takes the plane 20 minutes to travel 50 miles. How long has the plane been in the air if they have traveled 175 miles?

$k = \frac{y}{x}$

$k = \frac{20}{50} = 0.4$

$y = 0.4x$

$y = 0.4(175)$

$y = 70$

(A) 70 minutes
B 85.5 minutes
C 140 minutes
D 437.5 minutes

Skill #3

- ☐ I can determine whether a direct or inverse variation exists when I am given a data set or practical situation.
- ☐ I can write an equation for direct or inverse variation when I am given a data set or practical situation.
- ☐ I can graph an equation representing a direct variation.
- ☐ Need more practice (IXL – R.4, R.6, R.7)