VIRGINIA
STANDARDS OF LEARNING ASSESSMENTS

Spring 2001 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 Which property is illustrated by this equation?

$$\mathbf{\frac{3}{2}x + 0 = \frac{3}{2}x}$$

A Commutative Property for Addition
B Distributive Property
C Additive Inverse
D Additive Identity

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

F $(4 + x^2) + z = 4 + (x^2 + z)$
G $7y^2 \times 1 = 7y^2$
H $6p^3 + 9 = 3(2p^3 + 3)$
J $9y^5 + 0 = 9y^5$

3 Which is equivalent to $\mathbf{\frac{x^2 - 4}{x^2 - 4x + 4}}$?

A $\frac{1}{x + 1}$

B $\frac{x + 2}{x - 2}$

C $\frac{1}{4x}$

D $\frac{1}{x + 4}$

4 $\dfrac{6a + 12}{a} \cdot \dfrac{a^3}{a + 2} = ?$

F $6a^2$

G $\dfrac{6}{a^2}$

H $\dfrac{6(a + 2)}{a}$

J $\dfrac{6a^2 + 24a + 24}{a^4}$

5 **Which is equivalent to** $\dfrac{3x}{7} + \dfrac{5y}{14x}$**?**

A $\dfrac{8y}{21}$

B $\dfrac{x^2}{14}$

C $\dfrac{6x^2 + 5y}{14x}$

D $\dfrac{3x^2 + 5y}{14x}$

6 **Which is equivalent to** $16^{\frac{3}{4}}$**?**

F 4

G 8

H 12

J 32

7 **Which is equivalent to** $a^{\frac{1}{2}} b^{\frac{3}{4}}$**?**

A ab^3

B $\sqrt{ab^3}$

C $\sqrt[3]{a^2b^4}$

D $\sqrt[4]{a^2b^3}$

8 Which of the following expressions cannot be factored into a product of lower degree terms over the set of real numbers?

F $8a^3 + b^3$

G $4x^2 - 12xy + 9y^2$

H $x^2 + 5x + 25$

J $16a^2 - 9b^2$

9 What is the sum of $(2 - 5i)$ and $(3 + i)$?

A $^-4 - 4i$

B 1

C 5

D $5 - 4i$

10 Which is equivalent to $\frac{5 + i}{1 + 3i}$?

F $\frac{4 - 8i}{5}$

G $\frac{4 - 7i}{5}$

H $\frac{1 - 7i}{5}$

J $\frac{^-1 - 7i}{4}$

11

x	$f(x)$
$^-3$	2
0	5
3	$^-10$

The table shows some elements of a function. Which equation is *most* likely a rule for the function?

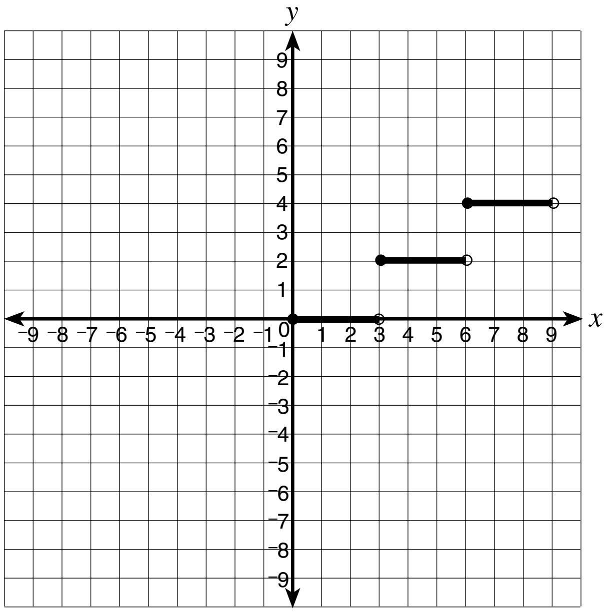
A $f(x) = x + 5$

B $f(x) = {}^-5x + 5$

C $f(x) = 5 - 2x - x^2$

D $f(x) = x^2 - 5x + 5$

12



What is the equation of the function shown?

F $f(x) = \begin{cases} 0 \text{ for } 0 < x < 3 \\ 2 \text{ for } 3 < x < 6 \\ 4 \text{ for } 6 < x < 9 \end{cases}$

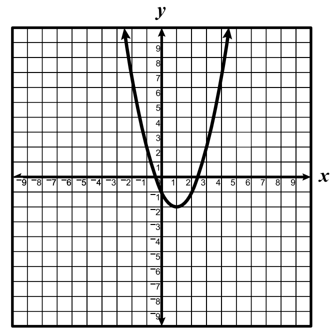
G $f(x) = \begin{cases} 0 \text{ for } 0 \leq x < 3 \\ 2 \text{ for } 3 \leq x < 6 \\ 4 \text{ for } 6 \leq x < 9 \end{cases}$

H $f(x) = \begin{cases} 0 \text{ for } 0 < x \leq 3 \\ 2 \text{ for } 3 < x \leq 6 \\ 4 \text{ for } 6 < x \leq 9 \end{cases}$

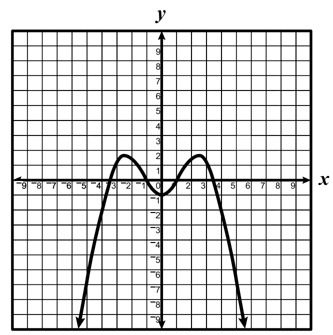
J $f(x) = \begin{cases} 0 \text{ for } 0 \leq x \leq 3 \\ 2 \text{ for } 3 \leq x \leq 6 \\ 4 \text{ for } 6 \leq x \leq 9 \end{cases}$

13 **Which graph could represent a third-degree polynomial function?**

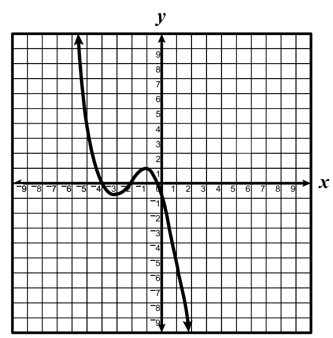
A



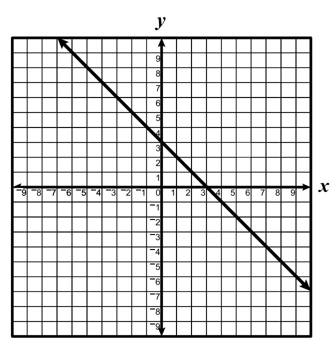
B



C



D



GO ON

14 Which is a zero of the function $f(x) = x^2 + 6x + 8$?

F $^-8$

G $^-4$

H 2

J 4

15 If the domain of $y + 2 = x^2$ is $\{^-2, ^-1, 1, 3\}$, what is the range?

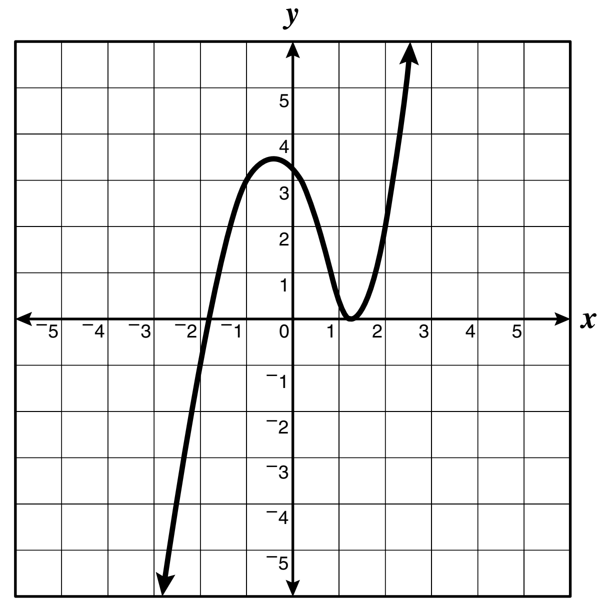
A $\{^-1, 2, 7\}$

B $\{^-6, ^-3, 3, 11\}$

C $\{^-7, ^-2, ^-1, 1\}$

D $\{^-11, ^-3, 3, 6\}$

16



This is a portion of the graph of a polynomial function. Apparently the function has a double zero —

F between $^-2$ and $^-1$

G between $^-2$ and 1

H between 1 and 2

J between 3 and 4

17 The volume (V) of a sphere varies directly with the cube of its radius (r). If k is the constant of proportionality, which is the formula for this relationship?

A $V = kr$

B $V = kr^3$

C $V = \frac{k}{r^3}$

D $r = kV^3$

GO ON

18 **Two arithmetic means between 3 and 24 are —**

F 8 and 12
G 8 and 16
H 9 and 16
J 10 and 17

19 **Driving a piling into a harbor bottom, a pile driver sinks the piling 24 inches on the first stroke, 18 inches on the second stroke, and $13\frac{1}{2}$ inches on the third stroke. If the sequence is continued, how far will the piling be driven down on the 5th stroke?**

A $1\frac{1}{2}$ in.

B $4\frac{1}{2}$ in.

C 6 in.

D $7\frac{19}{32}$ in.

20 **Hooke's law states that the force required to stretch a spring varies directly with the distance the spring is stretched. If a 10-pound force stretches a spring 2 inches, what force is required to stretch the spring 5 inches?**

F 15 pounds
G 20 pounds
H 25 pounds
J 30 pounds

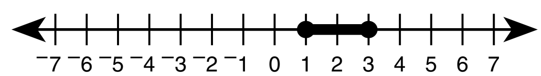
21 **If $f(n) = 2^n - n$, then $f(3) =$**

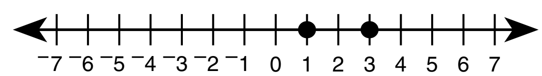
A 3
B 5
C 9
D 11

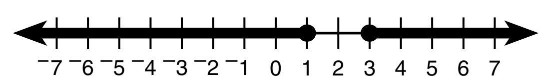
22 **Which is the solution to $|2x - 4| > 8$?**

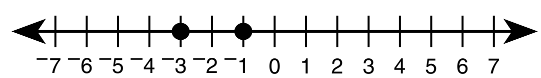
F $^-2 < x < 6$
G $x < {}^-6$ or $x > 2$
H $x = 2$ or $x = 6$
J $x < {}^-2$ or $x > 6$

23 **Which number line shows the solution to $|x - 2| = 1$?**

A


B


C


D


24 What are the solutions to $(y + 3)^2 - 81 = 0$?

F $y = {}^-12$ or $y = {}^-6$

G $y = {}^-12$ or $y = 6$

H $y = 12$ or $y = {}^-6$

J $y = 12$ or $y = 6$

25 What is the solution to $\sqrt{\dfrac{x + 3}{2}} = 3$?

A $x = 3$

B $x = 9$

C $x = 15$

D $x = 33$

26 What are the solutions to $x^2 - 3x - 4 = 0$?

F $x = 1$ or $x = {}^-4$

G $x = {}^-1$ or $x = 4$

H $x = \dfrac{3 \pm i\sqrt{7}}{2}$

J $x = \dfrac{3 \pm \sqrt{7}}{2}$

27 The height of a right triangle is 5 units more than twice its base. If the area of the triangle is 21 square units, what is its height?

A $\dfrac{7}{2}$ units

B $\dfrac{{}^-5 + \sqrt{193}}{4}$ units

C $\dfrac{5 + \sqrt{193}}{2}$ units

D 12 units

28 **What is the solution to $\frac{x}{2x+1} = \frac{4}{3}$?**

F $x = {}^{-}\frac{1}{5}$

G $x = {}^{-}5$

H $x = {}^{-}\frac{4}{5}$

J $x = {}^{-}\frac{5}{4}$

29 **What are the solutions to $4x - 16 = {}^{-}2x^2$?**

A $x = 4i$ or $x = {}^{-}2$

B $x = {}^{-}4$ or $x = 2$

C $x = 4$ or $x = 2i$

D $x = 4$ or $x = 2$

30 **What is the solution to $\sqrt{5x} - 1 = 2$?**

F $x = \frac{1}{5}$

G $x = \frac{\sqrt{3}}{5}$

H $x = \frac{5}{9}$

J $x = \frac{9}{5}$

31 **A pendulum L inches in length takes t seconds to make one full cycle according to the equation**

$$t = 2\pi\sqrt{\frac{L}{384}}$$

To the nearest tenth of an inch, what is the length of a pendulum that completes one full cycle every 1.5 seconds?

A 9.6 in.

B 14.6 in.

C 21.9 in.

D 29.2 in.

32 **A polynomial function has a zero at $x = {}^{-}4$. Which expression *must* be a factor of the polynomial?**

F $x - 4$

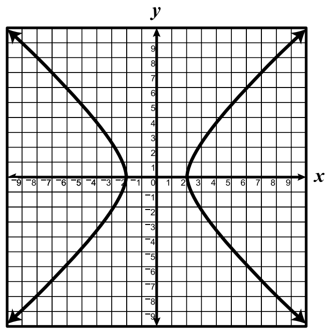
G $x - 2$

H $x + 2$

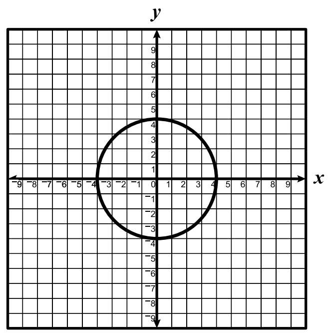
J $x + 4$

33 **Which of the following could be the graph of $y = \frac{1}{4}x^2$?**

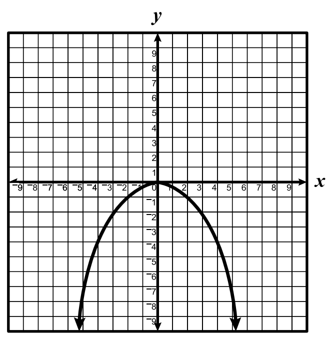
A



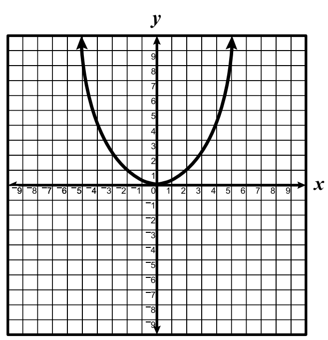
B



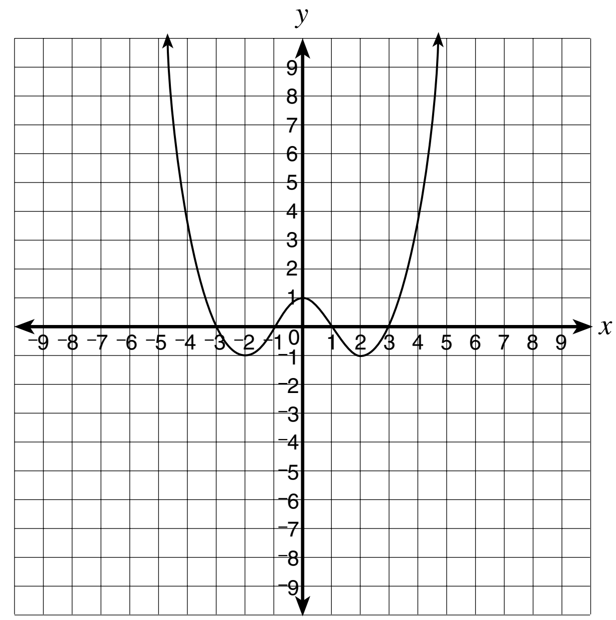
C



D



34



Which of the following sets contains all the apparent zeros for the function shown?

F $\{1\}$

G $\{^-2, 0, 2\}$

H $\{^-2, 1, 2\}$

J $\{^-3, ^-1, 1, 3\}$

35 **What are the coordinates of the vertex of the graph of $y - 2 = (x + 3)^2$?**

A $(^-2, 3)$

B $(^-3, 2)$

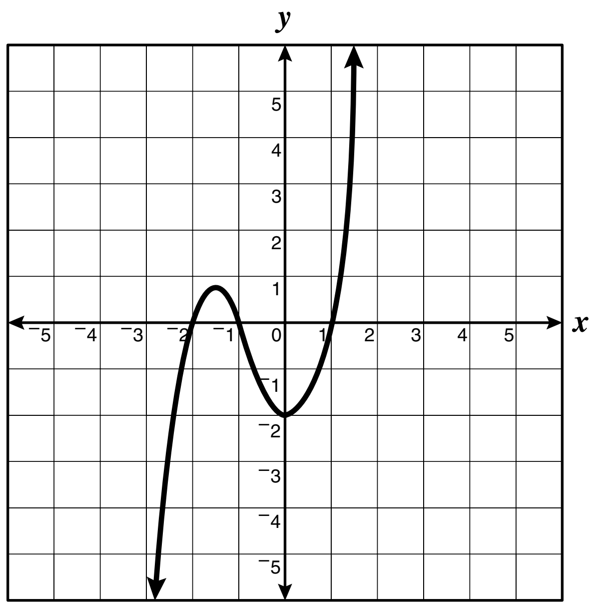
C $(3, ^-2)$

D $(2, ^-3)$

36 **Which describes the graph of $\frac{x^2}{4} - \frac{y^2}{16} = 1$?**

F Parabola
G Circle
H Ellipse
J Hyperbola

37



A section of the graph of a polynomial function with integral coefficients is shown. Which of the following sets most likely contains only elements that are factors of the polynomial?

A $\{(x - 2), (x - 1.5)\}$
B $\{(x - 2), (x - 1), (x + 1)\}$
C $\{(x + 2), (x + 1), (x - 1)\}$
D $\{x, (x - 2), (x - 1), (x + 1)\}$

38 $S = \begin{bmatrix} 3 \\ ^{-}1 \end{bmatrix}$

$T = [2 \quad ^{-}2]$

Which matrix is the product $S \times T$?

F $[8]$

G $[6 \quad 2]$

H $\begin{bmatrix} 6 \\ 2 \end{bmatrix}$

J $\begin{bmatrix} 6 & ^{-}6 \\ ^{-}2 & 2 \end{bmatrix}$

39 $[1 \quad 2 \quad 3 \quad 6] = P$

Matrix P shows the point value for the different ways points may be scored in a football game.

$$\begin{bmatrix} 2 \\ 0 \\ 2 \\ 3 \end{bmatrix} = S$$

Matrix S shows the number of times a team scored points in a game categorized by the way points may be scored. What was the total number of points the team scored in the game?

A 19
B 24
C 26
D 27

GO ON

40 **A small plant manufactures toy cars and trucks on two production lines. Matrix *A* is the input-output matrix of each item on each line per hour. Matrix *B* gives the number of hours each line operates in a day.**

$$A = \begin{array}{c} \textit{Line 1} \quad \textit{Line 2} \\ \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix} \end{array} \begin{array}{l} \textit{Trucks} \\ \textit{Cars} \end{array} \quad \text{and}$$

Number of Hours

$$B = \begin{bmatrix} 8 \\ 12 \end{bmatrix}$$

Which product represents the matrix of the number of toy cars and trucks produced in a day on both production lines?

F $\begin{array}{r} \textit{Trucks} \\ \textit{Cars} \end{array} \begin{bmatrix} 64 \\ 44 \end{bmatrix}$

G $\begin{array}{r} \textit{Trucks} \\ \textit{Cars} \end{array} \begin{bmatrix} 24 \\ 72 \end{bmatrix}$

H $\begin{array}{r} \textit{Trucks} \\ \textit{Cars} \end{array} \begin{bmatrix} 44 \\ 64 \end{bmatrix}$

J $\begin{array}{r} \textit{Trucks} \\ \textit{Cars} \end{array} \begin{bmatrix} 16 \\ 48 \end{bmatrix}$

41 **If $A = \begin{bmatrix} 3 & 2 \\ 5 & 3 \end{bmatrix}$ and the product $A \cdot B = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then $B =$**

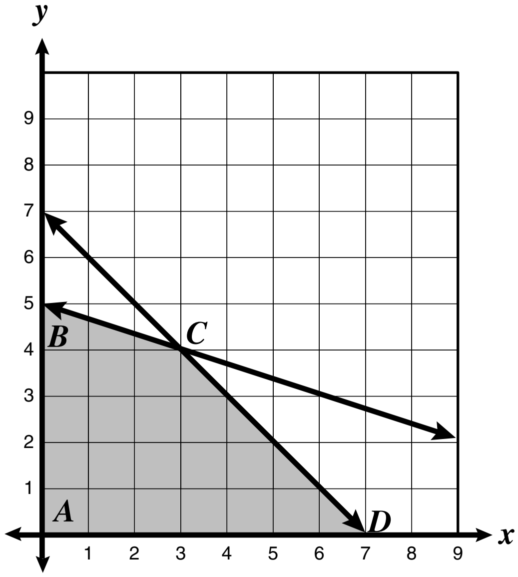
A $\begin{bmatrix} \frac{1}{3} & 0 \\ 0 & \frac{1}{3} \end{bmatrix}$

B $\begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix}$

C $\begin{bmatrix} \frac{1}{3} & \frac{1}{2} \\ \frac{1}{5} & \frac{1}{3} \end{bmatrix}$

D $\begin{bmatrix} 3 & -4 \\ 5 & -8 \end{bmatrix}$

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 $3x + 2y$ occurs?

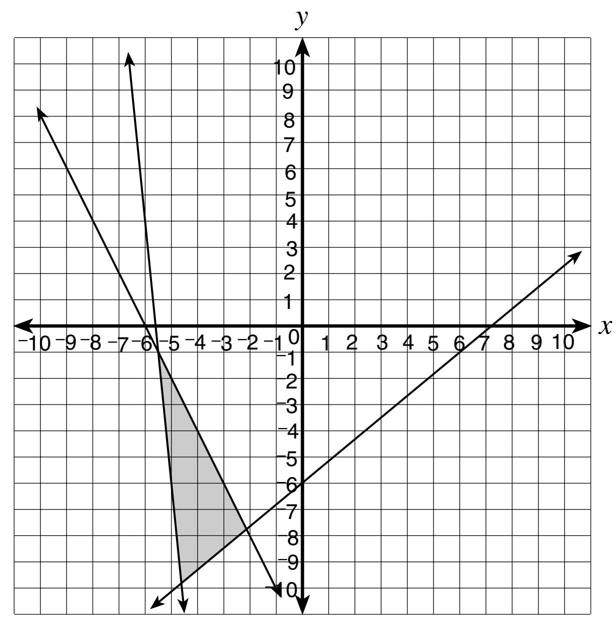
F A

G B

H C

J D

43 **The graph shows the solution for which system of inequalities?**



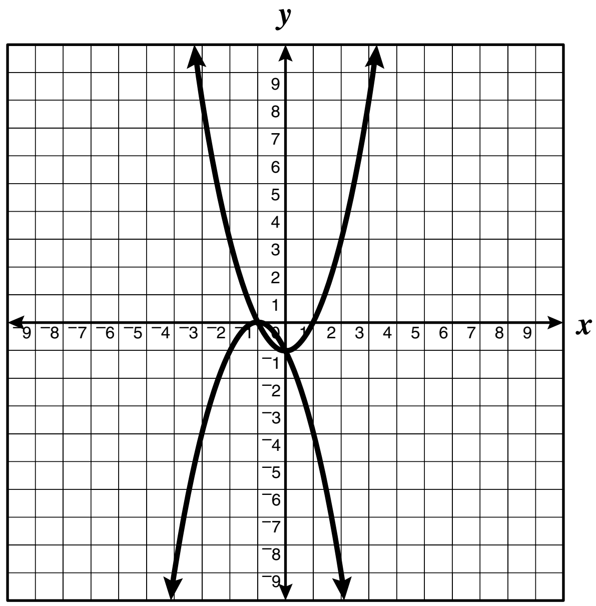
A $\begin{cases} y \geq {}^{-}10x - 56 \\ y \geq \dfrac{5x}{6} - 6 \\ y \leq {}^{-}2x - 12 \end{cases}$

B $\begin{cases} y \leq 56 - 10x \\ y \geq \dfrac{5x}{6} - 6 \\ y \leq 12 - 2x \end{cases}$

C $\begin{cases} y \geq {}^{-}12 - 2x \\ y \leq \dfrac{5x}{6} \\ y \leq {}^{-}56 - 10x \end{cases}$

D $\begin{cases} y \leq 2x - 12 \\ y \geq 6 - \dfrac{5x}{6} \\ y \geq 10x - 56 \end{cases}$

44



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

F {(⁻1, 1)}

G {(⁻1, 0), (1, 0)}

H {(⁻1, 0), (0, 1)}

J {(⁻1, 0), (0, ⁻1)}

45 $\begin{cases} x^2 - 3y^2 = -8 \\ x^2 + 2y^2 = 12 \end{cases}$

Which is the solution to the system of equations above?

A {(⁻2, ⁻2), (⁻2, 2), (2, ⁻2), (2, 2)}

B {(⁻3.5, 0),(0, ⁻2.5), (0, 2.5), (3.5, 0)}

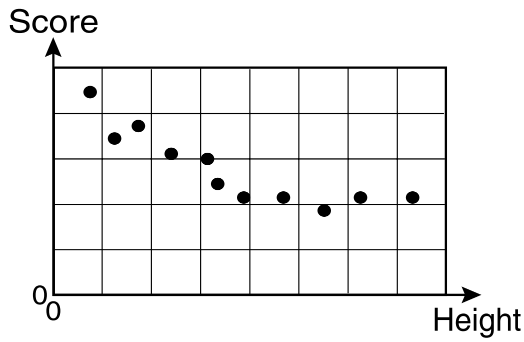
C {(⁻3, ⁻3), (⁻3, 3), (3, ⁻3), (3, 3)}

D {(⁻3, ⁻4), (⁻3, 4), (3, ⁻4), (3, 4)}

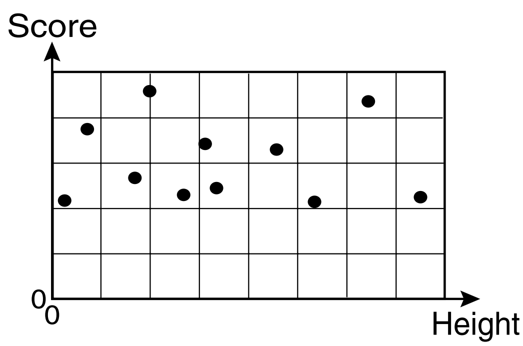
GO ON

46 **George was comparing the heights of 11 of his classmates with their algebra scores. Which of the following scatterplots is most likely a representation of that relationship?**

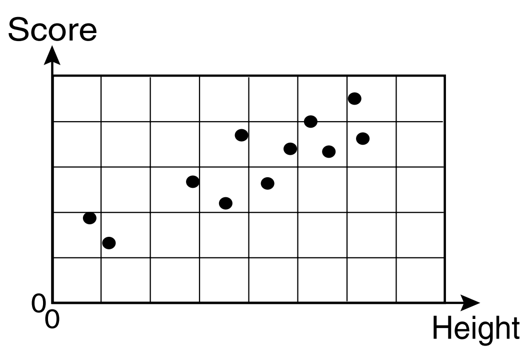
F



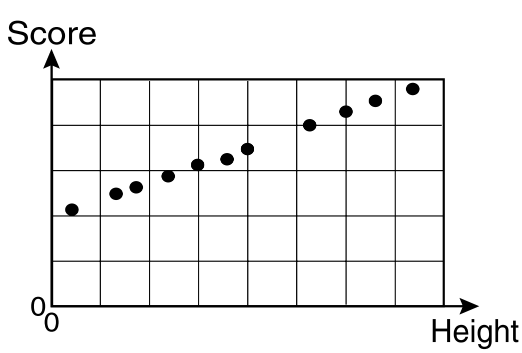
G



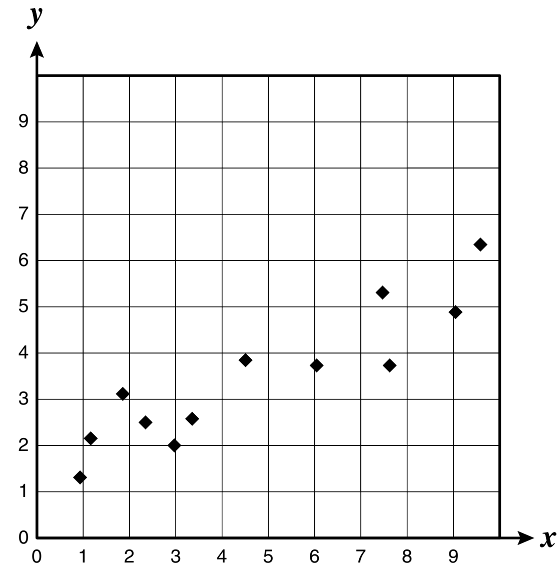
H



J



47



Which equation is nearest to the line of best fit of the data in this scatterplot?

A $y = x$

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

C $y = 2x$

D $y = \sqrt{x} + 2$

GO ON

48 **In 1990, sales at ABC Electronics totaled 4.9 million dollars. During 1996, total sales amounted to 12.1 million. Assuming the growth in sales is a linear relation, what total sales can the company expect in 2001?**

F 16.9 million

G 18.1 million

H 24.2 million

J 25.3 million

49 **The table shows the number of students enrolled in the advanced algebra program at Fairoaks High School during the 6 years since its initiation.**

Year (x)	Number of Students (n)
1	66
2	72
3	82
4	90
5	100
6	106

Which of the following equations most closely describes the relationship between n, the number of students enrolled, and x, the number of years the class has been in existence?

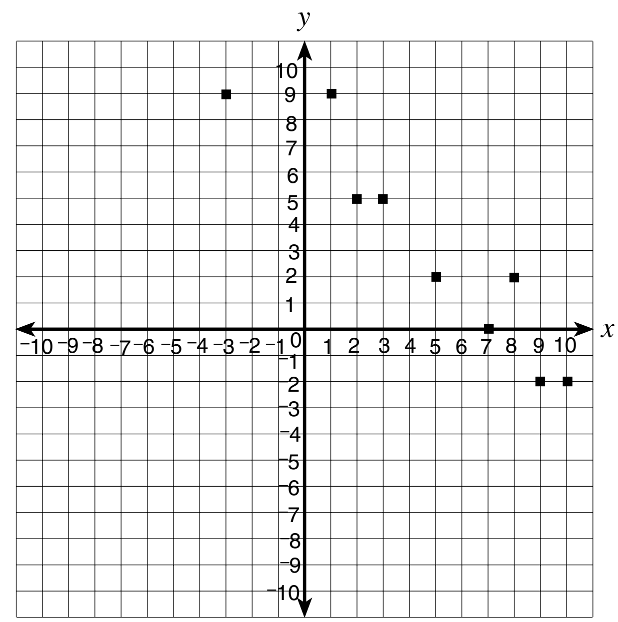
A $n = x + 65$

B $n = 6x + 60$

C $n = 8x + 58$

D $n = 10x + 46$

50



Which line best fits the scatterplot data?

F $2y = {}^{-}x + 8$

G $8 = x - y$

H $y = 8 - x$

J $2y = x - 15$

STOP

Answer Key

Test Sequence	Correct Answer	Reporting Category	Reporting Category Description
1	D	001	Expressions and Operations
2	H	001	Expressions and Operations
3	B	001	Expressions and Operations
4	F	001	Expressions and Operations
5	C	001	Expressions and Operations
6	G	001	Expressions and Operations
7	D	001	Expressions and Operations
8	H	001	Expressions and Operations
9	D	001	Expressions and Operations
10	G	001	Expressions and Operations
11	C	002	Relations and Functions
12	G	002	Relations and Functions
13	C	002	Relations and Functions
14	G	002	Relations and Functions
15	A	002	Relations and Functions
16	H	002	Relations and Functions
17	B	002	Relations and Functions
18	J	002	Relations and Functions
19	D	002	Relations and Functions
20	H	002	Relations and Functions
21	B	002	Relations and Functions
22	J	003	Equations and Inequalities
23	B	003	Equations and Inequalities
24	G	003	Equations and Inequalities
25	C	003	Equations and Inequalities
26	G	003	Equations and Inequalities
27	D	003	Equations and Inequalities
28	H	003	Equations and Inequalities
29	B	003	Equations and Inequalities
30	J	003	Equations and Inequalities
31	C	003	Equations and Inequalities
32	J	004	Analytical Geometry
33	D	004	Analytical Geometry
34	J	004	Analytical Geometry
35	B	004	Analytical Geometry
36	J	004	Analytical Geometry
37	C	004	Analytical Geometry
38	J	005	Systems of Equations/Inequalities
39	C	005	Systems of Equations/Inequalities
40	H	005	Systems of Equations/Inequalities
41	B	005	Systems of Equations/Inequalities
42	J	005	Systems of Equations/Inequalities
43	A	005	Systems of Equations/Inequalities
44	J	005	Systems of Equations/Inequalities
45	A	005	Systems of Equations/Inequalities
46	G	006	Statistical Analysis
47	B	006	Statistical Analysis
48	G	006	Statistical Analysis
49	C	006	Statistical Analysis
50	H	006	Statistical Analysis