

VIRGINIA
STANDARDS OF LEARNING ASSESSMENTS

Spring 2002 Released Test

END OF COURSE
ALGEBRA II

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DIRECTIONS

Read and solve each question. Then mark the space on the answer sheet for the best answer.

SAMPLE

What is the next term in the arithmetic sequence 2, 5, 8, 11, ...?

- A 3
- B 13
- C 14
- D 17

1 What is the sum of the polynomials $(4q^4 + 3q^2 + 8q)$ and $(5q^3 - 2q^2 - q)$?

- A $-q^4 + q^2 + 7q$
- B $4q^4 + 5q^3 + q^2 + 7q$
- C $4q^4 + q^2 + 7q$
- D $15q^7 + 2q^6$

2 Which of the following equations is an example of the commutative property?

F $2x^2 + 4x = 4x + 2x^2$

G $(2x^2 + 4x) + 6 = 2x^2 + (4x + 6)$

H $3(2x^2 + 4x) = 6x^2 + 12x$

J $(2x^2 + 4x) \left(\frac{1}{2x^2 + 4x} \right) = 1$

3 For which of the following operations is the commutative property *not* valid?

- A Multiplication of real numbers
- B Multiplication of complex numbers
- C Multiplication of matrices
- D Multiplication of negative real numbers

4 Which is equivalent to $\frac{\frac{x}{x+7}}{\frac{x-9}{x+7}}$?

F -9

G $\frac{x^2 - 9x}{(x + 7)^2}$

H $\frac{x}{x - 9}$

J $\frac{-1}{9}$

5 Which expression is equivalent to $\sqrt[3]{a^2}$?

A $a^{\frac{3}{2}}$

B $a^{\frac{2}{3}}$

C $a^{\frac{1}{6}}$

D a^6

6 Which is equivalent to $\sqrt[3]{8x^6}$?

- F 2
- G $2x$
- H $2x^2$
- J $2x^3$

7 Which is a factored form of $8x^3 + 1$?

- A $(2x - 1)(4x^2 - 2x + 1)$
- B $(2x - 1)(4x^2 + 2x - 1)$
- C $(2x + 1)(4x^2 - 2x + 1)$
- D $(2x + 1)(4x^2 + 2x - 1)$

8 Which is a factor of $16x^2 - 1$?

- F $(x - 1)$
- G $(4x + 1)$
- H $(8x - 1)$
- J $4x$

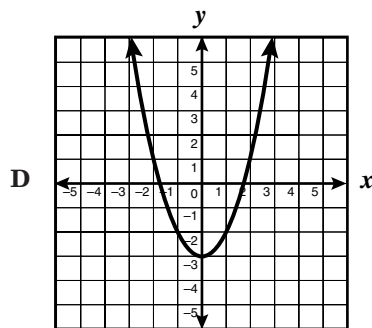
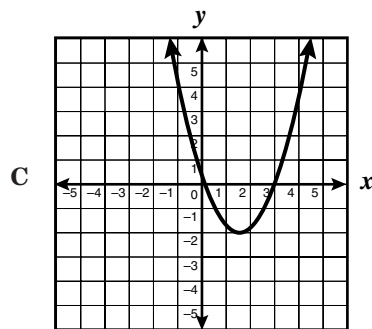
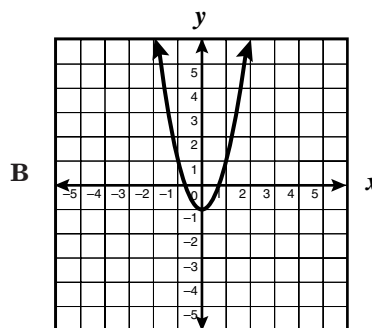
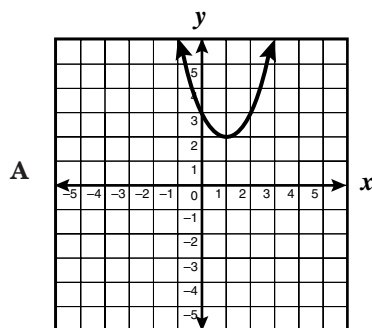
9 Which is equivalent to $(4 - 3i)^2$?

- A 25
- B $25 - 2i$
- C 7
- D $7 - 24i$

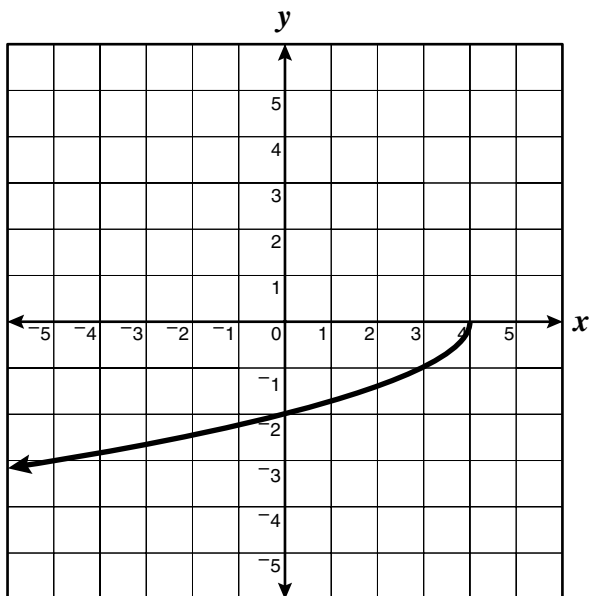
10 What number does i^4 equal?

- F i
- G -1
- H $-i$
- J 1

11 Which best represents the graph of $y = x^2 - 2x + 3$?



12



Which most likely represents the equation of the graph above?

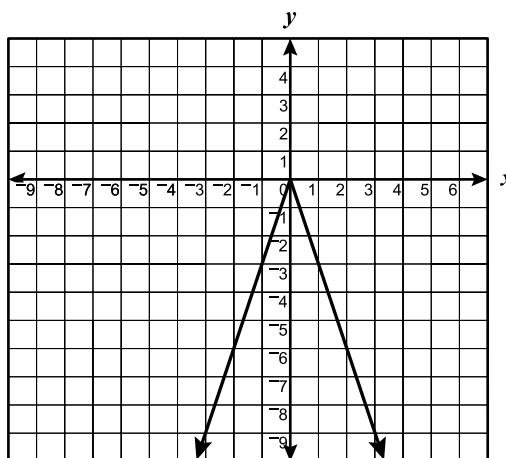
F $y = \sqrt{4 - x}$

G $y = -\sqrt{4 - x}$

H $y = -\sqrt{4 + x}$

J $y = \sqrt{4 + x}$

13 The graph below is an example of which type of function?



- A Absolute value
- B Exponential
- C Linear
- D Quadratic

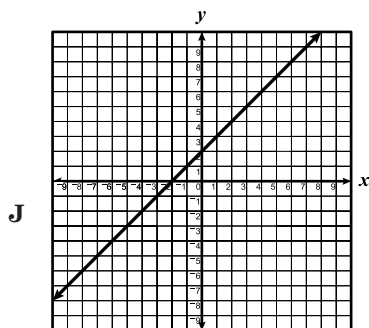
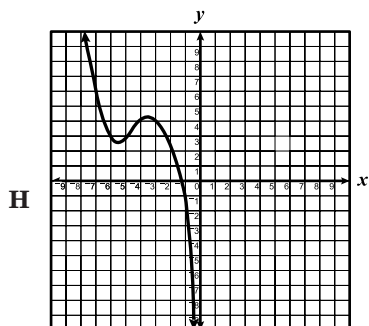
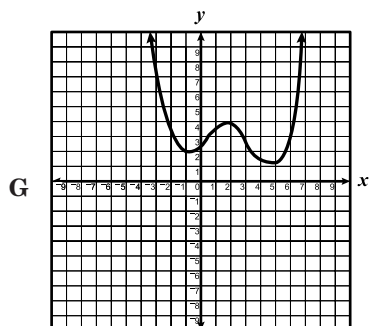
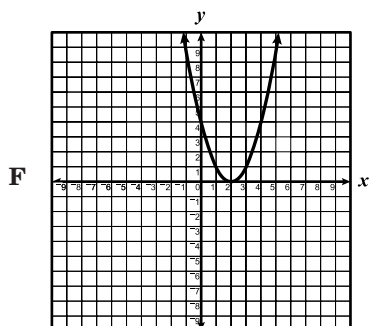
14 If $f(x) = 5x^2 - 7$, what is $f(-3)$?

- F -52
- G -22
- H 38
- J 45

15 Which value is *not* a zero of $P(x) = x^3 + 3x^2 - x - 3$?

- A 1
- B -1
- C 3
- D -3

- 16 Which graph could represent a polynomial function with *no* real zeros?



- 17 The amount of interest (I) owed on a loan varies directly with the length of time (t) of the loan. If k is the constant of proportionality, which formula represents this relationship?

A $I = kt$

B $I = \frac{k}{t}$

C $t = kI$

D $t = \frac{k^2}{I}$

- 18 Boyle's Law states that, for a fixed amount of gas, the volume of the gas at a constant temperature is inversely proportional to the pressure. If a certain gas occupies 9.84 liters at a pressure of 50 centimeters of mercury (cm Hg), what is the approximate pressure when the volume is increased to 12 liters?

F 39.8 cm Hg

G 41.0 cm Hg

H 43.2 cm Hg

J 45.1 cm Hg

- 19 Which of the following sets represents an arithmetic sequence?

A $\{2, 11, 20, 29, 38, \dots\}$

B $\{1, 3, 9, 27, 81, \dots\}$

C $\{3, -5, 7, -9, 11, \dots\}$

D $\{1, 16, 36, 64, 100, \dots\}$

20 If $a_n = 6 + (n - 1)5$, then $a_7 =$

- F 31
- G 36
- H 40
- J 42

21 Given:

$$f(x) = \sqrt{x^2 - 1}$$

$$g(x) = x^2$$

Which of the following expressions represents $g(f(x))$?

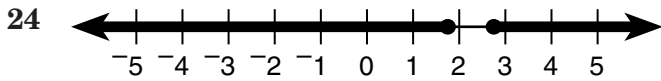
- A $x^2\sqrt{x^2 - 1}$
- B x
- C $\sqrt{x^4 - 1}$
- D $x^2 - 1$

22 Which of the following represents the solution to $|x| = 7$?

- F $x = 7$
- G $x = 0$
- H $x = -7$
- J $x = -7$ or $x = 7$

23 What is the solution to $\sqrt{x + 16} = 3\sqrt{x}$?

- A $x = \frac{1}{2}$
- B $x = \frac{8}{5}$
- C $x = 2$
- D $x = 8$



Which inequality describes the solution set graphed above?

- F $|x - 3| > 1$
- G $|2x - 5| < 3$
- H $|4x - 9| \geq 2$
- J $|5x - 13| \leq 5$

25 What are the solutions to $y^2 - 4y + 4 = 36$?

- A $y = -4$ or $y = 8$
- B $y = 4$ or $y = 8i$
- C $y = \pm 4$
- D $y = \pm 4i$

26 What is the solution set for $(x + 1)^2 - 9 = 0$?

- F $\{-4, 2\}$
- G $\{-3, -1\}$
- H $\{2, 4\}$
- J $\{-1, 3\}$

27 Which quadratic equation has solutions $x = \frac{1}{2}$ and $x = \frac{2}{3}$?

- A $6x^2 - 7x - 2 = 0$
- B $6x^2 + 7x + 2 = 0$
- C $6x^2 + 7x - 2 = 0$
- D $6x^2 - 7x + 2 = 0$

28 What is the solution set for $5x^2 + 4x = 1$?

- F $\left\{-1, \frac{-1}{5}\right\}$
- G $\left\{-1, \frac{1}{5}\right\}$
- H $\left\{\frac{-1}{5}, 1\right\}$
- J $\left\{\frac{1}{5}, 1\right\}$

29 What is the solution set for $\sqrt{x - 4} = 5$?

- A $\{21\}$
- B $\{25\}$
- C $\{29\}$
- D $\{33\}$

30 What value of q is the solution to the equation $\frac{7q-9}{6} = \frac{6q+2}{4}$?

F $q = -\frac{11}{8}$

G $q = -6$

H $q = \frac{31}{9}$

J $q = 48$

31 What is the solution to $|2x - 3| < 4$?

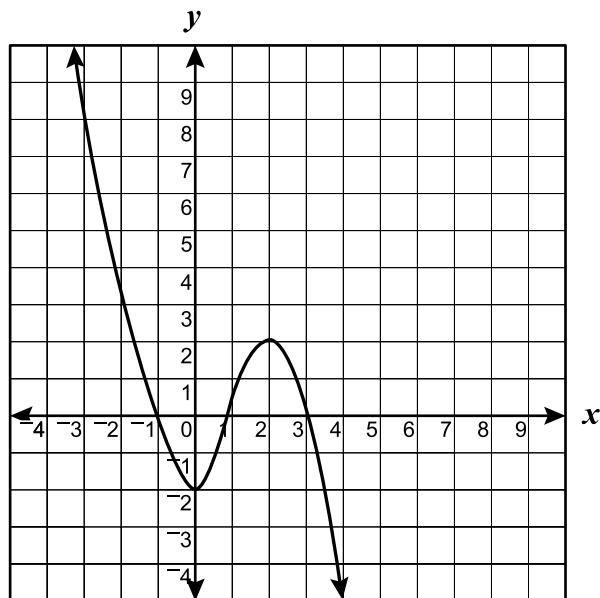
A $-\frac{1}{2} < x < \frac{7}{2}$

B $-\frac{7}{2} < x < \frac{7}{2}$

C $x > -\frac{1}{2}$ or $x < \frac{7}{2}$

D $x = -\frac{1}{2}$ or $x = \frac{7}{2}$

32



The polynomial function shown apparently has zeros at —

F -1 and 2

G $-1, 0.7,$ and 3

H -2

J $1, -0.7,$ and -3

33 Which of the following functions has x -intercepts at -2 and 1 ?

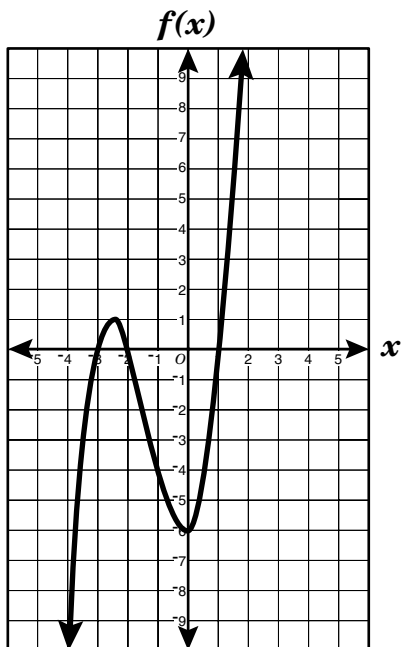
A $y = x^2 - x - 2$

B $y = x^2 + x - 2$

C $y = x^2 - 2x + 1$

D $y = 2x - 1$

34 $f(x) = x^3 + 4x^2 + x - 6$ is graphed below.



Which is the factored form of $f(x)$?

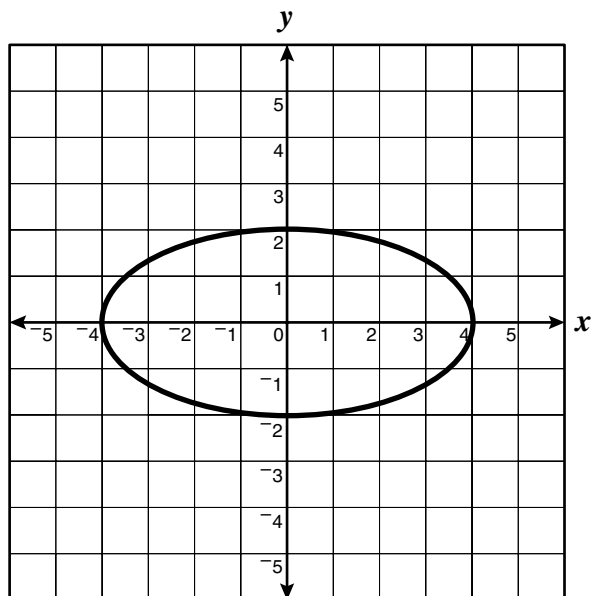
F $f(x) = (x - 3)(x - 2)(x + 1)$

G $f(x) = x(2x + 5)(x - 1)$

H $f(x) = x(x + 3)(x + 2)$

J $f(x) = (x - 1)(x + 2)(x + 3)$

35



Which equation is most likely represented by the ellipse shown?

A $\frac{x}{16} + \frac{y}{4} = 1$

B $\frac{x^2}{4} + \frac{y^2}{2} = 1$

C $\frac{x^2}{4} + \frac{y^2}{16} = 1$

D $\frac{x^2}{16} + \frac{y^2}{4} = 1$

36 When graphed, which of the following equations would produce a parabola?

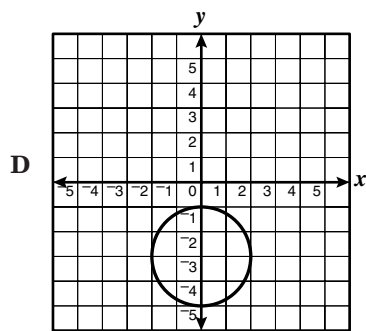
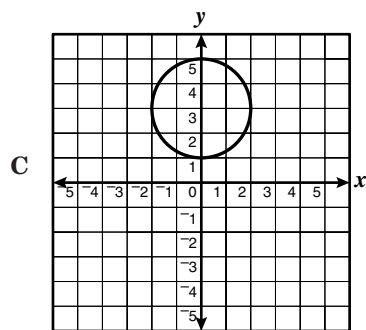
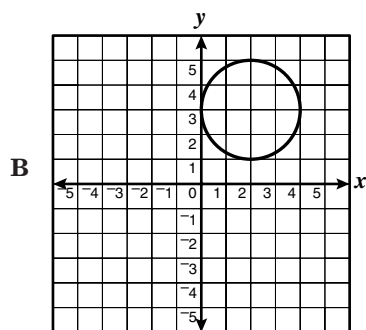
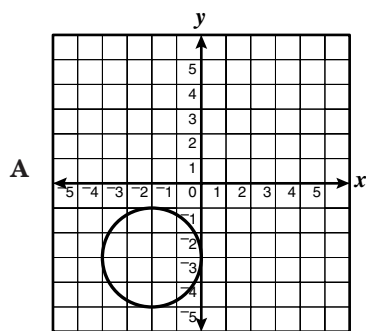
F $(y - 2)(x - 4) = \frac{1}{4}$

G $(y - 4) = \frac{1}{4}(x - 2)^2$

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

J $(y - 4)^2 = \frac{1}{4}(x - 2)^2$

37 Which graph best represents $(x - 2)^2 + (y - 3)^2 = 4$?



38 $A = \begin{bmatrix} 0 & 2 & -1 \\ 3 & 0 & 4 \\ 1 & -2 & -3 \end{bmatrix}$

$B = \begin{bmatrix} 1 & -2 & 1 \\ 2 & 0 & 3 \\ -3 & 2 & -1 \end{bmatrix}$

Which matrix is the product of $B \cdot A$?

F $\begin{bmatrix} 1 & 0 & 0 \\ 5 & 0 & 7 \\ -2 & 0 & -4 \end{bmatrix}$

G $\begin{bmatrix} -5 & 0 & -12 \\ 3 & -2 & -11 \\ 5 & -4 & 14 \end{bmatrix}$

H $\begin{bmatrix} 0 & -4 & -1 \\ 6 & 0 & 12 \\ -3 & -4 & 3 \end{bmatrix}$

J $\begin{bmatrix} 7 & -2 & 7 \\ -9 & 2 & -1 \\ 6 & -8 & -2 \end{bmatrix}$

39 Which matrix is the multiplicative inverse of $\begin{bmatrix} 7 & 16 \\ 4 & 9 \end{bmatrix}$?

A $\begin{bmatrix} -9 & 4 \\ 4 & 7 \end{bmatrix}$

B $\begin{bmatrix} -9 & 16 \\ 4 & -7 \end{bmatrix}$

C $\begin{bmatrix} 9 & 16 \\ 4 & 7 \end{bmatrix}$

D $\begin{bmatrix} -9 & 16 \\ 4 & 7 \end{bmatrix}$

40 $\begin{cases} -x + 2y - 5z = -12 \\ 2x - 3y + 7z = 19 \\ -5x - 2y + z = -10 \end{cases}$

Given the system of equations above,

$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = ?$

F $\begin{bmatrix} 3 \\ -2 \\ 1 \end{bmatrix}$

G $\begin{bmatrix} -12 \\ 19 \\ 10 \end{bmatrix}$

H $\begin{bmatrix} 1.1 & 0.8 & -0.1 \\ -3.7 & -2.6 & -0.3 \\ -1.9 & -1.2 & -0.1 \end{bmatrix}$

J $\begin{bmatrix} 0 \\ -11 \\ 32 \end{bmatrix}$

41
$$\begin{cases} 9x - 5y = 12 \\ 8x + 3y = 22 \end{cases}$$

Which matrix equation represents the given system of linear equations?

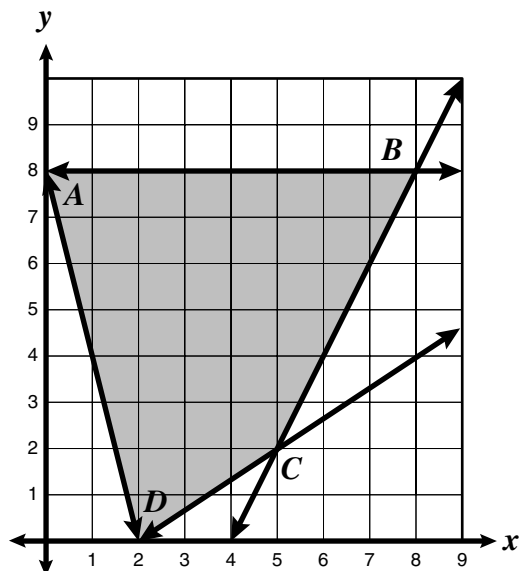
A
$$\begin{bmatrix} 9 & 8 \\ -5 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 12 \\ 22 \end{bmatrix}$$

B
$$\begin{bmatrix} 9 & 8 \\ -5 & 3 \end{bmatrix} [x \quad y] = \begin{bmatrix} 12 \\ 22 \end{bmatrix}$$

C
$$\begin{bmatrix} 9 & -5 \\ 8 & 3 \end{bmatrix} [x \quad y] = \begin{bmatrix} 12 \\ 22 \end{bmatrix}$$

D
$$\begin{bmatrix} 9 & -5 \\ 8 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 12 \\ 22 \end{bmatrix}$$

42



The graph of the linear programming model consists of polygon $ABCD$ and its interior. Under these constraints, which is the point where the *maximum* value of $4x + 3y$ occurs?

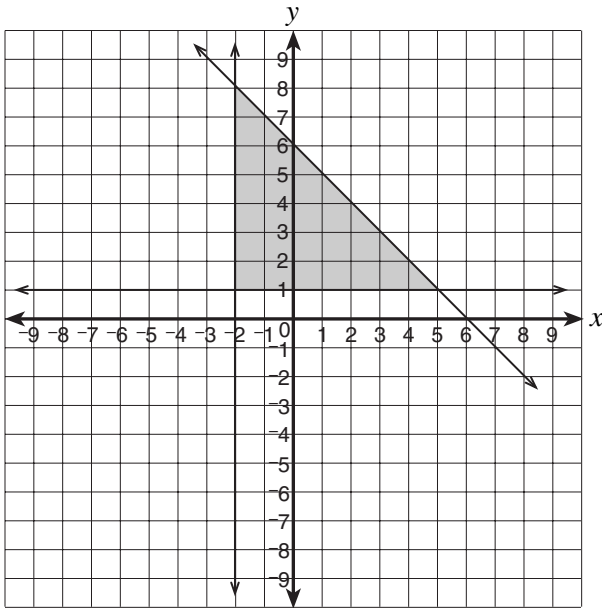
F A

G B

H C

J D

43



Which set of constraints produced the shaded feasible region?

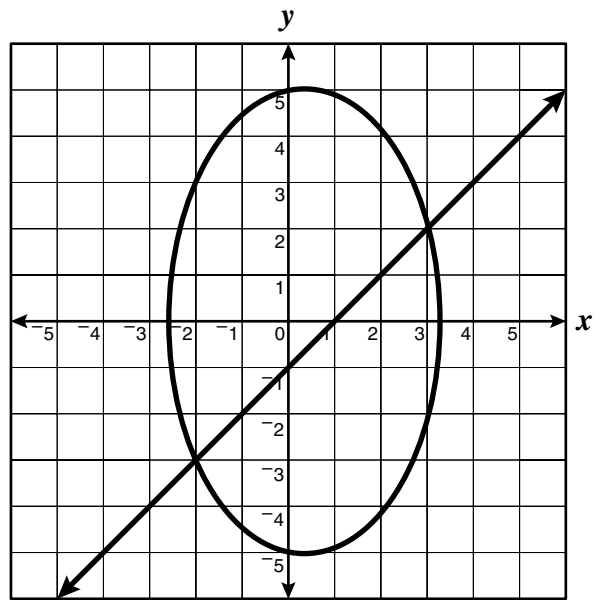
A $\begin{cases} y \geq 6 - x \\ x \geq 1 \\ y \geq -2 \end{cases}$

B $\begin{cases} x + y \leq 6 \\ x \geq -2 \\ y \geq 1 \end{cases}$

C $\begin{cases} x \geq 6 - y \\ x \geq 1 \\ y \leq 2 \end{cases}$

D $\begin{cases} x + y \leq 8 \\ x - y \leq 6 \\ x \geq -2 \\ y \geq 1 \end{cases}$

44



This is a portion of the graph of a system of equations. Which is most likely the solution set for the system?

F $\{(-2.1, -3.4), (2, 3)\}$

G $\{(-3, 2), (-2.1, 3.4)\}$

H $\{(-2, -3), (3, 2)\}$

J $\{(2.1, -3.4), (3, 2)\}$

45 $\begin{cases} y = x + 1 \\ y = (x + 3)^2 - 4 \end{cases}$

Which is the solution set for the system of equations above?

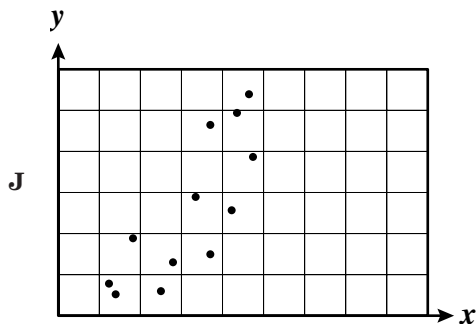
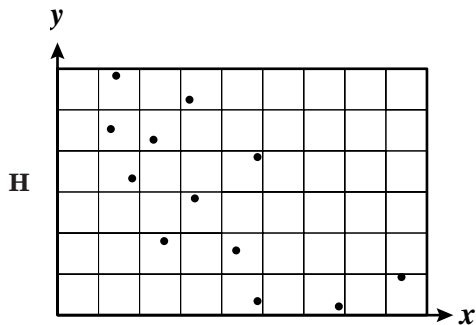
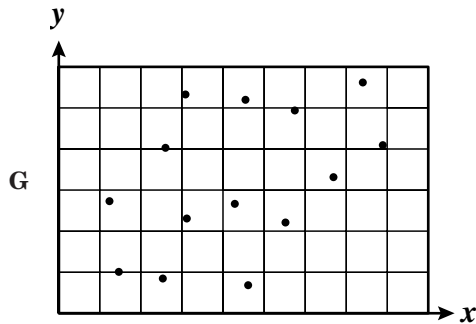
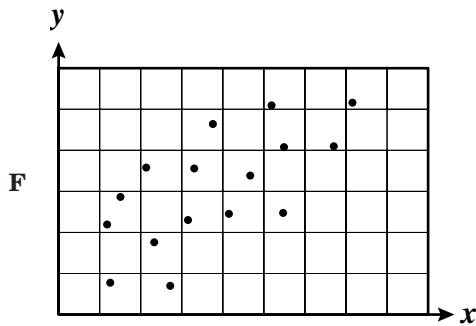
A $\{(-6.4, 7.4), (-0.6, 1.6)\}$

B $\{(-4, -3), (-2, -3)\}$

C $\{(-4, -3), (-1, 0)\}$

D $\{(0.6, 1.6), (6.4, 7.4)\}$

- 46 Which of the following scatterplots shows a negative correlation?



- 47 The Social Security (FICA) wage base, y , (in thousands of dollars) from 1983 to 1988 is given by the equation $y = 1.9x + 34.1$, where x is the number of years since 1983. What was the FICA wage base in 1995?

- A \$53,100
- B \$48,200
- C \$56,900
- D \$58,800

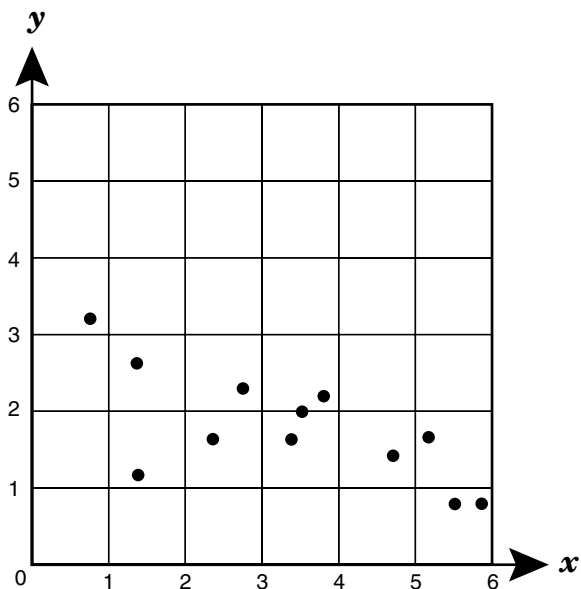
- 48 A clothing manufacturer is funding a study to determine the amount spent annually on clothes, given a family's income. This table contains data tracking the clothing purchases for seven families.

Annual Income	Annual Clothes Expenditure
\$25,100	\$3,800
29,600	4,200
34,400	5,000
28,700	3,900
34,600	4,700
31,500	4,500
27,700	4,200

Assuming a linear relationship, approximately how much would you expect a family with an annual income of \$33,000 to spend on clothes?

- F 4,400
- G 4,600
- H 4,800
- J 5,000

49 Consider this scatter plot.



Which equation represents the line closest to the curve of best fit?

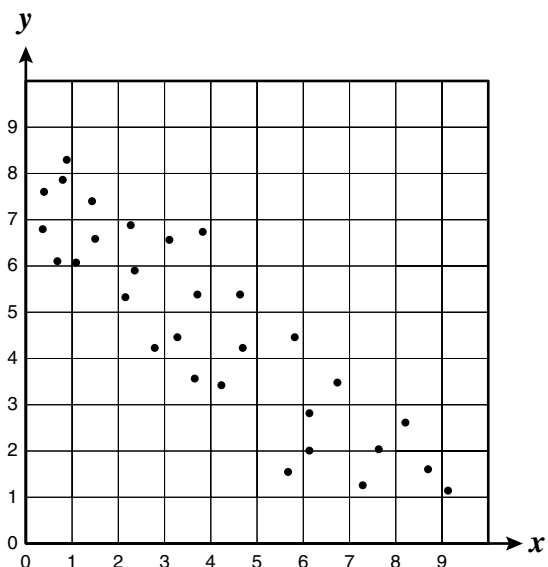
A $y = \frac{1}{2}x + 3$

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

C $y = -\frac{1}{3}x + 3$

D $y = x$

50



Which is closest to the value of the slope of the line of best fit of the data in this scatterplot?

F -3

G -1

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

J 1