

TEST NAME: **S-ID.6**
TEST ID: **844115**
GRADE: **09 - Ninth Grade**
SUBJECT: **Mathematics**
TEST CATEGORY: **School Assessment**

Student: _____

Class: _____

Date: _____

1. The starting salaries for the employees at a company from 1996 to 2002 are shown in the table below.

Year	Salary
1996	\$28,680
1998	\$29,255
2000	\$29,882
2002	\$30,719

Using the line of best fit for the data, in what year is the starting salary predicted to be about \$35,000?

- A. 2008
 - B. 2011
 - C. 2012
 - D. 2015
2. The table shows Maggie's recent electric bills. The amount due is equal to the product of the kilowatt-hours (kWh) used and the cost per kWh.

Electric Bill History

Month	Usage (kWh)	Amount Due (\$)
April	462	69.14
June	428	64.20
August	317	48.34
October	306	46.91
December	331	50.94

Maggie wants to buy a new energy-efficient refrigerator. Her old refrigerator uses about 1200 kWh per year, while the new one would use about 400 kWh per year. Approximately how much money would Maggie save per year if she buys the new refrigerator?

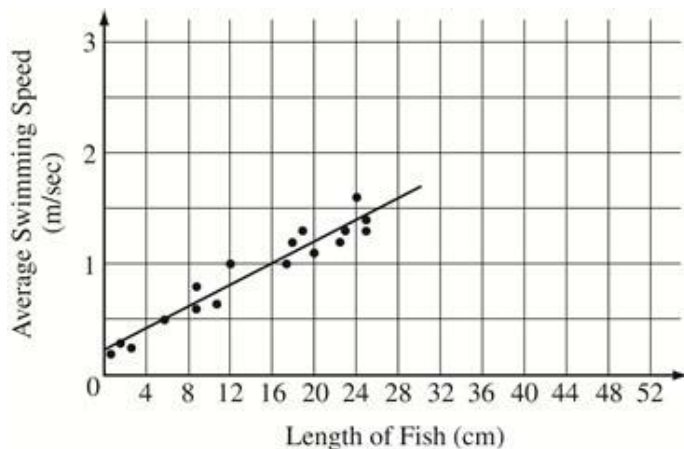
- A. \$20
- B. \$60
- C. \$120
- D. \$180

3. The table below shows the average verbal and math score on a test for students in seven states.

State	Verbal Score (x)	Math Score (y)
State 1	418	466
State 2	401	443
State 3	430	478
State 4	401	440
State 5	397	437
State 6	425	470
State 7	443	490

Using the line of best fit for the data, what is the **approximate** predicted average math score for a state that had an average verbal score of 500?

- A. 550
 - B. 560
 - C. 570
 - D. 580
4. The average swimming speed, in meters per second, for one type of fish is related to the length of the fish, in centimeters, as shown in the scatterplot below.



Based on the line of best fit shown on the graph, what would be the average swimming speed, in meters per second, for a fish 50 centimeters long?

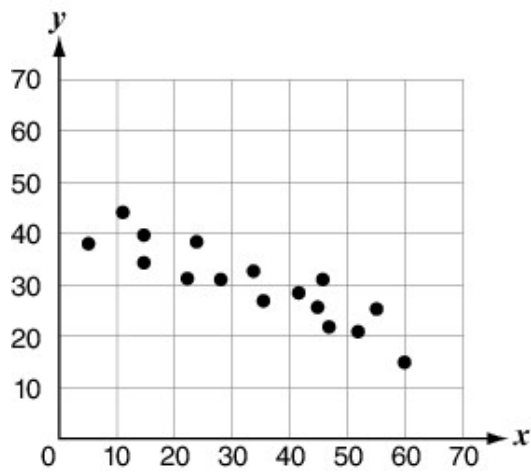
- A. Between 1.5 and 2
- B. Between 2 and 2.5
- C. Between 2.5 and 3
- D. Greater than 3

5. Which equation **best** models the data in the table below?

x	y
1.0	11.4
2.5	17.8
4.0	23.7
5.5	29.8

- A. $3x - y = -9.4$
- B. $4x - y = -7.4$
- C. $5x - y = -5.0$
- D. $6x - y = -5.4$

6. Which function **best** fits the data in this scatter plot?



- A. $y = -\frac{1}{2}x + 45$
- B. $y = -2x + 45$
- C. $y = -\frac{1}{4}x + 45$
- D. $y = -4x + 45$

7. Which equation **best** models the data in the table below?

x	y
1	3
2	5
4	7
7	9
11	12

- A. $y = 0.76x + 3.72$
- B. $y = 1.32x - 4.90$
- C. $y = 3.72x + 0.76$
- D. $y = 4.90x + 1.32$

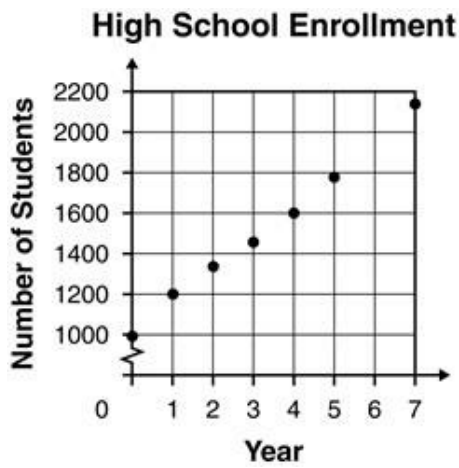
8. The table below shows the population of a state over 40 years.

Year	Population
1960	4,556,155
1970	5,084,411
1980	5,880,095
1990	6,628,637
2000	8,049,313

Using an exponential model, in what year will the population initially exceed 10 million?

- A. 2010
- B. 2018
- C. 2020
- D. 2028

9. The graph shows the number of students enrolled in a high school over a 7-year period.



If this trend continues, approximately how many students will be enrolled in year 9?

- A. 2000
 - B. 2250
 - C. 2400
 - D. 2600
10. Janine tested microwave ovens with different power levels to determine how long it would take each oven to bring two cups of room-temperature water to a boil. She recorded the time for each of four ovens in the table below.

Time to Boil Water

Microwave Power (watts)	Time (seconds)
700	85
850	78
1000	70
1100	65

Based on the relationship shown in the table, which is the best prediction of the amount of time it would take to boil two cups of room-temperature water in a 1350-watt microwave oven?

- A. 49 seconds
- B. 53 seconds
- C. 58 seconds
- D. 61 seconds

11. Which equation is the exponential best-fit model for the data in the table below?

x	1	2	3	4	5	6	7
y	6.00	5.04	4.23	3.56	2.99	2.51	2.11

- A. $y = 0.4(6.3)^x$
B. $y = 0.8(7.1)^x$
C. $y = 6.3(0.4)^x$
D. $y = 7.1(0.8)^x$
12. The table shows the approximate fuel consumption for varying sizes of diesel generators operating at a full load.

Diesel Generator Fuel Consumption

Generator Size (kW)	Fuel Consumption (gal/hr)
60	4.8
75	6.1
100	7.4
125	9.1
135	9.8

This data is approximated by the linear model $y = 1.04 + 0.0647x$, where x represents the generator size and y represents the fuel consumption. About what size generator will use 15 gallons of fuel per hour?

- A. 180 kW
B. 195 kW
C. 200 kW
D. 215 kW
13. Treatment for feline hyperthyroidism involves a single dose of radioactive iodine. The amount of radioactive iodine remaining following treatment is shown in the table.

Radioactive Iodine Remaining after Treatment

Time (days)	Amount of Radioactivity (mCi)
0	3
8	1.5
16	0.75

About how much radioactivity will still remain 20 days after treatment?

- A. 0.0 mCi
B. 0.38 mCi
C. 0.53 mCi
D. 0.60 mCi

14. A sample includes 600 bacteria. After a dose of an antibiotic, the number of bacteria decreases. Pieta estimated and recorded the number of bacteria at 20-minute intervals following the dose of antibiotics. The relationship is given in the following table.

Interval	# of Bacteria
0	600
1	319
2	162
3	70
4	38

Based on this observed data and a reasonably well-fitted function, which value is a good prediction of the number of bacteria remaining after 2 hours?

- A. 9
 - B. 20
 - C. 70
 - D. 160
15. The table below shows the amount of time Darrell studied for six math tests and the grade he earned on each test.

Time (minutes)	Grade
20	72
25	74
37	81
40	81
52	85
57	88

Using the line of best fit for the data, what grade is Darrell predicted to earn if he studies for 1 hour?

- A. 88
- B. 89
- C. 90
- D. 91

16. The table below shows the population (in millions) of several states and the number of electoral votes those states have.

Population	Electoral Votes
8.4	15
4.1	8
17.0	27
8.7	15

Using the line of best fit for the data, **about** how many electoral votes should a state with a population of 7.4 million have?

- A. 11
 - B. 12
 - C. 13
 - D. 14
17. Challenges are a fun way to build school spirit. The challenge begins with two selected students, who in turn select additional students. The table shows the level of the challenge and the number of students selected at each level.

Level	Number of Students
0	2
1	7
2	24
3	86
4	300

Determine a reasonable exponential function for the data. Which value is the best prediction for the number of students who will be selected at Level 5?

- A. 285
- B. 515
- C. 1050
- D. 1500

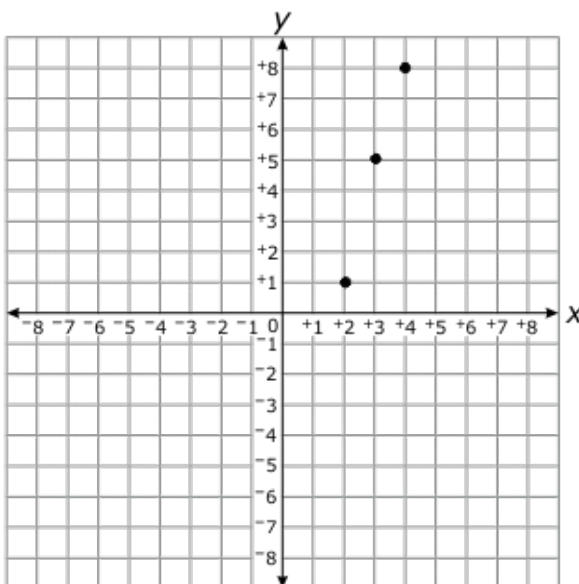
18. The table below shows the height of a plant, in inches, over 5 weeks.

Week (x)	Height (y)
0	0
1	1
2	3
3	6
4	8
5	11

Which is an **approximate** equation of the line of best fit for the data?

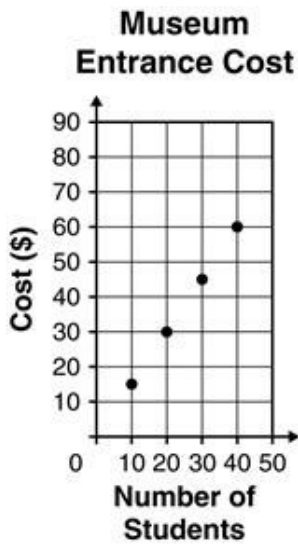
- A. $y = 2x - 0.5$
- B. $y = 2.2x$
- C. $y = 2.25x - 0.8$
- D. $y = 2.5x - 0.4$

19. Using the graph, which is the **approximate** line of best fit for these data?



- A. $y = 3x - 4$
- B. $y = 3.5x - 5.8$
- C. $y = 4x - 7$
- D. $y = 4.5x - 10.2$

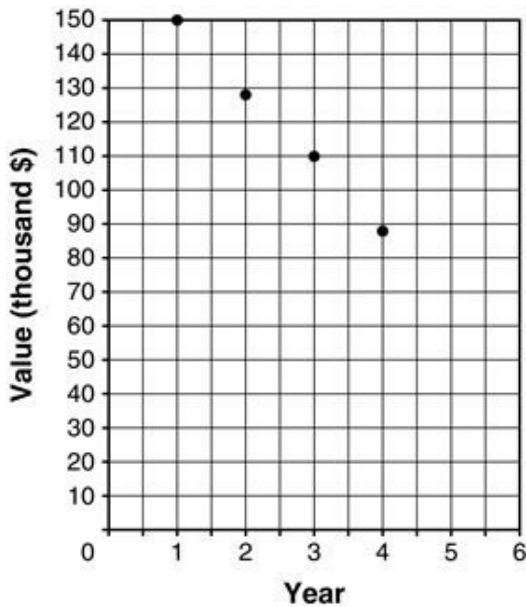
20. The graph below shows the costs for groups of multiples of 10 students to enter a museum.



According to the graph, how much would it cost for 160 students to enter the museum?

- A. \$60
- B. \$90
- C. \$160
- D. \$240

21. The value of a tractor used for farming depreciates over time. The graph shows the relationship between the value of a large diesel tractor with a list price of \$150,000 and the number of years it has been in use.



What will be the approximate value of the tractor in Year 5?

- A. \$100,000
- B. \$90,000
- C. \$70,000
- D. \$50,000

22. Using the exponential best fit model for the data below, what is the value of y when $x = 1$?

x	y
2	2.25
4	20.25
6	182.25

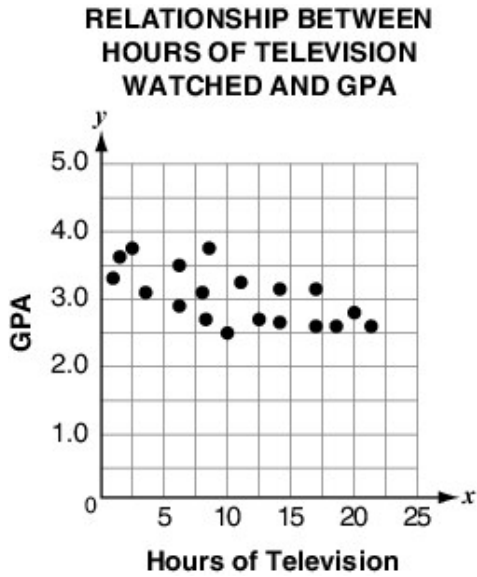
- A. 0.25
B. 0.50
C. 0.75
D. 1.25
23. The cost for several phone calls made are given in the table.

Number of Minutes	Cost of Phone Call (\$)
5	0.21
10	0.31
12	0.35
20	0.51
24	0.59
33	0.77

Using a linear model, what is the cost for a 40 minute phone call?

- A. \$1.24
B. \$0.91
C. \$0.87
D. \$0.11

24. The scatter plot below represents the relationship between the number of hours of television watched per week and grade point average (GPA).



Which function **best** fits the data?

- A. $y = -3.7x + 0.05$
 - B. $y = -0.05x + 3.7$
 - C. $y = 0.05x + 3.7$
 - D. $y = 3.7x - 0.05$
25. The table below shows the value of a car over two years.

Year	Value
0	\$15,500.00
0.5	\$14,560.00
1	\$13,911.20
1.5	\$12,969.66
2	\$12,204.09

Which equation **best** models the value of the car, y , after x years?

- A. $y = -1,636.4x + 15,465.4$
- B. $y = -1,647.9x + 12,204.09$
- C. $y = 15,465.4x - 1,636.4$
- D. $y = 12,204.09x - 1,647.9$

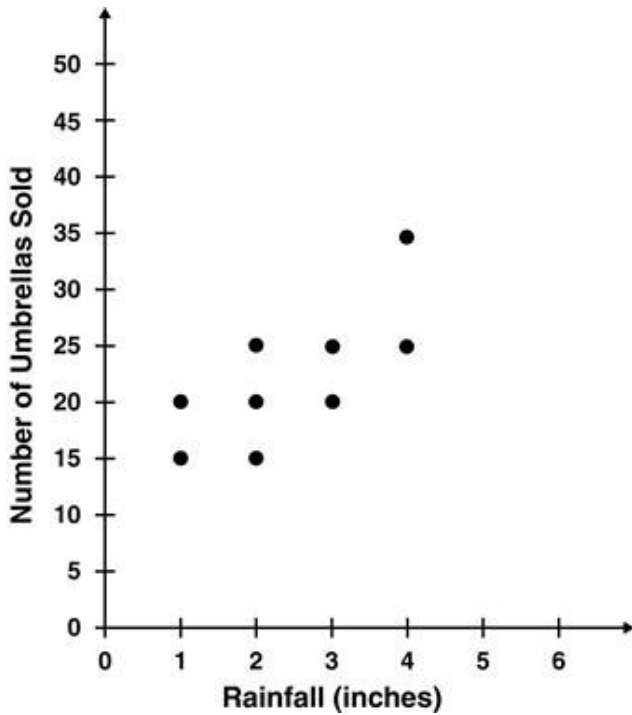
26. The table below shows ticket prices for the years 2000 to 2006.

Year (x)	Ticket Price (y)
2000	\$3.00
2001	\$3.00
2002	\$4.00
2003	\$5.00
2004	\$5.50
2005	\$6.00
2006	\$6.00

Using the line of best fit for the data, which choice is the **best** prediction of the price of a ticket in 2010?

- A. \$7.50
- B. \$7.70
- C. \$8.25
- D. \$8.80

27. The following graph shows the number of umbrellas sold at a store relative to the amount of rainfall in the town where the store is located.



Based on the line of best fit, approximately how many umbrellas would be sold if there were 6 inches of rain in the town?

- A. 20
 - B. 40
 - C. 60
 - D. 80
28. Jules kept track of her cab fare in the table below.

Cost of Cab Rides

Distance Traveled (miles)	Cost (\$)
7	16.20
3.4	9.00
4	10.20
5.6	13.40

The linear model $c = 2.20 + 2m$ describes the cost of the cab ride, c , as a function of the number of miles traveled, m . How much will it cost Jules to travel 16 miles in a cab?

- A. \$32.00
- B. \$34.20
- C. \$35.20
- D. \$37.20

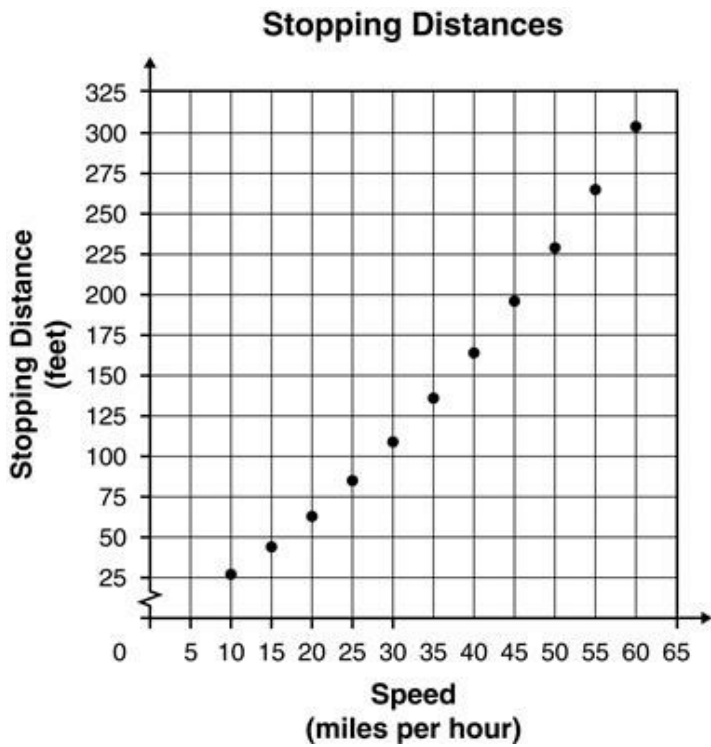
29. The table below shows the amount of rainfall in an area over 4 weeks.

Week (x)	Rainfall (y)
1	6 inches
2	8 inches
3	9 inches
4	11 inches

Which equation **best** fits the data?

- A. $y = 1.6x + 4.5$
- B. $y = 4.5x + 1.6$
- C. $y = 5.1(1.2)^x$
- D. $y = 1.2(5.1)^x$

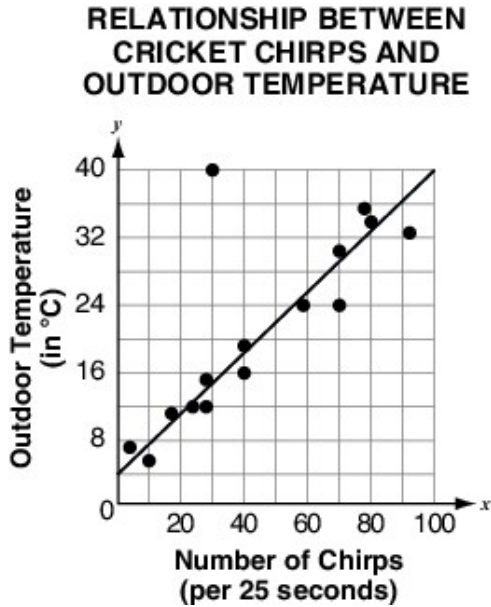
30. The stopping distances for various speeds are shown on the graph below.



Which function best models the graph?

- A. $y = 24.93(1.04)^x$
- B. $y = 0.17x + 20.45$
- C. $y = 5.78x - 52.72$
- D. $y = 0.05x^2 + 2.18x + 0.48$

31. The outdoor temperature can be determined by counting the number of chirps a cricket makes in 25 seconds. A scientist counted the number of chirps and recorded the outdoor temperature in degrees Celsius ($^{\circ}\text{C}$) once a month for 15 months. She found that there was a linear association and plotted her data along with the function that best fits.



If she counted 33 cricket chirps in 25 seconds, what would she predict the outdoor temperature to be?

- A. 12°C
- B. 15°C
- C. 40°C
- D. 80°C

32. A set of data is shown in the table below.

x	y
1	12.6
2	15.4
3	18.5
5	24.2
6	27.4

Assuming a linear relationship, what is the predicted value of y when $x = 4$?

- A. 19.4
- B. 20.4
- C. 21.4
- D. 22.4

33. The table below shows per capita consumption of bottled water for selected years, 1980–2005.

Year	Gallons Per Capita
1980	2.7
1985	5.1
1990	8.8
1995	11.6
2000	16.7
2005	25.4

Based on a line of best fit of the data, **about** how fast is the consumption of bottled water growing each year?

- A. 0.59 gallon per capita per year
- B. 0.86 gallon per capita per year
- C. 0.91 gallon per capita per year
- D. 1.09 gallons per capita per year

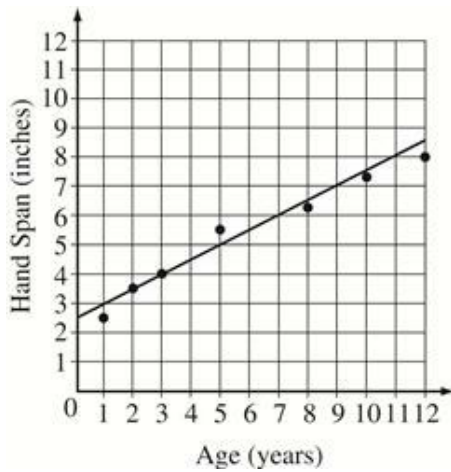
34. The life of a AA battery can be predicted by the number of hours of use. As the number of hours of use increases, the remaining battery power decreases. The linear association is demonstrated in the scatter plot below.



If Tyler used 20% of the battery power in his AA battery, for approximately how many hours has he used the battery?

- A. 6 hours
- B. 24 hours
- C. 27 hours
- D. 40 hours

35. The scatterplot below shows the hand spans, in inches, of several children from the ages of 1 through 12.



Based on the line of best fit for the data shown on the graph, what is the predicted age, in years, for a child who has a hand span of 7 inches?

- A. 6
- B. 7
- C. 9
- D. 10

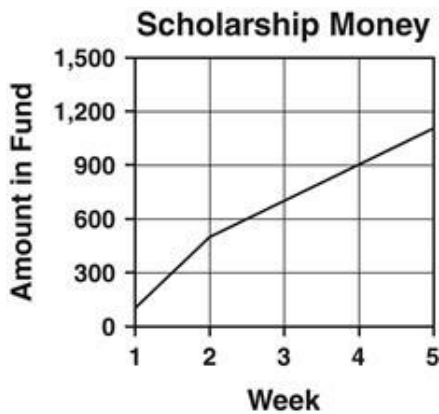
36. The table below shows the number of chickens on a farm in different years.

Years Since 2002 (x)	Number of Chickens (y)
0	282
1	440
2	596
3	753
4	910
5	1,068

Assuming a linear relationship, which is the **best** prediction of the number of chickens on the farm in 2015?

- A. 1,728
- B. 2,001
- C. 2,324
- D. 2,638

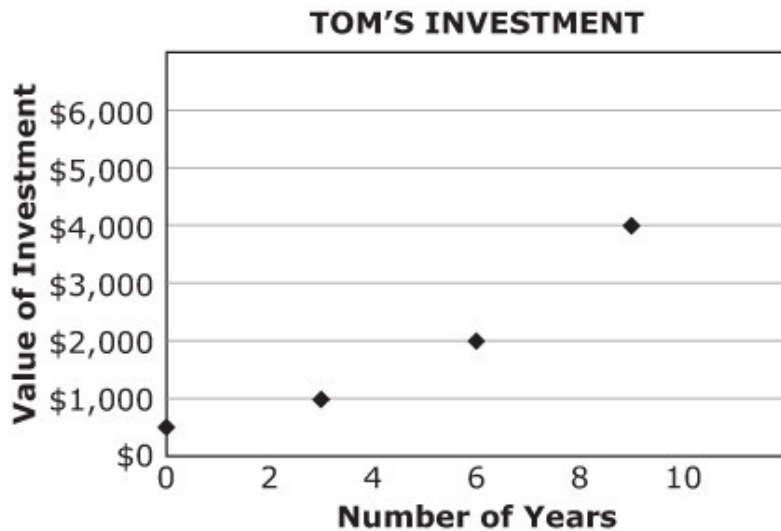
37. The graph shows the amount of money that the journalism club raised for a scholarship fund over a 5-week period.



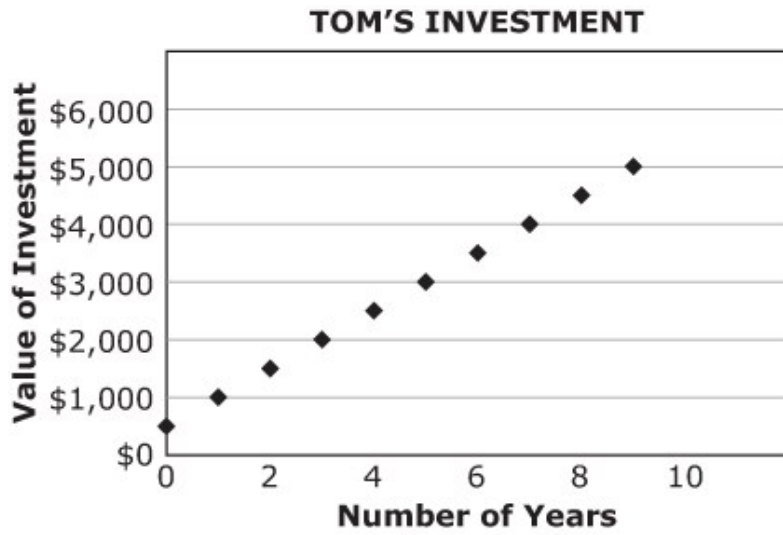
If x represents the number of weeks, which function is the best fit for the information in this graph?

- A. $f(x) = 3x + 100$
 - B. $f(x) = 200x$
 - C. $f(x) = 100x + 100$
 - D. $f(x) = 200x + 100$
38. Tom wants to invest \$500. He invests in a company that predicts his investment will double in value every 3 years. This situation can be modeled by the function $f(x) = 500 \cdot 2^{\frac{1}{3}x}$ where x represents the number of years Tom leaves his money with the company. Which graph models this situation?

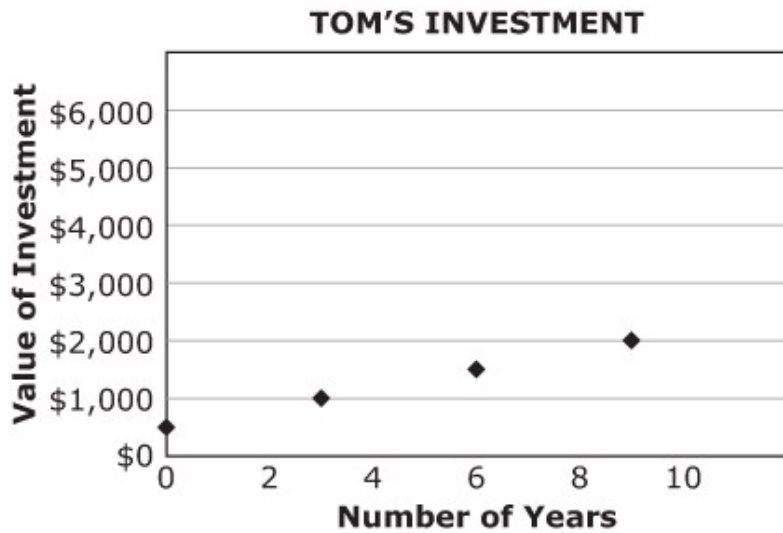
A.



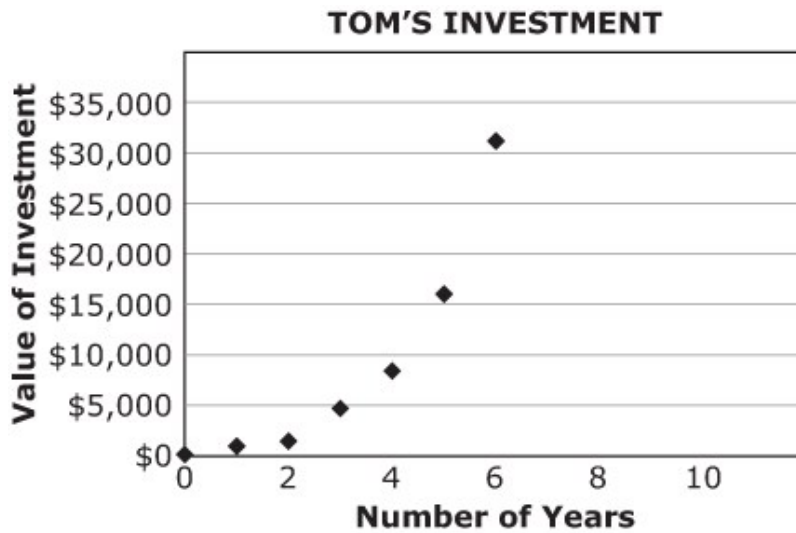
B.



C.



D.



39. Arthur invested \$100 in an account. His account balance is shown in the table.

Arthur's Account
Balance

Time (years)	Amount (\$)
1	109.00
2	118.81
3	129.50

About how many years will it take for Arthur's investment to double?

- A. 7.73 years
 - B. 7.79 years
 - C. 7.87 years
 - D. 8.04 years
40. The table below shows the shoe size and height of 8 players on a basketball team.

Shoe Size	Height (inches)
8.5	65.5
10.0	68.5
12.0	72.7
9.5	67.6
10.5	69.7
9.0	66.3
11.0	70.6
13.0	74.9

Using the line of best fit for the data, **about** how much does height increase for each 1.0 increase in shoe size?

- A. 0.5 inch
- B. 1 inch
- C. 2 inches
- D. 3 inches

41. The table shows the number of hours spent studying and the exam grade earned.

Hours Studied	Exam Grade
0.5	70
1	80
1.5	82
2	85
2.5	88

Using a linear model, *approximately* how many hours would a student study to earn a 97?

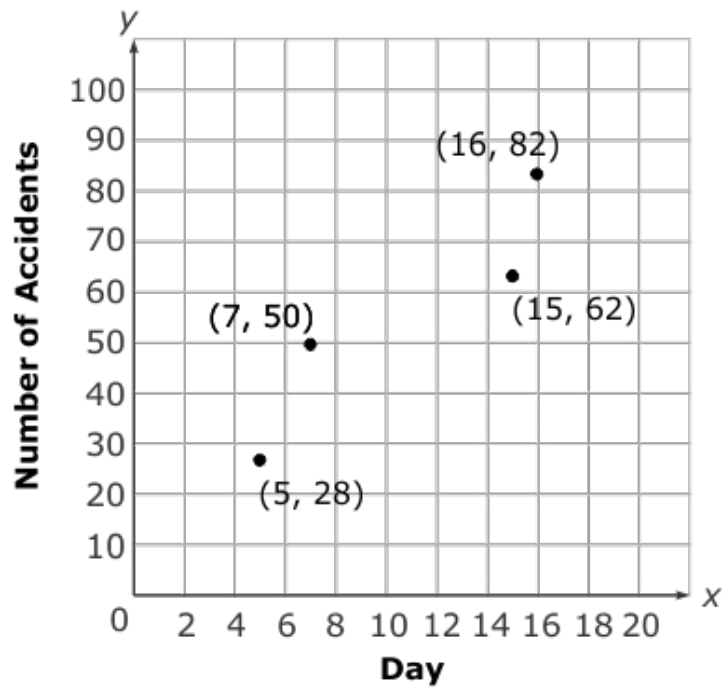
- A. 3 hours
 - B. 3.5 hours
 - C. 4 hours
 - D. 5 hours
42. Haley's science class recorded the amount of a material left each day to see how it changed. Their results are shown in the table below.

Day	Amount Left
1	23.14
2	10.51
3	6.75
4	3.24
5	1.73
6	0.84
7	0.42
8	0.17
9	0.13
10	0.03

Using the equation of best fit for the data, *about* how much of the material was predicted to be left after $3\frac{1}{2}$ days?

- A. 8.61
- B. 6.48
- C. 5.00
- D. 4.40

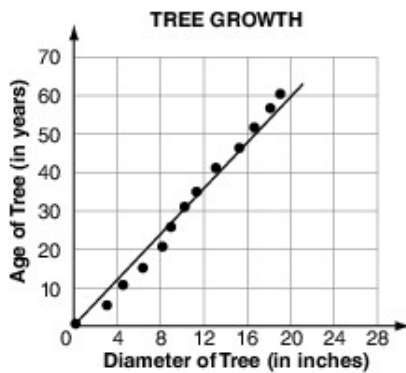
43. The scatterplot below shows the number of days the temperature was below 20° in 4 different cities and the number of weather-related car accidents in those cities during the month of January.



Which equation **best** fits the data?

- A. $y = 2.13x + 14.7$
- B. $y = 2.73x + 12.55$
- C. $y = 3.73x + 15.4$
- D. $y = 4.38x + 10.4$

44. The scatter plot below relates the diameter of a particular species of tree, in inches, to its age, in years. The growth rate of a tree, in years per inch, is also known as the growth factor of the tree. The slope of the line of best fit in the scatter plot represents the growth rate, or factor, of the tree.



The table below lists the growth factors of different species of trees.

Tree Species	Growth Factor
Cottonwood	2.0
Silver maple	3.0
Red oak	4.0
White pine	5.0

What species of tree is most likely represented by the scatter plot?

- A. Cottonwood
- B. Silver maple
- C. Red oak
- D. White pine

45. A price study tracked the cost of a bag of groceries over a five-year period. The data can be modeled by a function of the form $C = a(b)^x$, where x represents the number of years since the study began.

Grocery Price Study

Years Since Study Began	Cost (\$)
0	30.00
1	32.10
2	34.35
3	36.75
4	39.32

Which value is the best prediction of the cost of the groceries nine years after the beginning of the study?

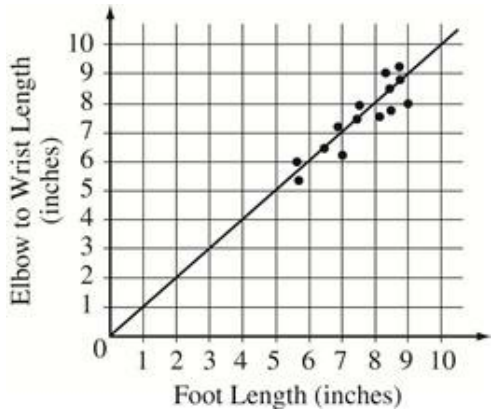
- A. \$48.64
 - B. \$52.17
 - C. \$55.15
 - D. \$59.01
46. The table shows the number of customers, R , that entered a store over several weeks, w .

Week	0	1	2	3	4
Customers (in thousands)	8	15	29	54	102

Which equation *best* fits these data?

- A. $R = 1.89w + 8$
- B. $R = 8w + 1.89$
- C. $R = 8(1.89)^w$
- D. $R = 1.89(8)^w$

47. The scatterplot below shows the relationship between foot length, in inches, and the length from the inner elbow to the wrist, in inches, for fourteen people who were sampled. A line that approximates these data is shown on the graph.



Based on this line, what is the predicted length, in inches, from the inner elbow to the wrist for a person with a foot length of 12 inches?

- A. 10
 - B. 11
 - C. 12
 - D. 13
48. The table shows the growth of a certain type of bacteria.

Time in Days (x)	0	2	4	6	8
Number of Cells (N)	120	270	631	1,450	3,360

Which equation *best* models this set of data?

- A. $N = 1.52(118.8)^x$
- B. $N = 118.8(1.52)^x$
- C. $N = 75x + 120$
- D. $N = 383x - 365.8$

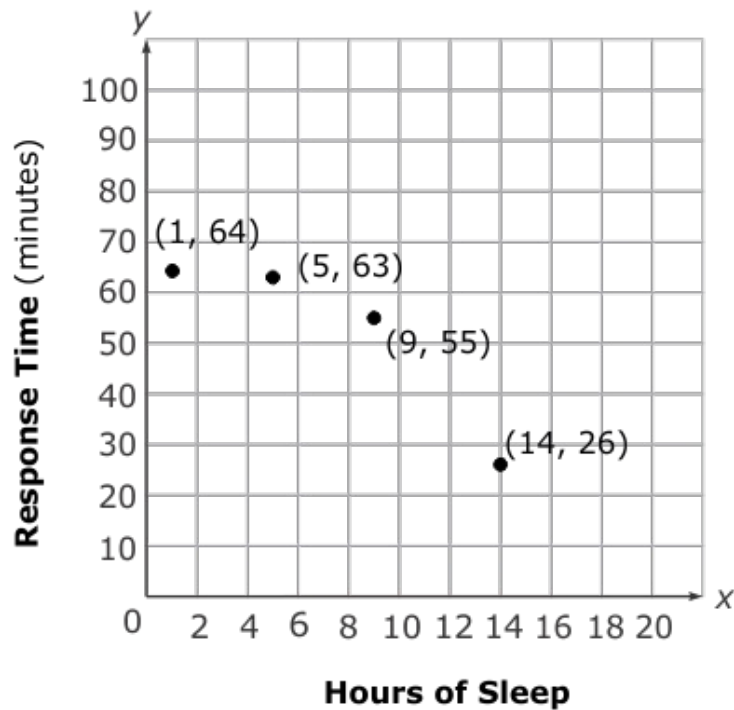
49. The table below shows the average attendance at a football team's games in different years.

Year	Attendance
2000	7,650
2002	9,999
2004	11,190
2006	13,008

Assuming a linear trend, in what year was the team's attendance first predicted to be greater than 20,000?

- A. 2008
- B. 2010
- C. 2012
- D. 2014

50. The scatterplot below shows the number of hours of sleep that 4 teenagers got before taking the SAT and the average response time in seconds it took for those teens to answer each question.



Using the equation of the line of best fit, how many hours of sleep would you expect a teen to get to have a response time of 46 seconds?

- A. 7.25 hours
- B. 9.31 hours
- C. 13 hours
- D. 60.76 hours

51. John is growing a sample of bacteria. He has collected the following data.

Bacterial Growth

Time (hours)	Number of Bacteria
0	5
1	15
2	45

John needs to divide the sample in half once the number of bacteria has reached 1000. How many hours after the initial time must he divide the sample?

- A. 2.41 hours
- B. 4.82 hours
- C. 33.8 hours
- D. 99.5 hours

52. The table below shows the boiling point of water, y , at different barometric pressures, x .

Barometric Pressure	Boiling Point (°F)
200	140.18
300	152.38
400	164.44
500	178.16
600	186.98
700	194.18
800	200.30
900	206.96
1,000	213.53

Using the line of best fit for the data, what is the *approximate* temperature predicted for a barometric pressure of 250?

- A. 127.41°F
- B. 145.78°F
- C. 146.28°F
- D. 149.91°F

53. The table below shows the value of a car over 2 years.

Year	0	0.5	1.0	1.5	2.0
Value (dollars)	15,500.00	14,560.00	13,911.20	12,969.66	12,204.09

Using an exponential best-fit model, after *approximately* how many years will the car be worth 40% of its original value?

- A. 7.2 years
- B. 7.7 years
- C. 8.2 years
- D. 8.7 years

54. A data set is shown below.

x	y
1	6.00
2	5.04
3	4.23
4	3.56
5	2.99
6	2.51
7	2.11

Using an exponential best-fit model, what is the predicted value of y when $x = 10$?

- A. 1.78
- B. 1.49
- C. 1.25
- D. 0.88

55. A travel trailer bought today will depreciate over time at a fairly steady rate, as shown in the table.

Years	Value (\$)
0	40,000
1	34,000
2	29,000
3	24,500
4	21,000
5	17,500

Using a function fit to this data, which dollar amount would predict the trailer's value in 10 years?

- A. \$3,500
- B. \$5,700
- C. \$7,900
- D. \$9,300

56. Which two variables are **most likely** to have a negative correlation?

- A. a person's weight and shoe size
- B. the size of a diamond in a ring and the price of the ring
- C. the amount of time a student watches television and the amount of time the student studies
- D. the amount of time a student studies for a test and the number of questions on the test that the student answers correctly

57. The electric company is installing new electric meters in a neighborhood. The table below shows the number of homes in the neighborhood with meters installed after different numbers of weeks.

Week	Meters Installed
0	8
1	15
2	29
3	54
4	102

Using an exponential best fit model, **approximately** how many homes will have meters installed after 6 weeks?

- A. 194
- B. 266
- C. 366
- D. 443

58. The table below shows the arm spans and heights of 8 students in a class.

Arm Span (x)	Height (y)
63 inches	65 inches
71 inches	70 inches
62 inches	60 inches
66 inches	64 inches
65 inches	68 inches
72 inches	73 inches
58 inches	60 inches
62 inches	64 inches

Using a linear model for the data, what is the **approximate** predicted arm span of a student who is 6 feet tall?

- A. 72.3 inches
 - B. 71.5 inches
 - C. 61.2 inches
 - D. 58.6 inches
59. A trucking company collected data on the distance and time required for several deliveries.

Distance (miles)	Time (hours)
85	1.6
120	3.0
153	3.2
185	4.0
210	4.2
250	5.0

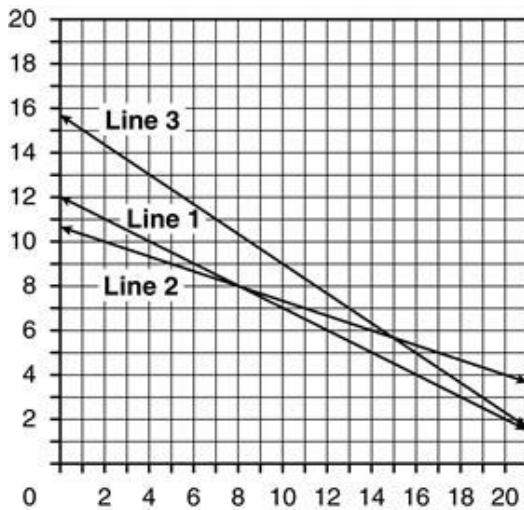
Using a linear best fit model, **approximately** how many hours would be needed for a delivery of 225 miles?

- A. 4.3
- B. 4.5
- C. 4.7
- D. 4.9

60. A student is trying to determine the line of best fit for the data in the table below.

x	y
2	14
4	11
7	12
8	8.5
10	8
12	5
14	6.5
16	3.5

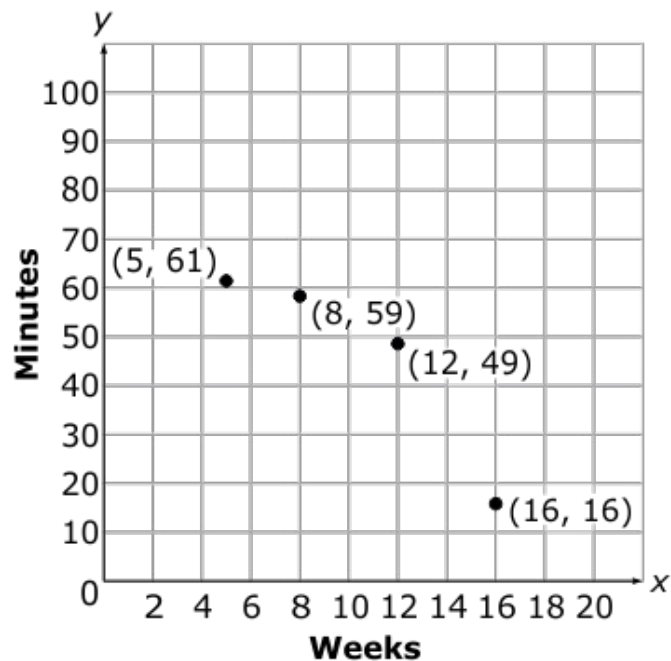
The graphs of three functions are given as possible lines of best fit.



Which statement best describes the reasoning for choosing one of the three graphs as the line of best fit?

- A. The sum of the squares error is greater for Line 1 than for Line 2 and Line 3, therefore Line 1 is the line of best fit.
- B. The sum of the squares error is greater for Line 2 than for Line 1 and Line 3, therefore Line 2 is the line of best fit.
- C. The sum of the squares error is less for Line 1 than for Line 2 and Line 3, therefore Line 1 is the line of best fit.
- D. The sum of the squares error is less for Line 3 than for Line 1 and Line 2, therefore Line 3 is the line of best fit.

61. A scatter plot for Deanna's race times and weeks training are displayed below.



In what week was Deanna's time closest to her time predicted by the line of best fit for the data?

- A. 5
- B. 8
- C. 12
- D. 16

62. Dr. Fisher is researching the growth of a culture of bacteria. He records the count of bacteria, y , after x hours. He wants to determine whether there is a relationship between the amount of time passed and the count of bacteria. He finds that the linear model that best fits the data is $y = -143 + 51x$.

Time	1	2	3	4	5	6	7	8	9
Bacteria	2	4	8	16	32	64	128	256	512
Residuals	94	45	-2	-45	80	99	86	-9	196

Using the residuals, which statement best explains the relationship between the amount of time and the count of bacteria?

- A. Because the residuals form a negative, linear association, there is a negative, linear relationship between the amount of time and the count of bacteria as demonstrated by $y = -143 + 51x$.
- B. Because the residuals form a curved association, there is a curved relationship between the amount of time and the count of bacteria as demonstrated by $y = -143 + 51x$.
- C. Because the residuals form a pattern, there is no linear relationship between the amount of time and the count of bacteria as demonstrated by $y = -143 + 51x$.
- D. Because the residuals do not form a pattern, there is a linear relationship between the amount of time and the count of bacteria as demonstrated by $y = -143 + 51x$.

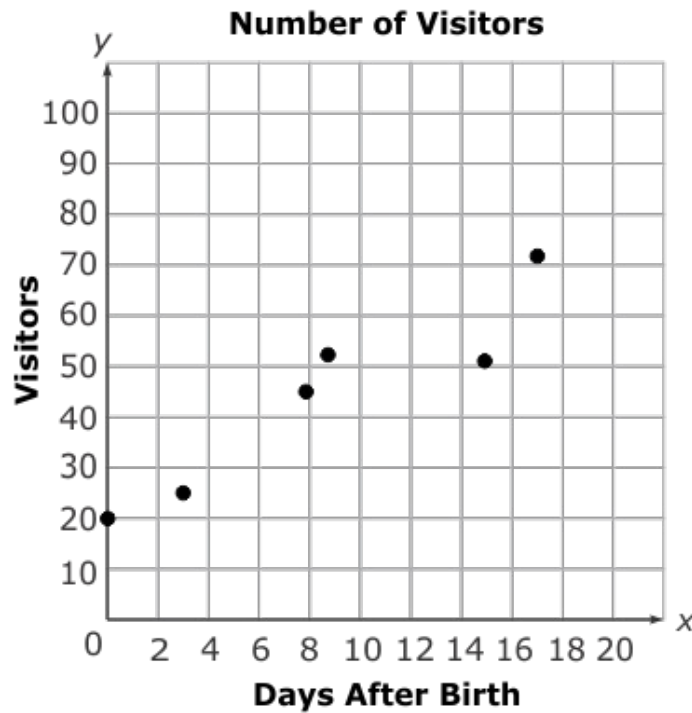
63. The table below shows a linear relation.

x	y
0	-5
1	-2
2	1
3	5
4	8
5	12

Using a linear model, how many residuals of the relation will be negative?

- A. 1
- B. 2
- C. 3
- D. 4

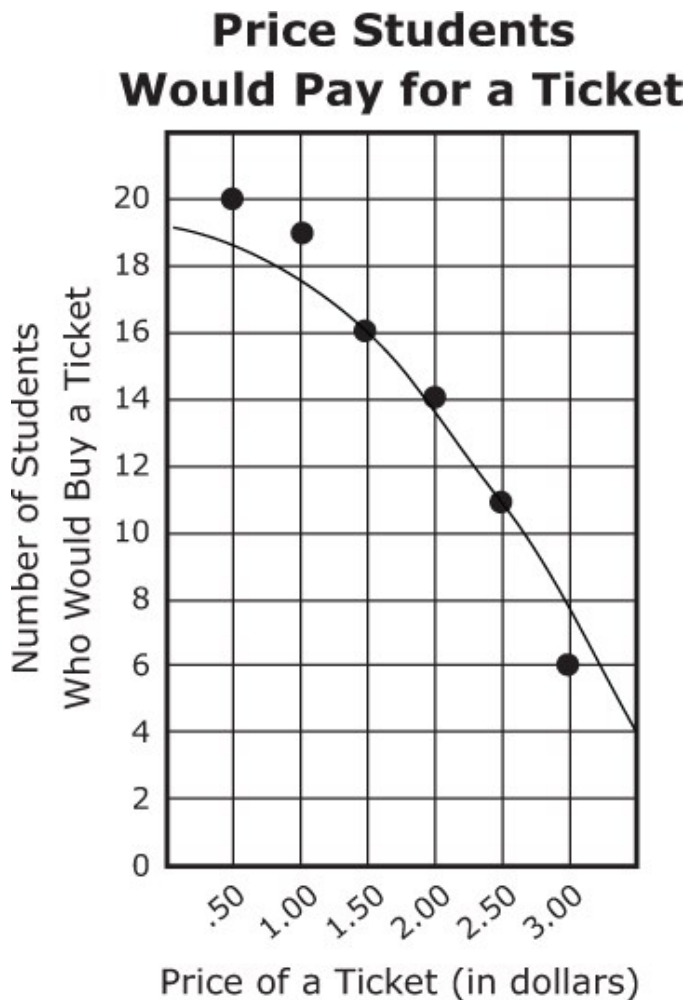
64. The graph shows the number of visitors attending the panda exhibit at the zoo each day after the birth of a new baby panda. The equation of the line of best fit for the data is $y = 2.61x + 21.21$.



Which ordered pair would **best** fit the model given?

- A. (6, 44)
- B. (10, 53)
- C. (12, 60)
- D. (16, 65)

65. The student government is planning a carnival. The president of the student government conducts a survey to find out how many students would buy a ticket based on the price of a ticket. The scatter plot below shows the data from the survey.



The president of the student government fits a function to the data points. Which statement best describes the fit of the function to the data?

- A. On average, the function overestimates the price of a ticket based on the number of students who would buy a ticket.
- B. On average, the function overestimates the number of students who would buy a ticket based on the price of a ticket.
- C. On average, the function underestimates the price of a ticket based on the number of students who would buy a ticket.
- D. On average, the function underestimates the number of students who would buy a ticket based on the price of a ticket.

66. The line of best fit for the data set below is $y = \frac{5}{6}x + 2.75$. What is the Sum of Squares error for these data?

$\{(1, 3), (2, 5), (3, 7), (4, 5), (5, 6), (6, 7), (7, 9), (8, 10)\}$

- A. 2.68
B. 6.50
C. 6.83
D. 7.19
67. The table below shows the amount a banquet hall charges to feed different sized groups of people.

Number of People	Cost
10	\$200
14	\$252
21	\$441
23	\$471

Using a linear model, what is the **approximate** residual value of the cost to feed 21 people?

- A. \$9
B. \$12
C. \$15
D. \$21

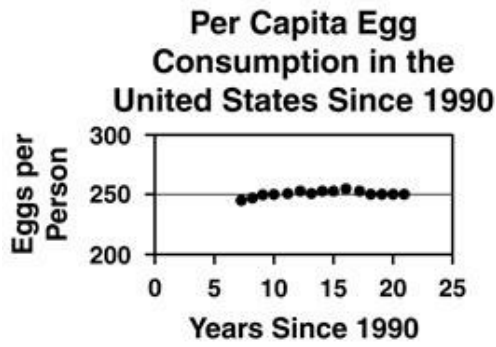
68. The table below shows the height and weight of the five players in the starting lineup of a basketball team.

Height (inches)	Weight (pounds)
60	120
64	135
67	142
70	160
71	167

Based on the line of best fit, what does the residual value for the 71 inch player represent?

- A. The predicted weight is approximately 3.1 pounds less than the player's actual weight.
 - B. The predicted weight is approximately 3.1 pounds more than the player's actual weight.
 - C. The predicted weight is approximately 2.4 pounds less than the player's actual weight.
 - D. The predicted weight is approximately 2.4 pounds more than the player's actual weight.
69. A scientist recorded the amount of rainfall during a storm. The scientist used the equation $y = -0.97x + 11.20$ to model the relationship between y , the amount of rainfall in millimeters, and x , the amount of time, in minutes, after the storm started. The actual amount of rainfall after 7 minutes was 5.20 millimeters. How does that data point compare with the amount of rainfall that the model predicts?
- A. The actual rainfall after 7 minutes was 4.41 millimeters less than the amount of rainfall that the model predicts.
 - B. The actual rainfall after 7 minutes was 0.79 millimeters less than the amount of rainfall that the model predicts.
 - C. The actual rainfall after 7 minutes was 0.79 millimeters more than the amount of rainfall that the model predicts.
 - D. The actual rainfall after 7 minutes was 4.41 millimeters more than the amount of rainfall that the model predicts.

70. The graph shows the per capita egg consumption in the United States since 1990. To find a function that best models the data, Devin graphed the residuals from several models.



Which graph of the residuals best suggests an appropriate model for the data?

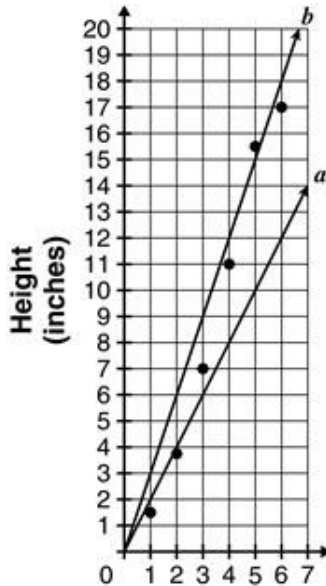
- A.
- B.
- C.
- D.

71. The height of a plant is measured each week after the first sprout shows above the soil. A botanist tries to predict the height of the plant in the upcoming weeks using the observed data in the table below.

Plant Growth

Week(s)	1	2	3	4	5	6
Height (in inches)	1.5	3.75	7	11	15.5	17

The two lines on the graph were drawn to fit a function to the data.



Based upon the residuals, which statement best describes the line that is a better fit for the given data?

- A. Line *a* is a better fit for the given data since the sum of squares error is less for Line *a* than the sum of squares error for Line *b*.
 - B. Line *b* is a better fit for the given data since the sum of squares error is less for Line *b* than the sum of squares error for Line *a*.
 - C. Line *b* is a better fit for the given data since the sum of squares error is greater for Line *b* than the sum of squares error for Line *a*.
 - D. Line *a* is a better fit for the given data since the sum of squares error is greater for Line *a* than the sum of squares error for Line *b*.
72. The data in the table can be used to determine and plot the residuals for a linear regression model.

<i>x</i>	<i>y</i>
1	42,101
2	42,312
3	43,087
4	42,111
5	41,572
6	40,826

Which conclusion can be drawn about the data based on the residual plot?

- A. The data are linear because the plot of the residuals forms a pattern.
- B. The data are not linear because the plot of the residuals forms a pattern.
- C. The data are linear because the plot of the residuals does not form a pattern.
- D. The data are not linear because the plot of the residuals does not form a pattern.

73. The data in the table can be used to determine and plot the residuals of a linear regression model.

x	y
-2	4
-1	1
0	0
1	1
2	4
3	9
4	16
5	25
6	36
7	49

Which statement about the residuals is true?

- A. The mean of the residuals is zero.
- B. The plot of the residuals forms a pattern.
- C. The plot of the residuals indicates the line is the curve of best fit.
- D. The plot of the residuals does not yield useful information about the curve of best fit.

74. Two students are trying to determine the line of best fit for the data in the table below.

x	y	Equation 1: $y = \frac{3}{5}x + 17$	Equation 2: $y = \frac{2}{5}x + 19$
4	20		
5	22		
6	19		
7	20.5		
8	22.5		
9	23.5		
10	22		
11	25		

The first student predicts Equation 1, $y = \frac{3}{5}x + 17$, as the line of best fit, while the second student predicts Equation 2, $y = \frac{2}{5}x + 19$, as the line of best fit. Which statement best describes the reasoning for choosing one of the equations as the line of best fit?

- A. The Sum of Squares error for Equation 1 is less than that of Equation 2; therefore, Equation 1 is the line of best fit for the data.
- B. The Sum of Squares error for Equation 1 is greater than that of Equation 2; therefore, Equation 1 is the line of best fit for the data.
- C. The Sum of Squares error for Equation 2 is less than that of Equation 1; therefore, Equation 2 is the line of best fit for the data.
- D. The Sum of Squares error for Equation 2 is greater than that of Equation 1; therefore, Equation 2 is the line of best fit for the data.

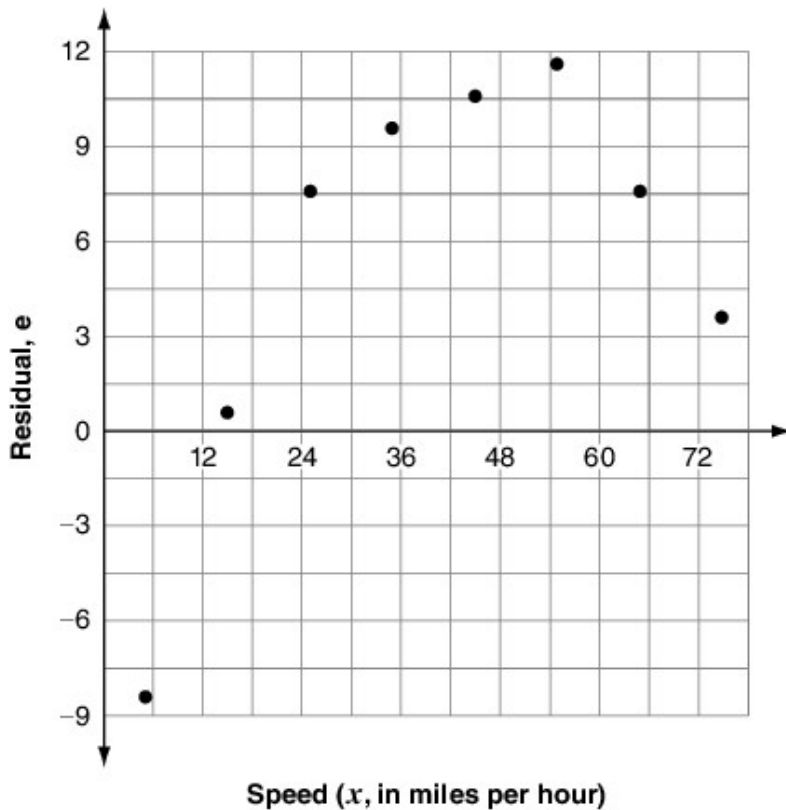
75. Sharon recorded the outside temperature, x , and the temperature inside a car, y , at six different times during a day. The results are shown in the table below.

Outside Temperature (°F)	Inside Temperature (°F)
61	62
69	64
81	82
86	90
96	97
100	96

Sharon then modeled the data using the line of best fit. Which statement is true about the line based on the residuals for the data?

- A. Since the residuals are scattered above and below the the line, the linear model is a good fit.
- B. Since the residuals form a pattern, the linear model is not a good fit.
- C. Since the majority of the residuals are above the line, the linear model is a good fit.
- D. Since the majority of the residuals are below the line, the linear model is not a good fit.

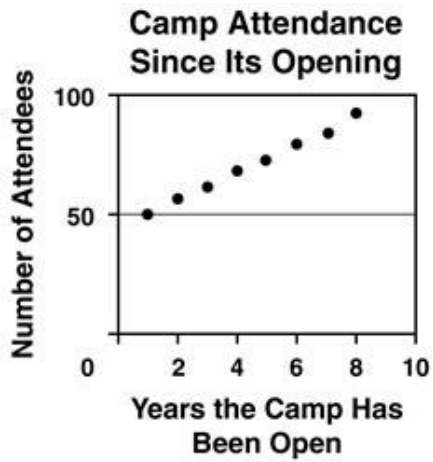
76. Leonard is studying the relationship between the fuel efficiency in miles per gallon (mpg), y , and the speed in miles per hour (mph), x , of his car. He collected data for 8 different speeds and found a linear model that best fit his data: $y = 18.46 + 0.16x$. To analyze the fit of his function, he found the residuals and created the following residual plot.



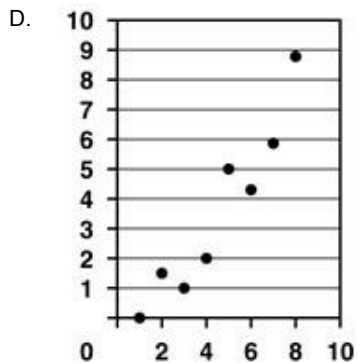
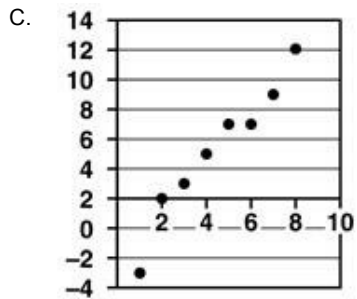
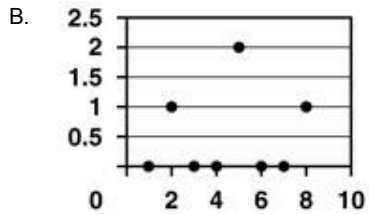
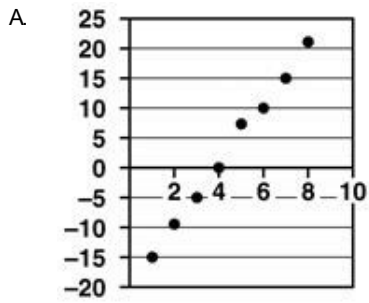
Using the residual plot, what conclusion can he make about the linear model he found?

- A. There is a negative linear relationship between the speed and fuel efficiency.
- B. There is a positive linear relationship between the speed and fuel efficiency.
- C. There is a quadratic relationship between the speed and fuel efficiency.
- D. There is a nonlinear relationship between the speed and fuel efficiency.

77. The graph shows the attendance at a summer camp for the first eight years it has been open. Several functions were generated to model the data.



The graphs of the residuals from each of those models are shown. Which residual graph relates to the function that best models the data?



78. The table below shows the average value of gold per troy ounce in different years.

Years Since 2000	Value
0	\$279
2	\$310
4	\$410
6	\$603
8	\$872
10	\$1,225

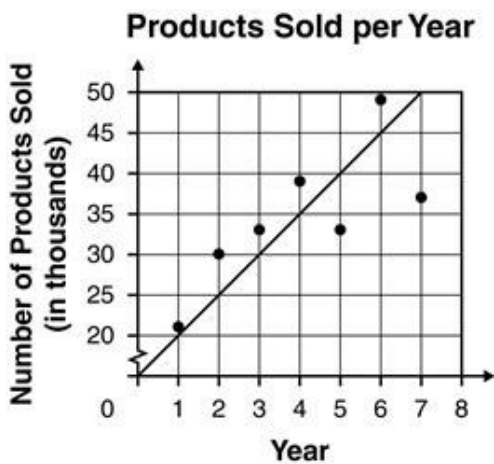
Using a linear model, what is the **approximate** difference in the actual and predicted value for 2004?

- A. \$112
- B. \$171
- C. \$239
- D. \$522

79. The manager of a company wants to accurately predict the increase in the number of products sold per year. The table and graph show information the company collected. Using the information, the company fit the given line to the data.

Products Sold per Year

Year	Number of Products Sold (in thousands)
1	21
2	30
3	33
4	39
5	33
6	49
7	37



Which statement best describes the use of residuals in determining how the graph of the function fits the data?

- A. Since the majority of the residual errors are positive, the graph of the line is close to the line of best fit.
- B. Since the majority of the residual errors are negative, the graph of the line is not close to the line of best fit.
- C. Since the sum of the squares of the residual errors is 285, a large number, the graph of the line is close to the line of best fit.
- D. Since the sum of the squares of the residual errors is 285, a large number, the graph of the line is not close to the line of best fit.

80. A set of data is shown below.

x	-1	0	1	2	3	4	5
y	3	7	5	6	7	8	8

Using a line of best fit, what is the **approximate** value of the residual for the data at $x = 2$?

- A. -0.815
 - B. -0.286
 - C. 0.286
 - D. 0.815
81. The line of best fit for a scatter plot is $y = 5.29x - 219$. The actual value of y when x is 57 is 90. What is the residual value when x is 57?
- A. 82.53
 - B. 7.47
 - C. -7.47
 - D. -33.00

82. The data in the table can be used to determine and plot the residuals for a linear regression model.

x	y
1	38,750
2	40,500
3	41,000
4	43,000
5	46,800
6	47,100

Which conclusion can be drawn about the data based on the residual plot?

- A. The data are linear because the plot of the residuals forms a pattern.
- B. The data are not linear because the plot of the residuals forms a pattern.
- C. The data are linear because the plot of the residuals does not form a pattern.
- D. The data are not linear because the plot of the residuals does not form a pattern.

83. Mr. Lopez, the guidance counselor at a high school, wants to determine whether there is a relationship between a student's IQ score and the student's GPA. He takes the data of 14 of his students and finds that the linear model that **best** fits is $y = -3.56 + 0.06x$. Using residuals, explain the relationship between a student's IQ score and his or her GPA.

IQ Score	73	81	85	89	90	97	99	102	108	110	115	117	120	125
GPA	1.05	1.25	1.5	1.6	1.9	2.2	2.3	2.6	3	3.1	3.2	3.5	3.8	3.9
Residuals	0.23	-0.05	-0.04	-0.18	0.06	-0.06	-0.08	0.04	0.08	0.06	-0.14	0.04	0.16	-0.04

- A. Since the residuals form a negative, linear association, there is a negative, linear relationship between IQ score and GPA as demonstrated by $y = -3.56 + 0.06x$.
- B. Since the residuals form a positive, linear association, there is a positive, linear relationship between IQ score and GPA as demonstrated by $y = -3.56 + 0.06x$.
- C. Since the residuals are scattered points, there is no relationship between IQ score and GPA as demonstrated by $y = -3.56 + 0.06x$.
- D. Since the residuals form no pattern, there is a linear relationship between IQ score and GPA as demonstrated by $y = -3.56 + 0.06x$.

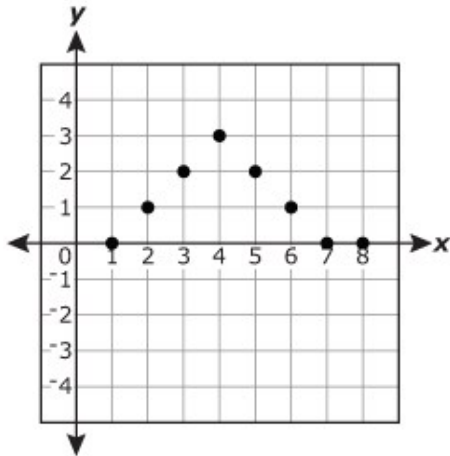
84. The table below shows the height and weight of 6 students in Mrs. Kale's class.

Height (inches)	Weight (pounds)
50	75
51	75
52.5	76
52	77
52	78
54	80

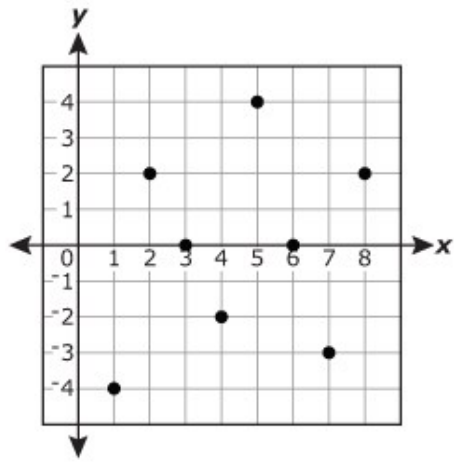
Using a linear model, what is the *approximate* value of the residual of the student 51 inches tall?

- A. -3.3
- B. -0.7
- C. $+0.7$
- D. $+3.3$
85. Which graph of residuals indicates that a linear model provides a good fit to the data for the function?

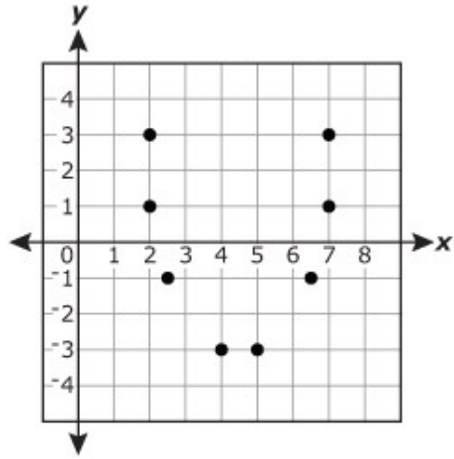
A.



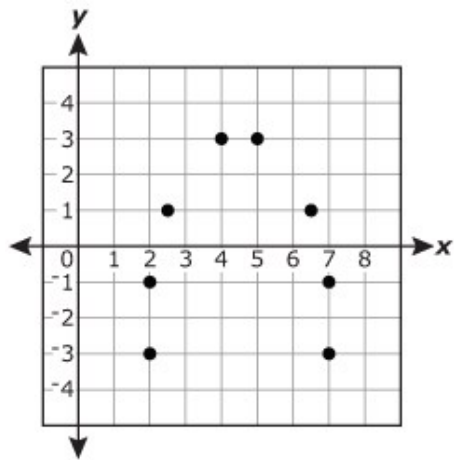
B.



C.



D.

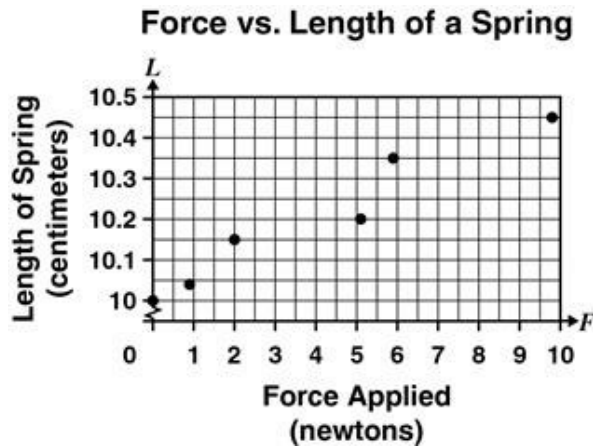


86. The length of a spring with no applied force acting on it is 10.00 centimeters. Juanita applied different forces to the spring and recorded the new lengths of the spring in a table.

Force vs. Length of a Spring

Force Applied (F) (newtons)	Length of Spring (L) (centimeters)
0	10.00
0.9	10.04
2.0	10.15
5.1	10.20
5.9	10.35
9.8	10.45

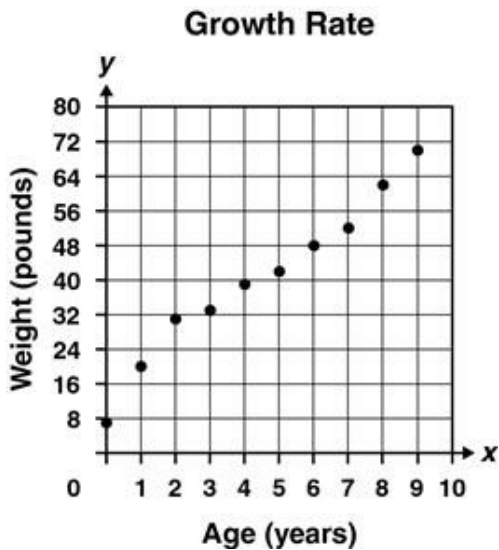
She also graphed a scatterplot from the results in the table.



Based on the scatterplot, which equation best represents these data?

- A. $F = 0.05L + 10$
- B. $L = 0.05F + 10$
- C. $F = 0.05L$
- D. $L = 0.05F$

87. The scatterplot shows the relationship between an animal's age and its weight.



Which equation best represents the relationship between x , the age in years, and y , the weight in pounds?

- A. $y = 6x + 16$
- B. $y = 6x + 13$
- C. $y = 7x + 7$
- D. $y = 9x + 7$

88. A U.S. businesswoman visited South Korea. Because the currency exchange rate can vary daily, she recorded the conversion amounts every time she exchanged money. The table shows the points she plotted on a scatterplot.

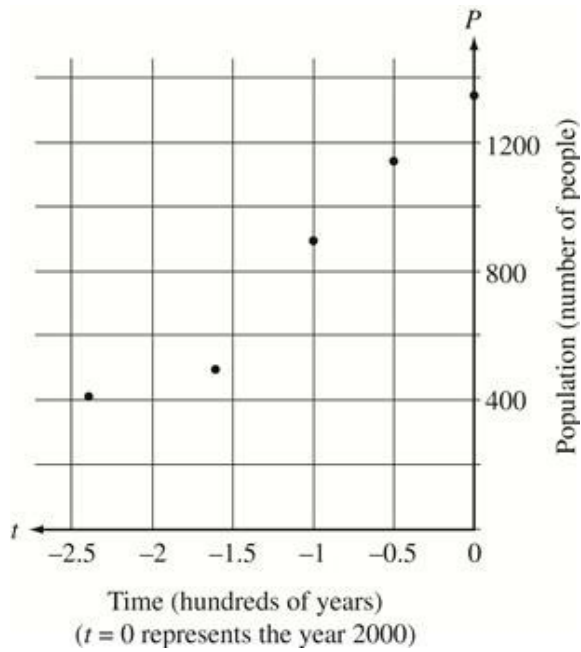
Exchange Values

U.S. Dollars	Korean Won
100	106,500
250	268,750
500	535,000
700	770,000
1,000	1,050,000

To estimate her typical exchange rate, which equation best fits the line between w , Korean Won, and d , U. S. Dollars?

- A. $w = 535,000$
- B. $w = 1,700d + 1,048$
- C. $w = 1,058d + 6,257$
- D. $w = 1,081d - 55,750$

89. The scatterplot below shows the population, P , of a small town in different periods of time. The time, t , represents hundreds of years, and $t = 0$ represents the year 2000.

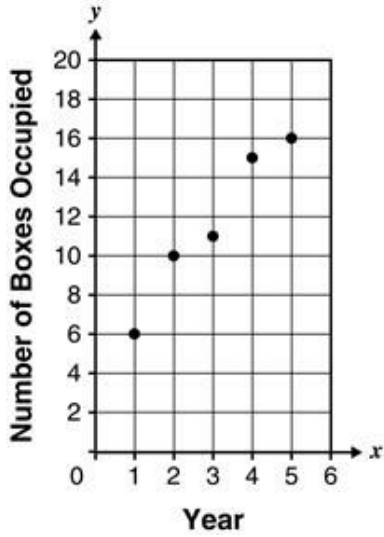


Which of the following equations best models the data in the scatterplot?

- A. $P = t + 1300$
- B. $P = -t + 1300$
- C. $P = 400t + 1300$
- D. $P = -400t + 1300$

90. Mr. King installed several duck nesting boxes in on his property. The graph below shows the number of boxes actually used by wood ducks in the spring for each of last five years.

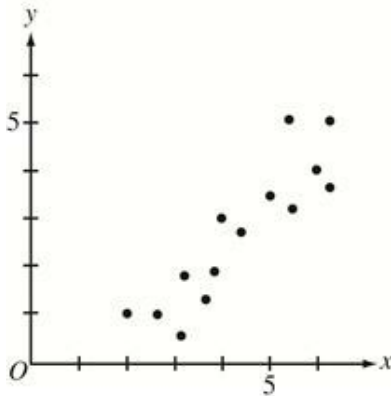
Wood Duck Nesting Boxes



Which equation best represents the line of best fit for this data?

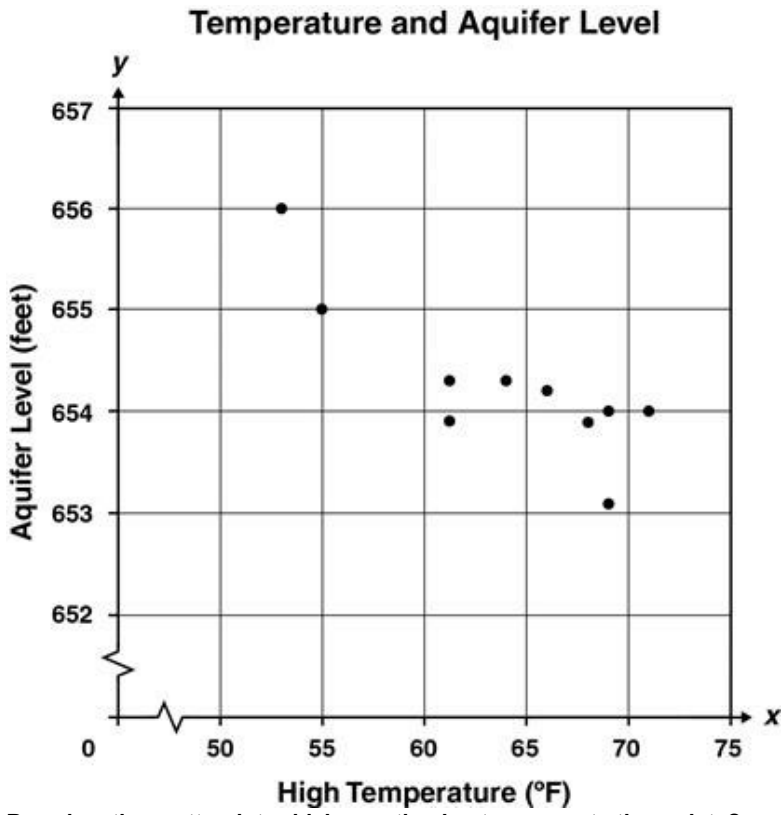
- A. $y = 2.5x + 4$
- B. $y = 0.4x + 4$
- C. $y = 2.5x + 15$
- D. $y = 0.4x - 1.5$

91. Which of the following equations best models the data in the scatterplot below?



- A. $y = x + 2$
- B. $y = x - 2$
- C. $y = -x + 2$
- D. $y = -x - 2$

92. The scatterplot shows x , the high temperature in degrees Fahrenheit ($^{\circ}\text{F}$), and y , the aquifer level in feet, for ten days in the same area.



Based on the scatterplot, which equation best represents these data?

- A. $y = 656 - 0.1x$
- B. $y = 661 - 0.1x$
- C. $y = 656 - 0.5x$
- D. $y = 661 - 0.5x$

93. Lisa collected data on the grams of fat and the grams of carbohydrates in 10 sandwiches at a popular restaurant. The table below represents the data she recorded.

Fat (in grams, x)	Carbohydrates (in grams, y)
42	49
65	53
48	50
23	29
12	32
18	32
37	40
30	38
24	36
17	31

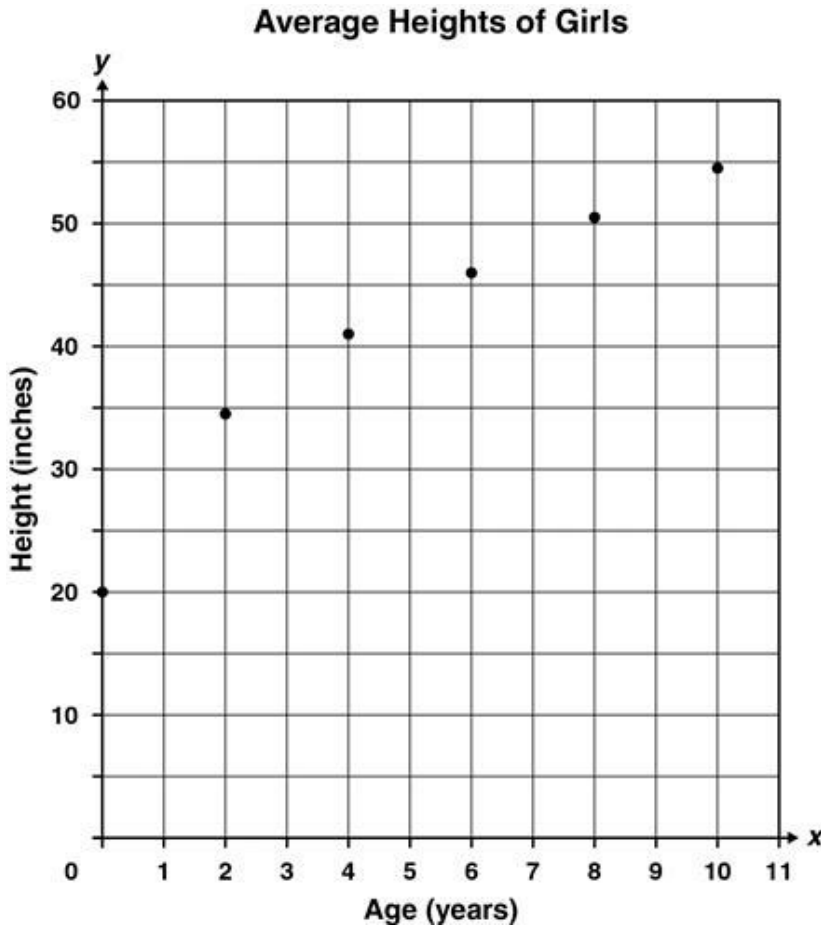
Which linear equation best fits Lisa's data?

- A. $y = 0.5x + 23$
- B. $y = 23x + 0.5$
- C. $y = 1.5x + 27$
- D. $y = 27x + 1.5$

94. The table and scatterplot show the average heights of girls at different ages.

Average Heights of Girls

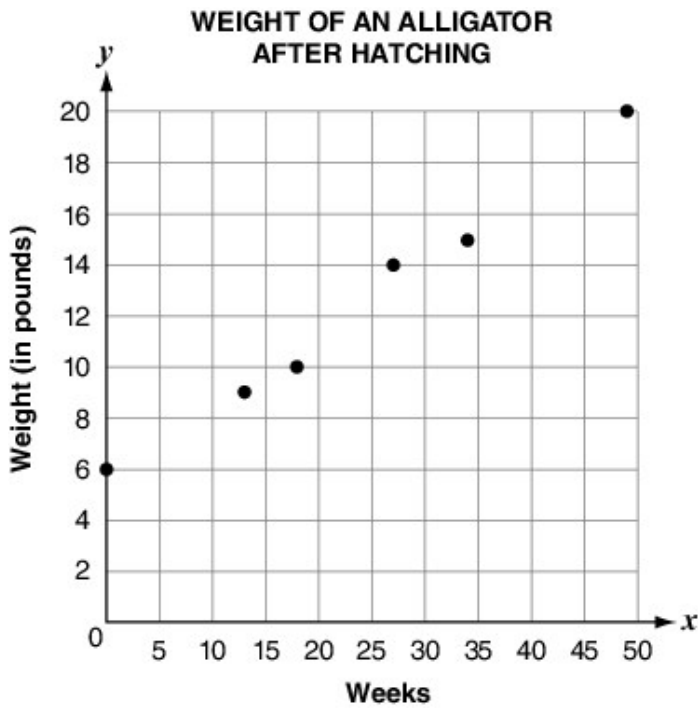
Age (years)	Height (inches)
0	20.0
2	34.5
4	41.0
6	46.0
8	50.5
10	54.5



The variable x represents age, in years, and y represents height, in inches. According to the scatterplot, which equation best represents the relationship between age and height?

- A. $y = 0.3x - 7$
- B. $y = 0.4x - 12$
- C. $y = 2.5x + 30$
- D. $y = 3.2x + 25$

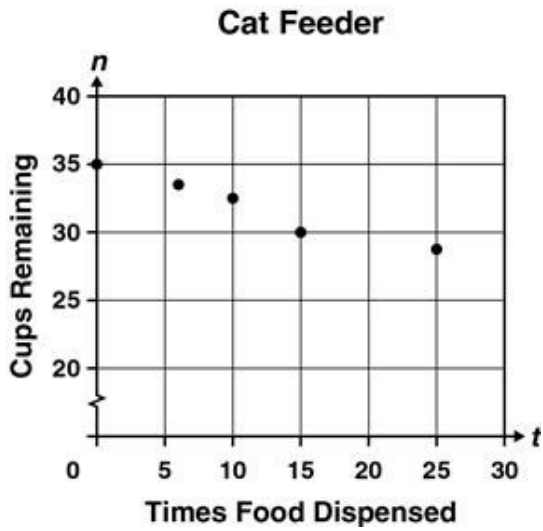
95. The scatter plot below shows how the weight of a baby alligator changed after hatching.



Which equation **best** represents the weight, w , of this alligator n weeks after hatching?

- A. $w = 0.25n + 6$
- B. $w = 0.65n + 6$
- C. $w = 6n + 0.25$
- D. $w = 6n + 0.65$

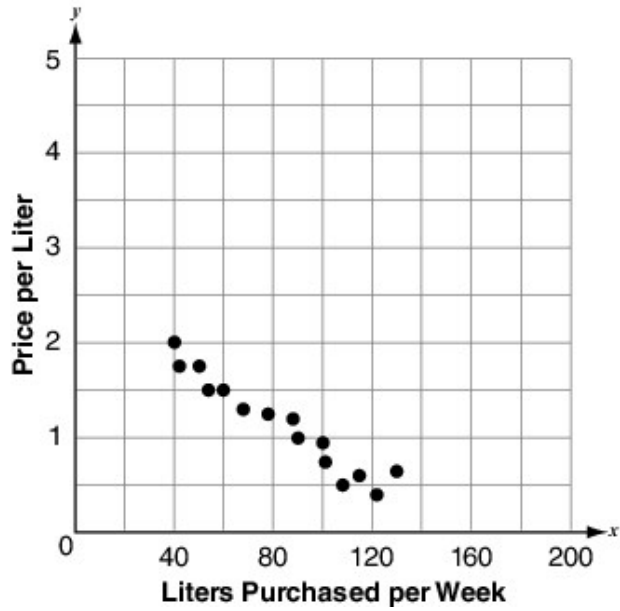
96. The graph shows the number of cups, n , remaining in a programmable cat feeder after food had been dispensed t times.



Which equation best represents the relationship between n and t ?

- A. $n = 35 - \frac{3}{10}t$
- B. $n = 35 - \frac{1}{3}t$
- C. $n = 35 - \frac{7}{5}t$
- D. $n = 35 - 3t$

97. This scatter plot shows the number of liters of gasoline purchased at a gas station last month, based on the price per liter.



Which linear equation best fits the data?

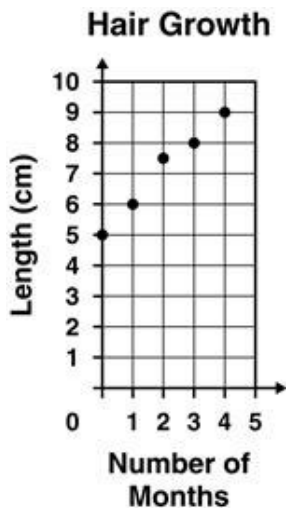
- A. $y = 2.5x + 0.02$
- B. $y = 0.02x + 2.5$
- C. $y = -0.02x + 2.5$
- D. $y = -2.5x + 0.02$

98. Billie works evenings as a baby-sitter. She is trying to find a fair hourly wage to charge, and has been experimenting with different rates for the last six months. For each month, she has recorded her hourly charge and the number of hours she's asked to baby-sit, as shown below.

Month	Hourly Wage	Hours Spent Babysitting
October	\$4.00	20
November	\$3.25	31
December	\$3.00	28
January	\$6.00	6
February	\$5.75	12
March	\$4.50	17
April	\$5.00	?

Billie believes that the number of hours' she works is roughly a function of her hourly rate. According to a line of best fit for the data in the chart, how many hours should she expect to work if she charges \$5 per hour?

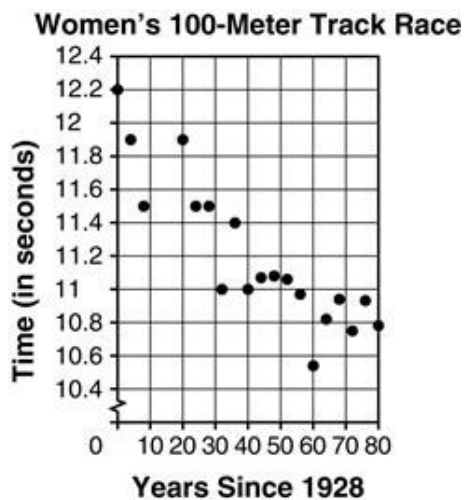
- A. 11
 B. 12
 C. 15
 D. 18
99. Michala is growing her hair to donate to charity. She records her hair length for several months and graphs the results.



Because she needs to grow hair to a specific length to donate it, she fits a linear equation to the data so she can estimate when her hair will be long enough. Which equation best models the relationship between g , the length of her hair in centimeters, and t , the number of months she let her hair grow?

- A. $g = 7.5$
 B. $g = 6t$
 C. $t = g + 5$
 D. $g = t + 5$

100. The following scatterplot shows the winning times in the women's 100-meter track race from the summer Olympic Games over the course of 80 years.



If t represents the time in seconds, and n represents the number of years since 1928, which equation represents a line of best fit for the data?

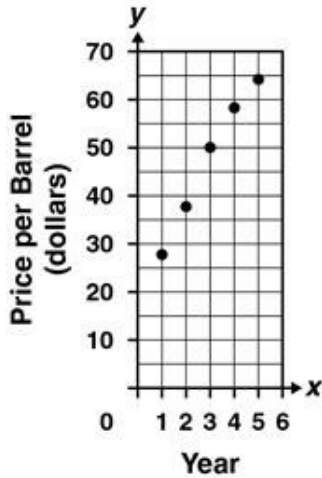
- A. $t = 50n + 12$
- B. $t = -50n + 12$
- C. $t = 0.02n + 12$
- D. $t = -0.02n + 12$

101. The table and scatterplot show the price of a barrel of crude oil over five years.

Annual Average Domestic Crude Oil Prices

Year	Price per Barrel (dollars)
1	27.69
2	37.66
3	50.04
4	58.30
5	64.20

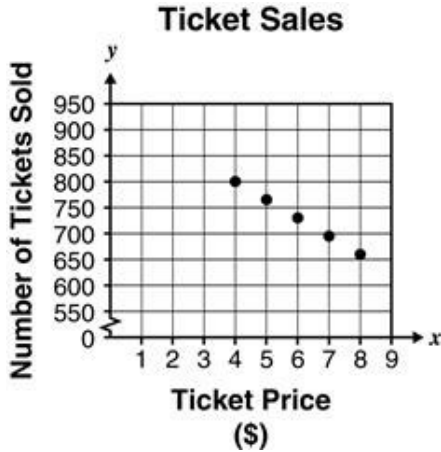
Annual Average Domestic Crude Oil Prices



The variable x represents time, in years, and y represents the price of crude oil per barrel, in dollars. According to the scatterplot, which equation best represents the relationship between the year and the price of crude oil?

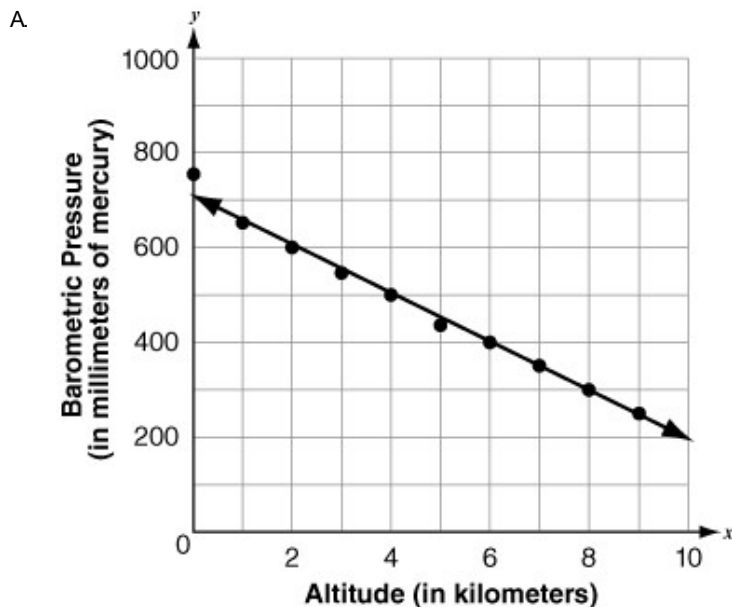
- A. $y = 0.1x - 2.0$
- B. $y = 0.2x - 5.9$
- C. $y = 9.4x + 19.5$
- D. $y = 11.2x + 16.1$

102. The head of the Drama Department is trying to determine the price to charge for tickets to the next production. The graph shows the relationship between ticket prices and number of tickets sold for past productions.

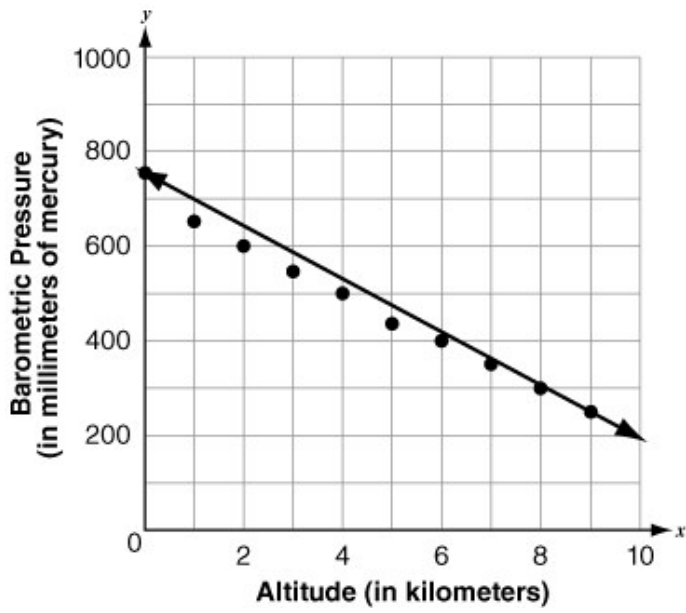


Which equation represents the line of best fit for this data?

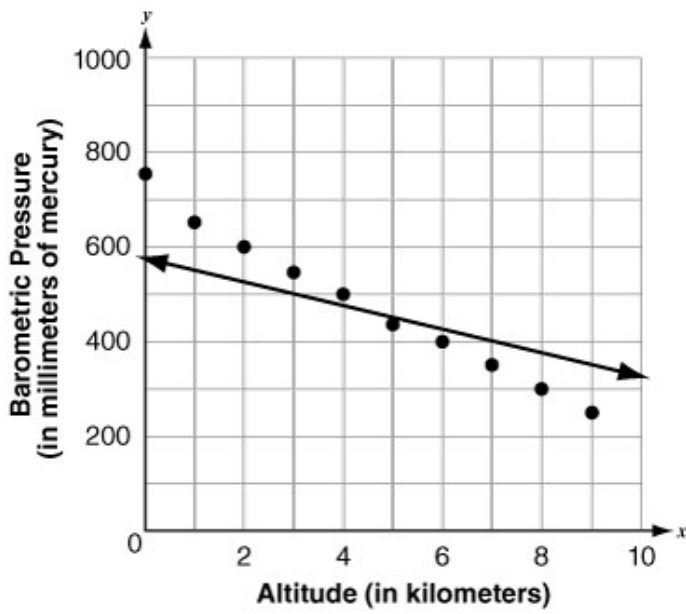
- A. $y = -\frac{1}{35}x + 940$
- B. $y = -35x + 940$
- C. $y = \frac{1}{35}x + 940$
- D. $y = 35x + 940$
103. Gregory is interested in Mount Everest and wants a rough estimate of how much oxygen hikers need to climb the mountain. He researches the altitude (in kilometers) and barometric pressure (in millimeters of mercury) recorded by hikers at ten different locations on the mountain and creates a scatter plot. Which line is the best fit for the data?



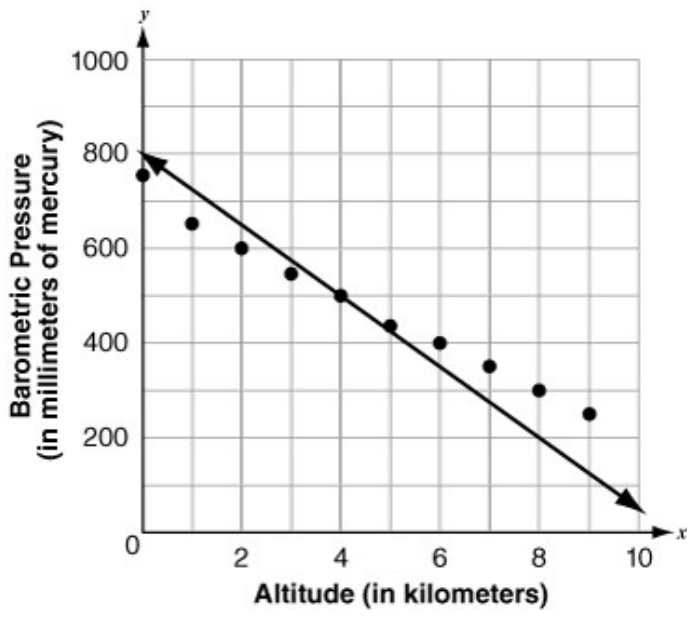
B.



C.



D.

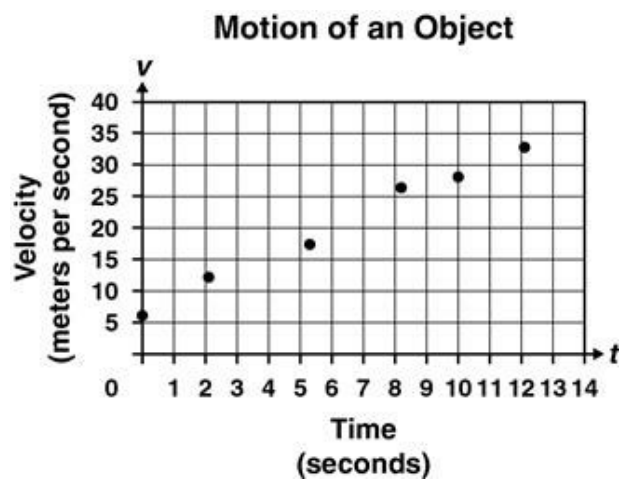


104. The motion of an object was recorded by measuring the velocity of the object in meters per second at various times, as shown in the table.

Motion of an Object

Time (seconds)	Velocity (meters per second)
0	6.1
2.1	12.2
5.3	17.4
8.2	26.4
10.0	28.1
12.1	32.8

The scatterplot below was graphed from the data in the table, where t represents the time, and v represents the velocity.



Based on the scatterplot, which equation best represents the relationship between velocity and time?

- A. $v = 2.19t + 6.7$
- B. $v = 2.24t + 5.7$
- C. $v = 2.71t + 6.1$
- D. $v = 2.90t + 6.1$

105. For an experiment on evaporation, Ginny filled a water tank. She then measured the level of the water several times to see much had evaporated. The table below shows the number of centimeters below the top the water was at each given number of days where x represents the number of days and y represents the number of centimeters.

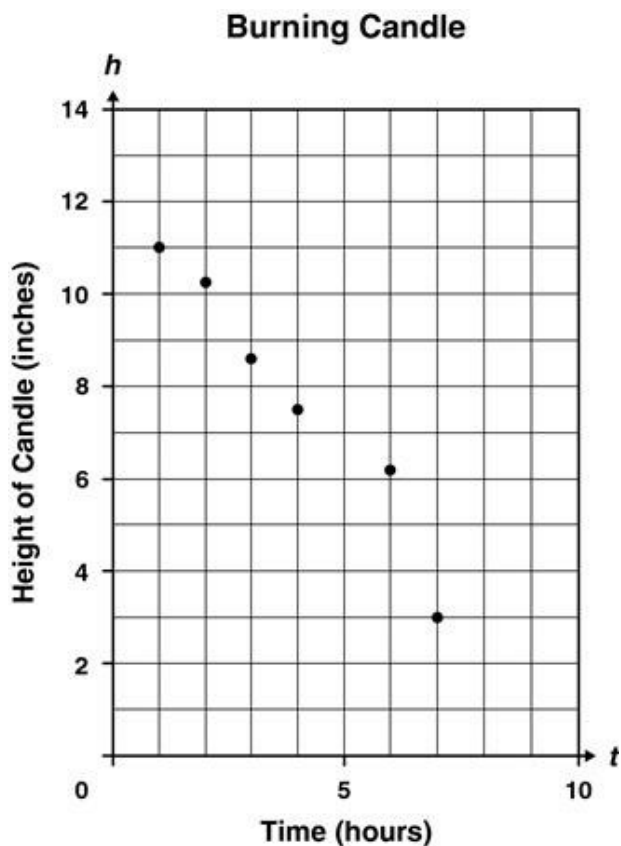
Data Point Coordinates

x	y
3	-13
5	-25
6	-31
9	-49
12	-67

What is the slope of the line representing the rate of evaporation?

- A. -19
- B. -12
- C. -6
- D. -5

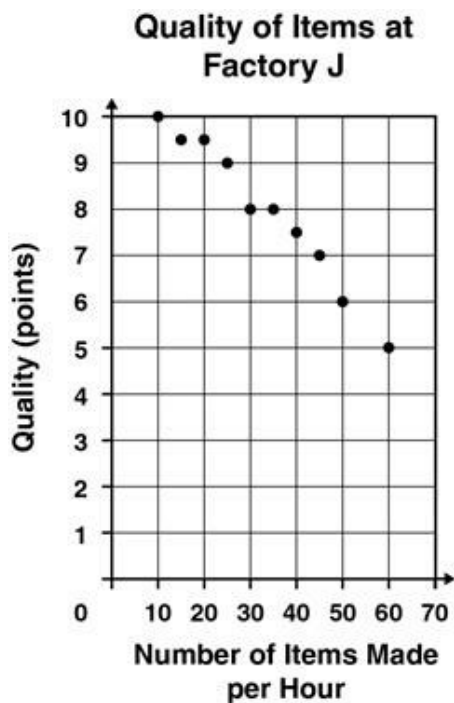
106. The graph shows the relationship between the height of a burning candle and the amount of time that has passed since the candle was lit.



Which equation best represents the relationship between t , the time in hours, and h , the height of the candle in inches?

- A. $h = 11 - 1.33t$
- B. $h = 11 - 0.8t$
- C. $h = 12 - 1.2t$
- D. $h = 12 - 0.75t$

107. A company makes the same type of item at two different factories. Over the past two weeks, the manager recorded the number of items made per hour and the quality of the items using a numerical scale. The scatterplot below shows data for Factory J.



Factory K makes items that are 20% lower in quality at each of the data points as Factory J. Which equation best models y , the quality of items at Factory K, as a function of x , the number of items made per hour?

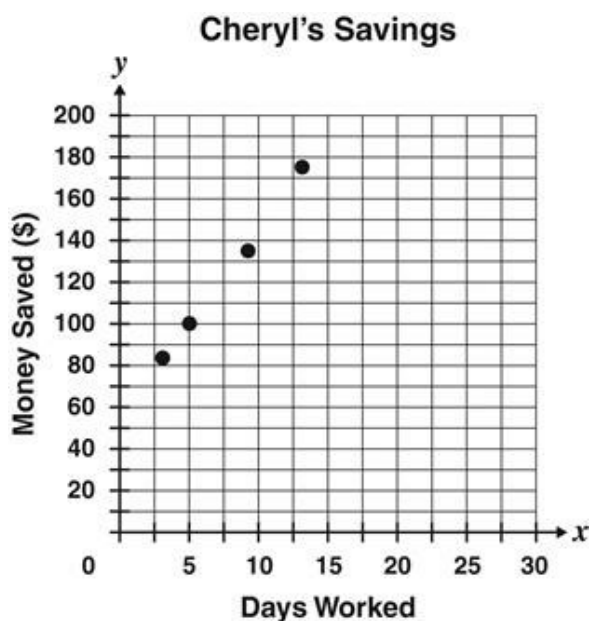
- A. $y = 9 - 0.08x$
- B. $y = 9 - 0.10x$
- C. $y = 11.25 - 0.08x$
- D. $y = 11.25 - 0.10x$

108. Cheryl puts some of her earnings in her savings account. The table below lists the amount of money she had in the account after working different numbers of days.

Cheryl's Savings

Days Worked	Money Saved (\$)
3	82
5	101
9	135
13	175

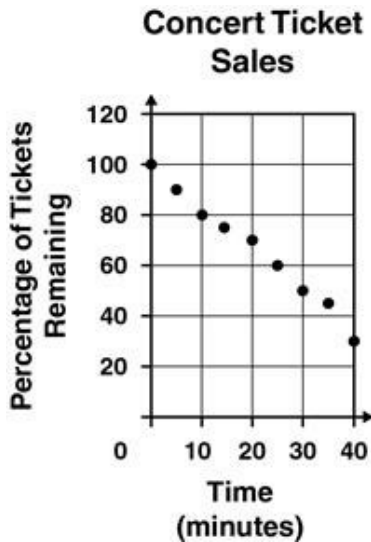
The graph below shows this information in a scatterplot.



If d represents the number of days worked and m represents the amount of money saved, which equation most closely represents the data?

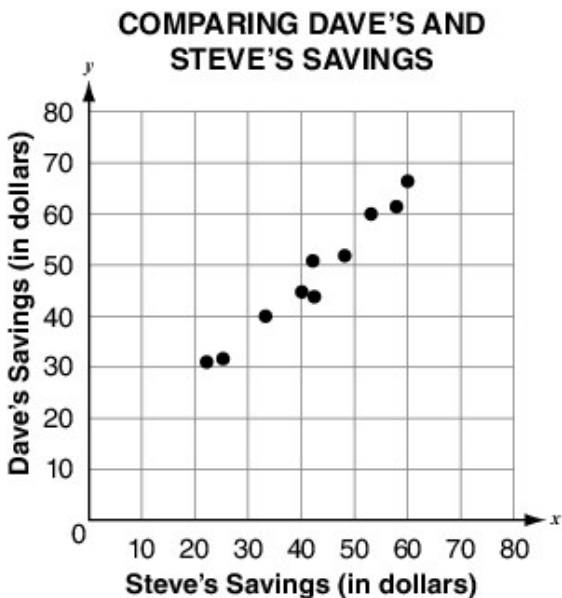
- A. $d = 43 + 10m$
- B. $m = 43 + 10d$
- C. $d = 55 + 9m$
- D. $m = 55 + 9d$

109. The sale of concert tickets began at 10 a.m. The scatterplot shows the relationship between time and the percentage of tickets remaining to be sold for the concert.



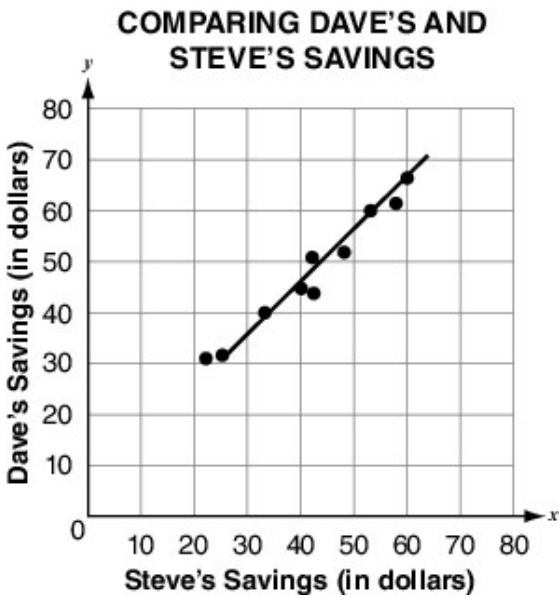
Based on the scatterplot, which equation best models the relationship between time in minutes, m , and the percentage of tickets remaining to be sold, p ?

- A. $p = 100.0 - 2.0m$
 - B. $p = 99.3 - 1.6m$
 - C. $p = 100.0m - 2.0$
 - D. $p = 99.3m - 1.6$
110. The scatter plot compares the amounts Dave and Steve saved each month.

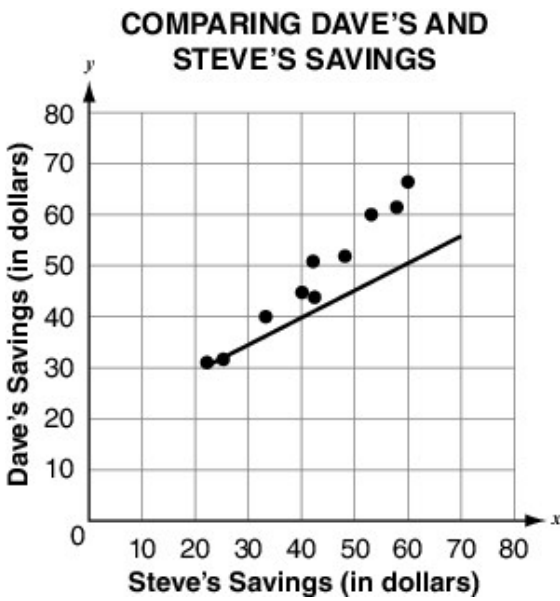


Which scatter plot shows the line of best fit that **most** accurately represents the relationship between Dave's and Steve's savings?

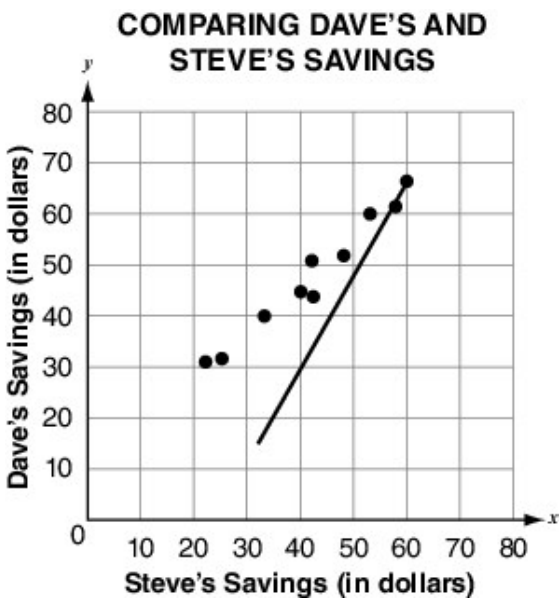
A.



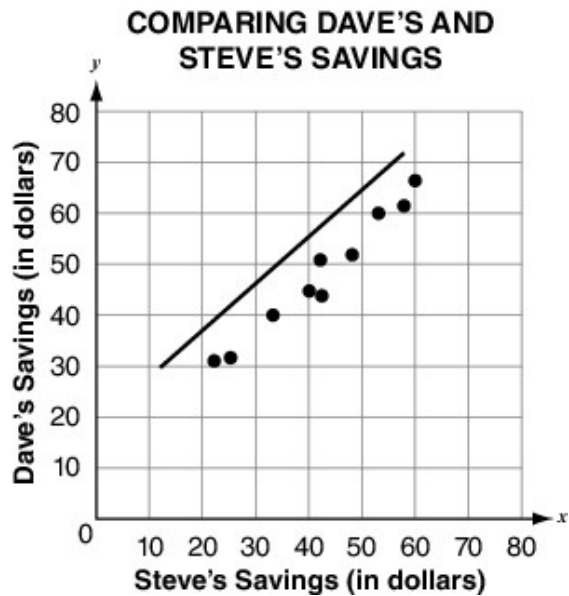
B.



C.



D.

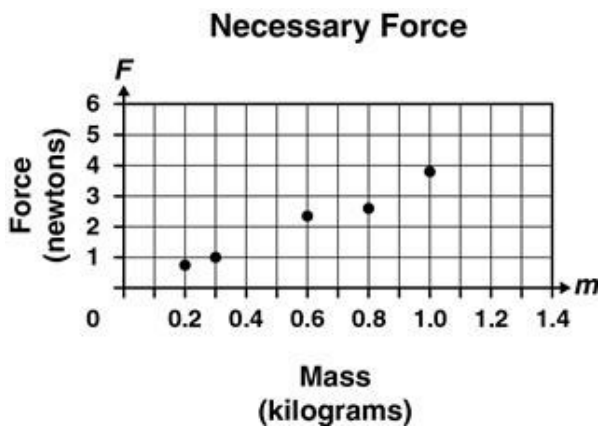


111. Five objects of different masses rest on a surface. The mass of each object and the minimum applied horizontal force, in newtons, necessary to move each object are shown in the table.

Necessary Force

Mass (kilograms)	Force (newtons)
0.2	0.75
0.3	1.00
0.6	2.35
0.8	2.60
1.0	3.80

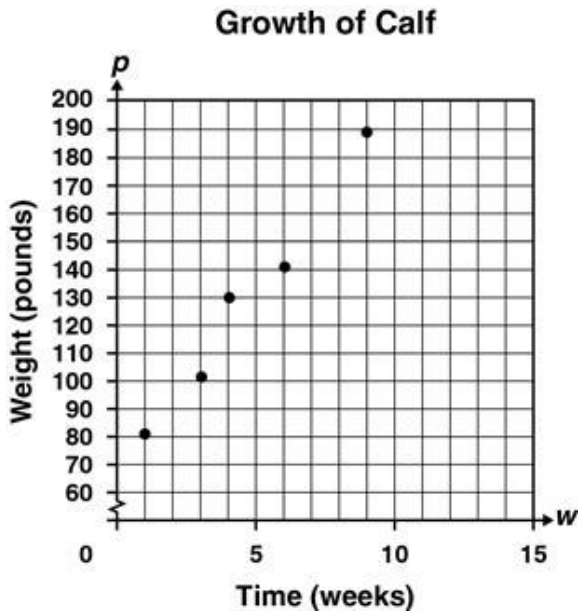
The scatterplot that corresponds to the table is shown below.



According to the graph, which equation best represents the relationship between force, F , and mass, m ?

- A. $F = 3.8m$
- B. $m = 3.8F$
- C. $F = 3.7m - 0.04$
- D. $m = 3.7F - 0.04$

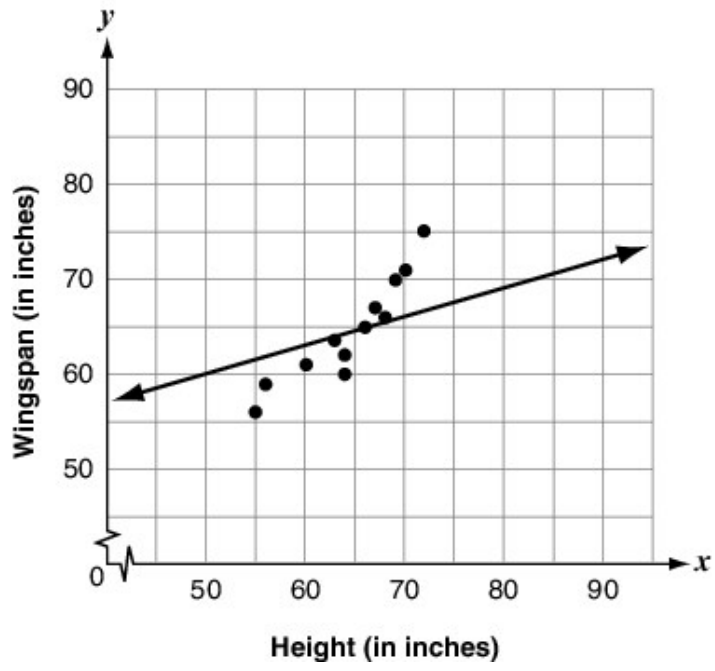
112. A farmer bought a calf and plans to raise it for a county fair contest. The graph shows the relationship between the weight of the calf, p , in pounds, and the number of weeks, w , since the farmer bought the calf.



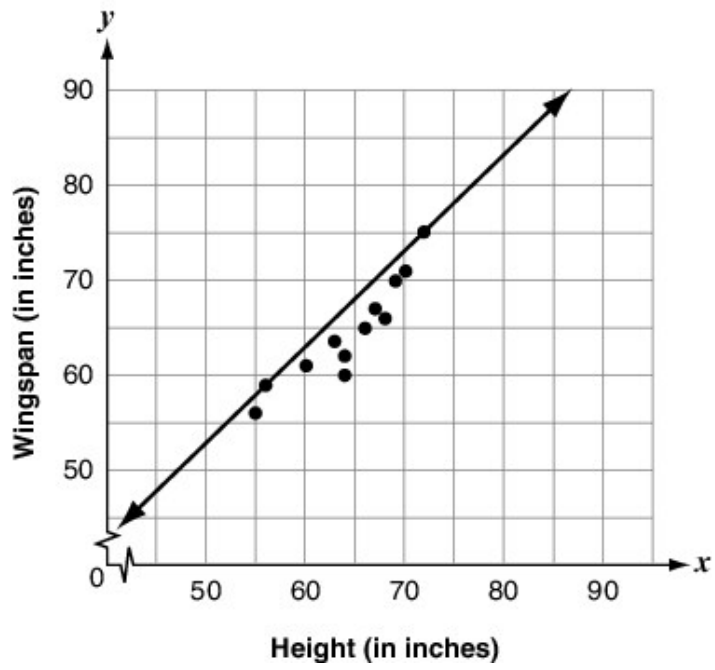
Which equation best represents the relationship between p and w ?

- A. $p = 0.1w + 81$
 - B. $p = 13w + 67$
 - C. $p = 16w + 66$
 - D. $p = 21w + 81$
113. A person's wingspan is the distance from the fingertips of one hand to the fingertips of the other hand when the person's arms are outstretched. Jacob is interested in seeing whether there is a relationship between a person's height and wingspan. He recorded the height (in inches) and the wingspan (in inches) of twelve high school students and created a scatter plot. In which of these scatter plots is the line of best fit **correctly** drawn?

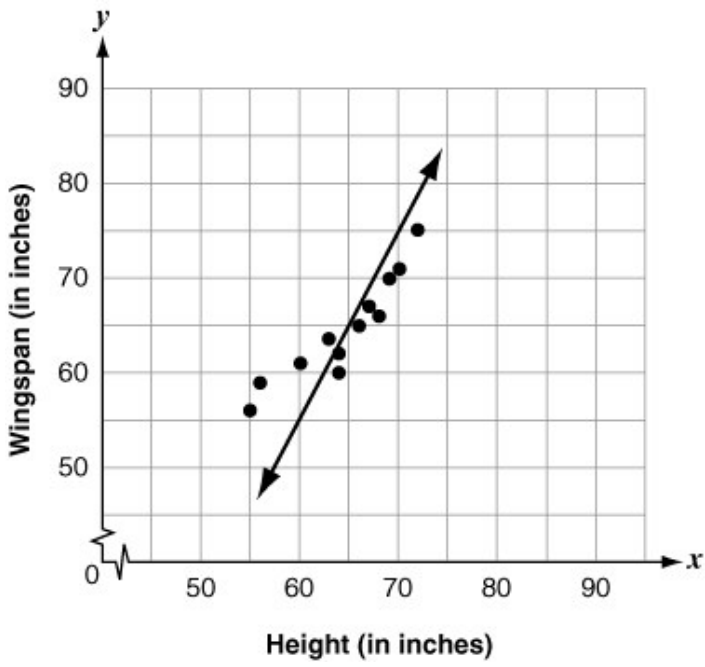
A.



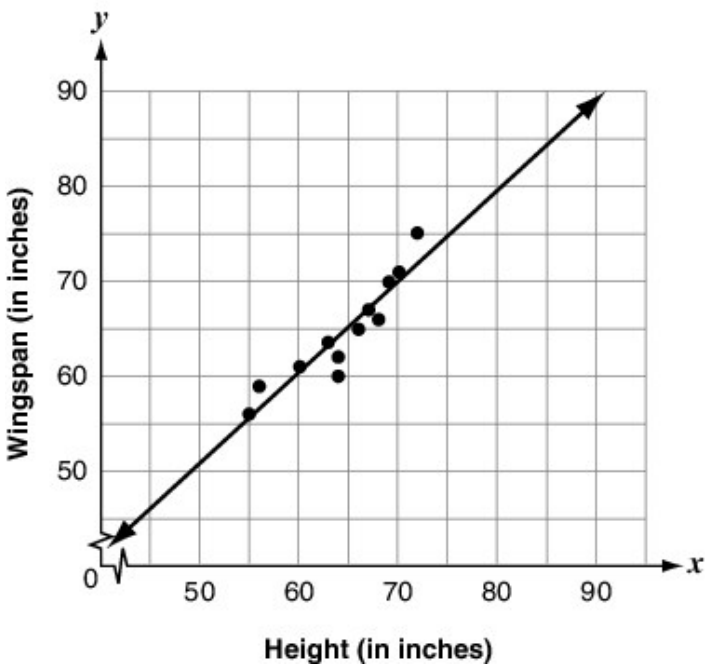
B.



C.

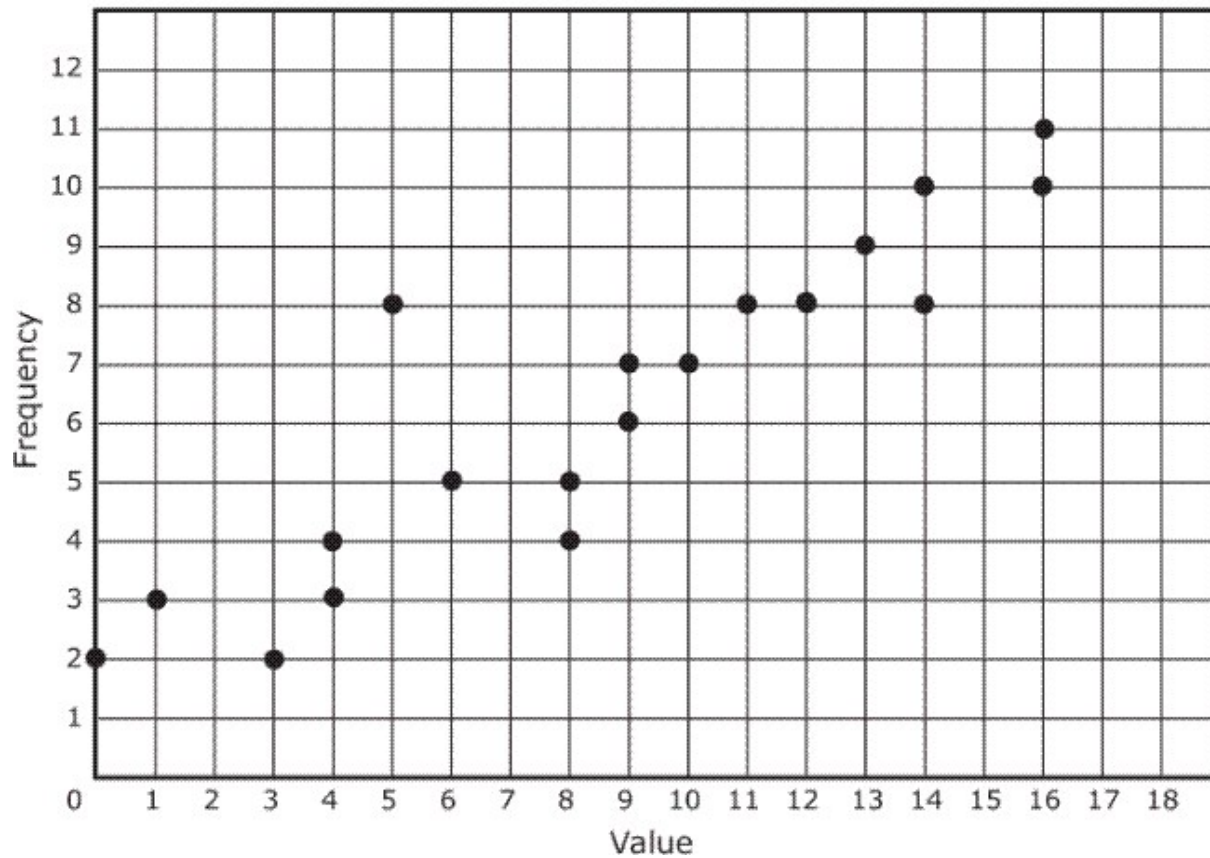


D.



114. The scatter plot shows data collected from an experiment.

Experiment Data



Which linear function **best** fits the data represented by the scatter plot?

- A. $y = \frac{1}{2}x + 2$
- B. $y = \frac{2}{3}x$
- C. $y = 1\frac{1}{2}x + 2$
- D. $y = 2x$