VIRGINIA
STANDARDS OF LEARNING ASSESSMENTS

Spring 2003 Released Test

END OF COURSE
ALGEBRA II

Property of the Virginia Department of Education

DIRECTIONS
Read and solve each question. For this test you may assume that the value of the denominator of a rational expression is not zero.

SAMPLE

$$\frac{6(a+2)}{a} \cdot \frac{a^3}{a+2} =$$

A $\frac{6}{a^2}$

B $\frac{6(a+2)}{a}$

C $6a^2$

D $\frac{6a^2 + 24a + 24}{a^4}$

1 What property is illustrated by the equation

$$3x(x+2) = 3x^2 + 6x?$$

A Associative Property of Addition
B Reflexive Property of Equality
C Associative Property of Multiplication
D Distributive Property

2 Which of the following statements is an example of the transitive property of inequalities?

F If $k \geq 0$, then $|k| = k$.
G If $k < 6$ and $6 < m$, then $k < m$.
H If $k < 6$, then $k + 2 < 8$.
J If $k < 6$ and $j > 0$, then $kj < 6j$.

3 Which expression is equal to $\frac{(4y^5 - 3y^2)}{5y^2}$**?**

A $4y^5 - 2y^2$

B $\frac{4}{5}y^3 + \frac{3}{5}$

C $\frac{5}{4}y^{-3} - \frac{5}{3}$

D $\frac{4}{5}y^3 - \frac{3}{5}$

4 Which is equivalent to

$$\frac{7a}{15b} - \frac{2b}{5}?$$

F $\frac{a}{5}$

G $\frac{a}{2}$

H $\frac{7a - 6b^2}{15b}$

J $\frac{7a - 4b}{5}$

5 Which is equivalent to $\left(\sqrt{2}\right)^3$**?**

A 2

B $\sqrt{2}$

C $2\sqrt{2}$

D $\sqrt{6}$

GO ON

6 Which is equivalent to $\sqrt[6]{a^2b^3}$?

F $\frac{1}{6}a^2b^3$

G a^3b^2

H $a^3b^{\frac{1}{2}}$

J $a^{\frac{1}{3}}b^{\frac{1}{2}}$

7 Which is a factored form of $9x^2 - 25$?

A $(3x - 5)(3x + 5)$
B $(3x - 5)^2$
C $(3x + 5)^2$
D $(9x - 25)^2$

8 Which is a factor of

$x^2 - 2x - 15$?

F $(x - 3)$
G $(x - 15)$
H $(x + 3)$
J $(x + 5)$

9 Which is equivalent to

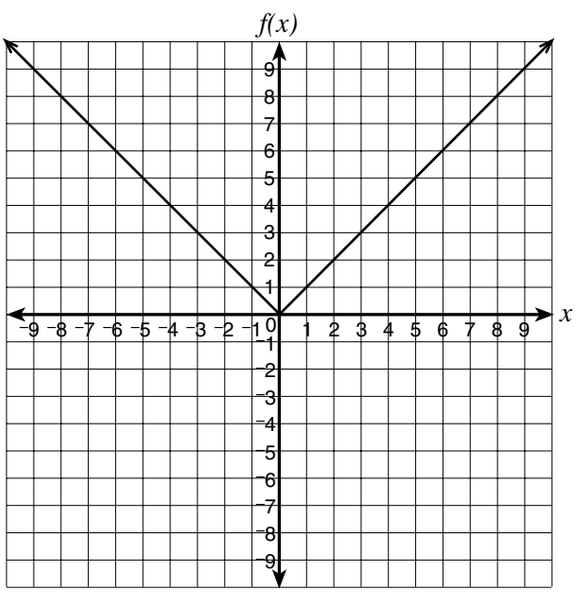
$(3 + 2i)(2 + 5i)$?

A $^-4 + 19i$
B $16 + 19i$
C $6 + 29i$
D $6 - 10i$

10 Which is equivalent to $\sqrt{3} \cdot \sqrt{-3}$?

F $3i$
G ^-3i
H 9
J $9i$

11 Which type of function is shown?



A Absolute value
B Exponential
C Linear
D Quadratic

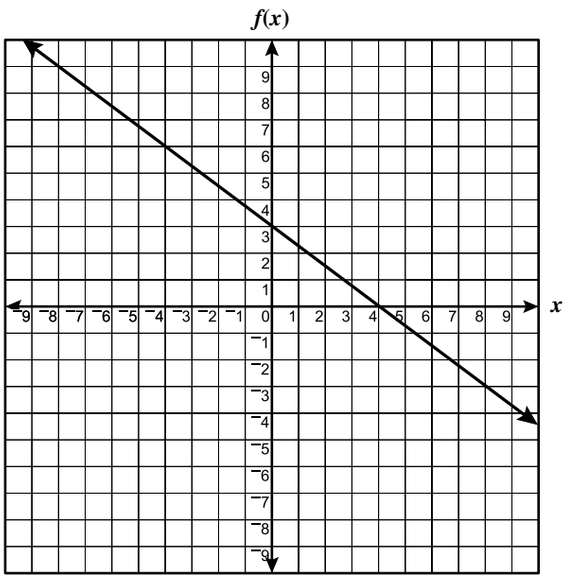
12 Which function includes the values in the table?

x	$^-2$	$^-1$	0	1	2
y	3	0	$^-1$	0	3

F $y = x - 1$
G $y = x + 1$
H $y = x^2 - 1$
J $y = (x - 1)^2$

GO ON

13



Which function is most closely represented by the graph?

A $f(x) = \frac{4}{3}x$

B $f(x) = 3 - \frac{4}{3}x$

C $f(x) = 3 + \frac{3}{4}x$

D $f(x) = 3 - \frac{3}{4}x$

14 What is the zero of the function

$$f(x) = 12x + 27?$$

F 27

G $\frac{9}{4}$

H 0

J $-\frac{9}{4}$

15 If the domain of $f(x) = 3x + 5$ is $\{-1, 0, 1, 2, 3\}$, what is the range?

A {0, 2, 9, 11, 14}

B {−8, −5, −2, 1, 4}

C {−4, −2, −1, 5, 8}

D {2, 5, 8, 11, 14}

16 The polynomial function

$$y = x^3 - 3x^2 + x + 1$$

has a zero between —

F −4 and −3

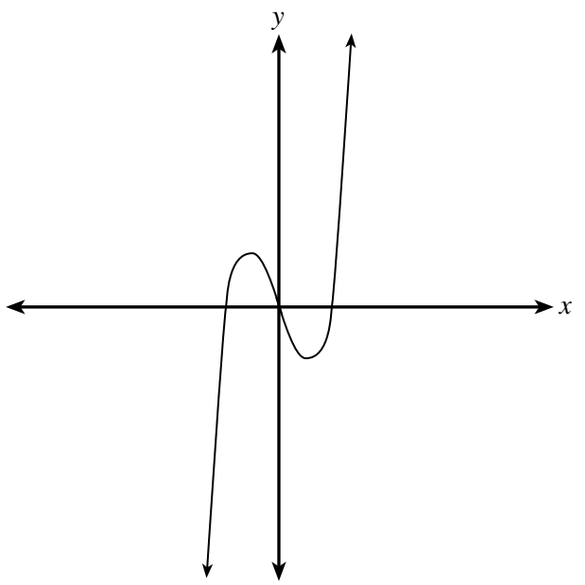
G −2 and −1

H −1 and 0

J 3 and 4

GO ON

17



If a, b, c, d, and g are real numbers and $a > 0$, which equation could be represented by this curve?

A $y = ax + b$
B $y = ax^2 + bx + c$
C $y = ax^3 + bx^2 + cx + d$
D $y = ax^4 + bx^3 + cy^2 + dx + g$

18 What is the value of $\sum_{n=1}^{6} 2^n$?

F 62
G 126
H 128
J 252

19 If $a_n = 1 + \frac{1}{n}$, then what is a_9?

A $\frac{11}{10}$
B $\frac{10}{9}$
C $\frac{9}{8}$
D $\frac{3}{2}$

20 In which of the following is z directly proportional to x and inversely proportional to the square of y?

F $z = k\frac{x^2}{y}$
G $z = kxy^2$
H $z = k\frac{x}{y^2}$
J $z = k\frac{y}{x}$

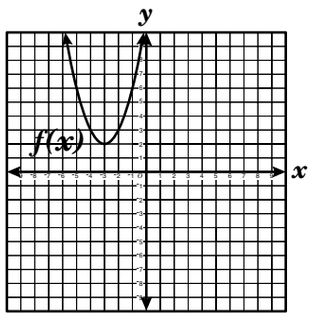
21 The time required to complete a job varies inversely as the number of people working. It took 4 hours for 7 electricians to wire a building. How long would it have taken 3 electricians to have done the job?

A 1 hr 43 min
B 5 hr 15 min
C 7 hr 30 min
D 9 hr 20 min

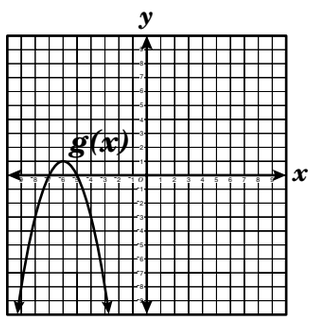
GO ON

22 Which apparently is a graph of a quadratic function that has no real zeros?

F



G



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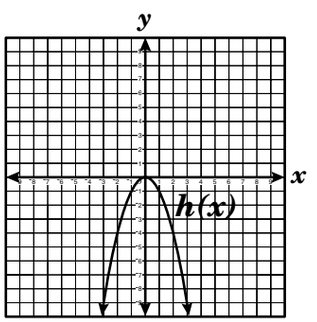

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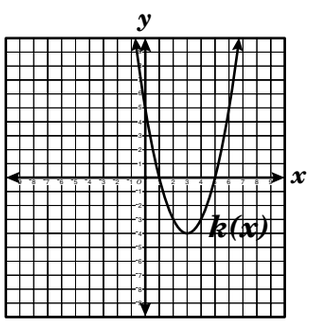
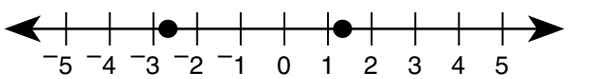


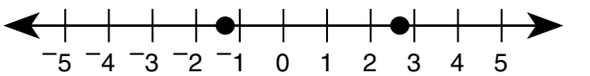
23 Which graph shows the solution set for

$$|3x - 2| = 6?$$

A

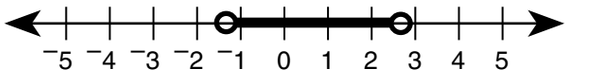


B



C

D



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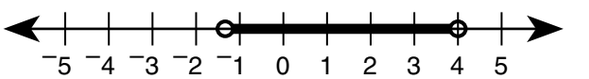


Which inequality describes the solution set graphed above?

F $|3x - 4| \geq 8$

G $|3x - 4| < 8$

H $|2x - 3| > 5$

J $|2x - 3| \leq 5$

25 What are the solutions to $x^2 - 12x + 16 = 0$?

A $-12 \pm 4\sqrt{5}$

B $-6 \pm 2\sqrt{5}$

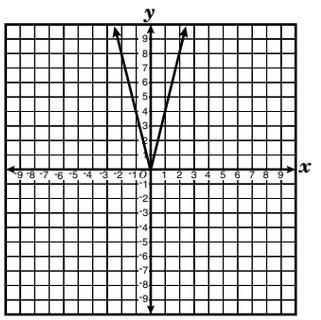
C $6 \pm 2\sqrt{5}$

D $12 \pm 4\sqrt{5}$

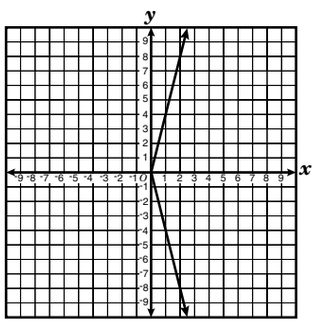
GO ON

26 Which is apparently the graph of $y = |4x|$?

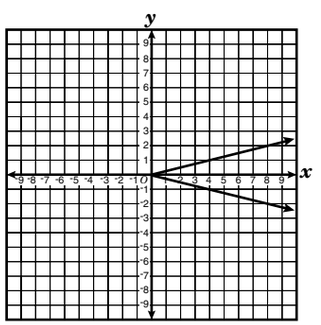
F



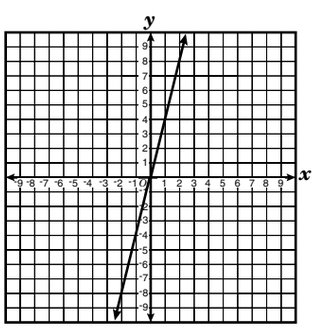
G



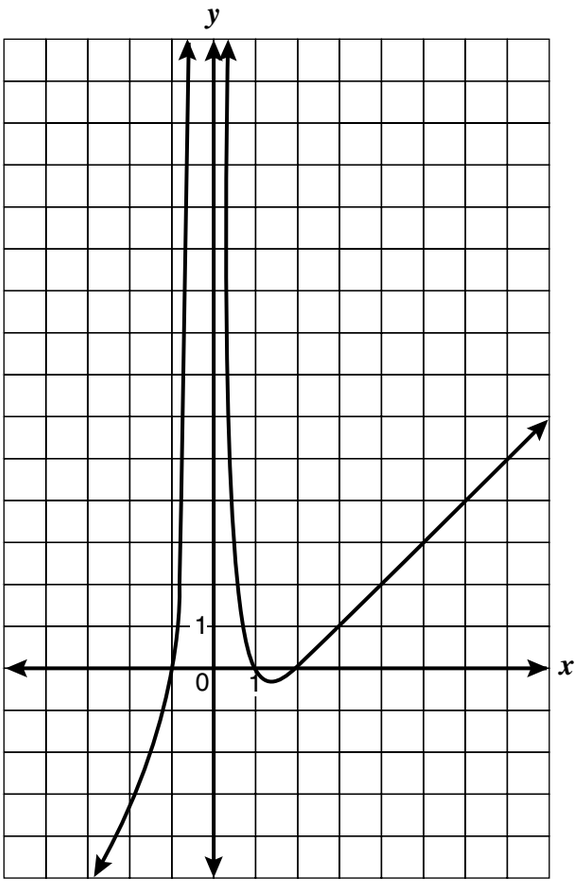
H



J



27 This is a graph of a rational function, f.



Which is *not* a solution of the equation $f(x) = 0$?

A -2

B -1

C 1

D 2

GO ON

28 Which is the solution set for

$$3x^2 - 4x - 15 = 0?$$

F $\left\{-3, \frac{5}{3}\right\}$

G $\left\{\frac{2 \pm i\sqrt{41}}{3}\right\}$

H $\left\{-\frac{5}{3}, 3\right\}$

J $\left\{-\frac{2 \pm i\sqrt{41}}{3}\right\}$

29 What is the solution set for

$\frac{1}{4}\sqrt{9 + x} = 1?$

A $\{-7, 7\}$

B $\{-5, 5\}$

C $\{7\}$

D $\{5\}$

30 For which value of x does

$$\frac{x - 2}{18} = \frac{x - 3}{15}?$$

F -8

G $-\frac{13}{3}$

H $\frac{13}{3}$

J 8

31 The length, s, (in feet) of the skid mark left by an automobile traveling at r miles per hour can be approximated by the relation $r = 2\sqrt{5s}$. At the scene of an accident, police measured a skid mark of 361 feet. About how many miles per hour was the car traveling when the brakes were applied?

A 42 mph

B 54 mph

C 76 mph

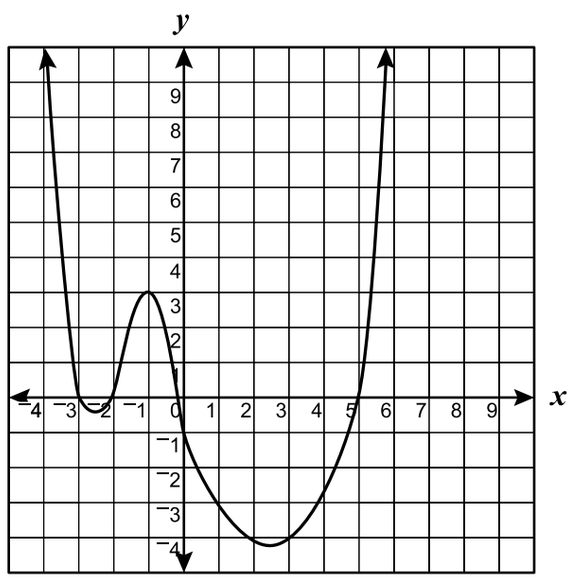
D 85 mph

GO ON

32 **Which function of x would have x-intercepts $-\frac{1}{2}$ and 3?**

F $y = 2x^2 - 5x - 3$
G $y = x^2 - x - 6$
H $y = 2x^2 + 5x - 3$
J $y = 2x^2 + 7x + 3$

33



Which set contains 3 apparent zeros of the polynomial function shown?

A $\{-2.5, -1, 3\}$
B $\{-3, -2, 5\}$
C $\{-3, 1, 2.5\}$
D $\{-3, -1, 3\}$

34 **If $f(x)$ is a polynomial with only factors x, $(x + 2)$, and $(x - 4)$, what is the solution set of $f(x) = 0$?**

F $\{0, 2, 4\}$
G $\{-4, 0, 2\}$
H $\{-2, 0, 4\}$
J $\{-4, -2, 0\}$

35 **When graphed, which of the following equations would produce a circle?**

A $x^2 - y^2 = 9$
B $x + y = 9$
C $y = x^2 - 9$
D $x^2 + y^2 = 9$

36 **Which describes the graph of**

$$\frac{x^2}{5} + \frac{y^2}{4} = 1?$$

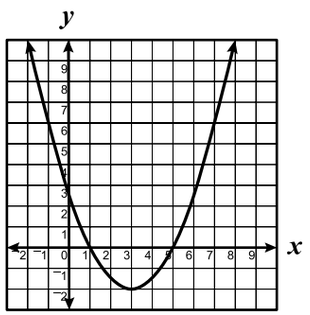
F An ellipse
G A hyperbola
H A parabola
J A circle

GO ON

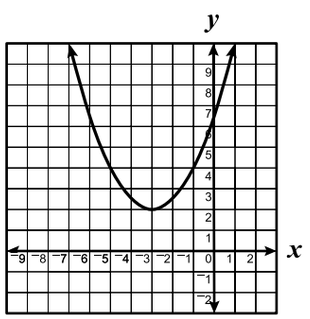
37 Which could be the graph of

$$y - 2 = \frac{1}{2}(x + 3)^2?$$

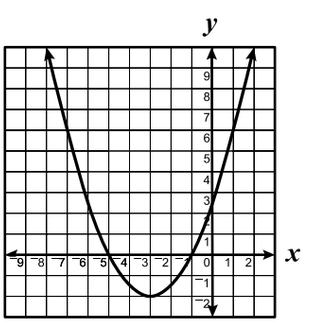
A



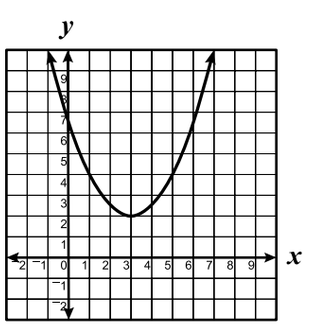
B



C



D



38 Buy-Rite Electronics has 3 locations each selling 3 different models of Convair radios. Matrix *A* shows the inventory of each model at each location.

	Model		
Store	**X**	**Y**	**Z**
South	**38**	**12**	**64**
Central	**42**	**18**	**42**
North	**65**	**36**	**71**

$= A$

Matrix *B* shows the cost of each model.

Model	**Cost**
X	**\$28.95**
Y	**\$82.39**
Z	**\$38.41**

$= B$

For each location, which shows the total value of the inventory of all 3 models?

F

South	\$110.10
Central	\$3,460.38
North	\$2,496.65

G

South	\$3,300.30
Central	\$8,403.78
North	\$6,606.52

H

South	\$4,547.02
Central	\$4,312.14
North	\$7,574.90

J

South	\$4,197.75
Central	\$5,437.74
North	\$6,798.57

GO ON

39 $Q = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$, $R = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $T = [1 \quad 2]$

Which product is *not* possible?

A $Q \times R$
B $Q \times T$
C $R \times Q$
D $R \times R$

40 $\begin{cases} ax + by = q \\ cx + dy = r \end{cases}$

Which matrix equation is equivalent to the system of equations above?

F $\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} q \\ r \end{bmatrix}$

G $\begin{bmatrix} ax & by \\ cx & dy \end{bmatrix} = \begin{bmatrix} q \\ r \end{bmatrix}$

H $\begin{bmatrix} a & b \\ c & d \end{bmatrix} [x \quad y] = \begin{bmatrix} q \\ r \end{bmatrix}$

J $\begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} q \\ r \end{bmatrix}$

41 **What is the multiplicative inverse of the matrix** $\begin{bmatrix} 4 & -1 \\ -7 & 8 \end{bmatrix}$**?**

A $\begin{bmatrix} \frac{1}{4} & -1 \\ \frac{-1}{7} & \frac{1}{8} \end{bmatrix}$

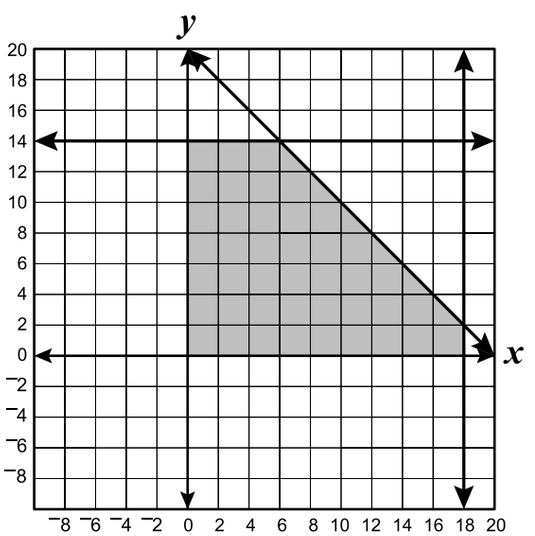
B $\begin{bmatrix} \frac{8}{25} & \frac{1}{25} \\ \frac{7}{25} & \frac{4}{25} \end{bmatrix}$

C $\begin{bmatrix} \frac{8}{25} & \frac{7}{25} \\ \frac{1}{25} & \frac{4}{25} \end{bmatrix}$

D $\begin{bmatrix} -4 & 1 \\ 7 & -8 \end{bmatrix}$

GO ON

42 **Tim makes posters on his computer. He gets $5 for each regular size and $8 for each large poster. To use linear programming to maximize income, Tim developed this feasible region from the set of constraints on his resources, where x = number of regular size posters and y = number of large posters.**



How many of each size poster should Tim make in order to bring in the greatest amount of money?

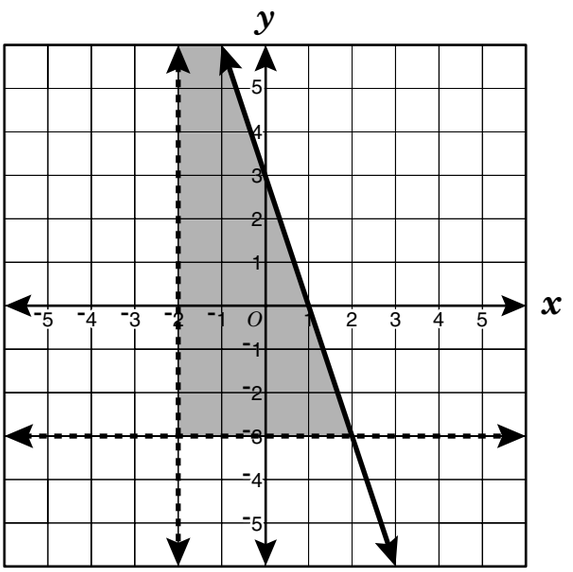
F 6 regular, 14 large

G 8 regular, 12 large

H 12 regular, 8 large

J 18 regular, 2 large

43



Which system of inequalities best represents the graph shown?

A $\begin{cases} -3x + y < 3 \\ y < -3 \\ x > -2 \end{cases}$

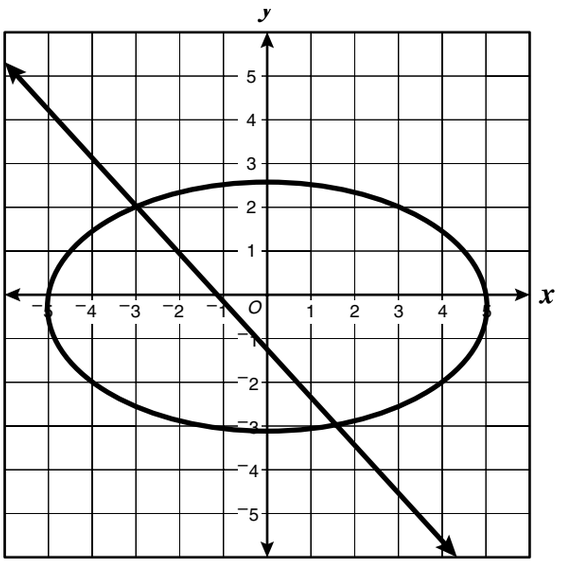
B $\begin{cases} -3x + y \leq 3 \\ y > -3 \\ x > -2 \end{cases}$

C $\begin{cases} 3x + y \leq 3 \\ y > -3 \\ x > -2 \end{cases}$

D $\begin{cases} y \leq 3x - 3 \\ y > -3 \\ x > -2 \end{cases}$

GO ON

44



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

F {(1.5, 2.5), (3, 2)}

G {(−2.5, 1.5), (2, −3)}

H {(−2, −3), (2.5, −1.5)}

J {(−3, 2), (1.5, −3)}

45 $\begin{cases} 2y = x^2 - 6x - 9 \\ 2y = -x^2 + 2x + 1 \end{cases}$

What is the solution set for this system of equations?

A {(5, −7), (−1, −1)}

B {(1, 1), (−5, 23)}

C {(1, −7), (−5, 23)}

D $\left\{\left(2, \frac{1}{2}\right)\right\}$

46 The chart gives the average number of students per computer in public schools in America.

Year	Students per computer
1990-91	20.0
1991-92	18.0
1992-93	16.0
1993-94	14.0
1994-95	10.5
1995-96	10.0
1996-97	7.8
1997-98	6.1

Assuming a linear relationship, which is the best estimate for the number of students per computer during 1989–1990?

F 5.4

G 10.8

H 20.2

J 21.9

GO ON

47 **The chart shows city real estate taxes paid by four families and the assessed value of their homes.**

Family	Hardy	Jacobs	Rosinni	Martinez
Value	$50,000	$80,000	$100,000	$150,000
Taxes	$1,100	$2,000	$2,600	$4,100

The tax on the Miller home was $1,700. What was the assessed value?

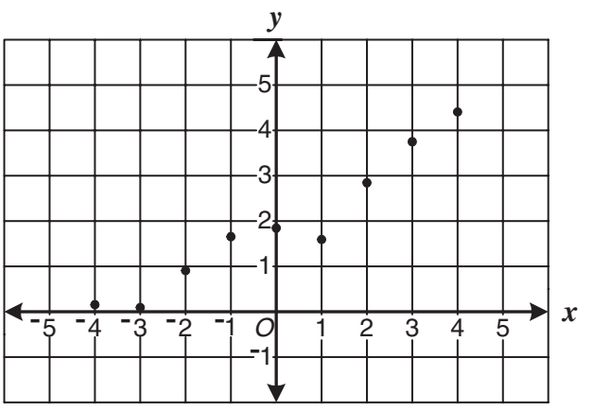
A $60,000

B $65,000

C $68,000

D $70,000

48



Which is most likely the equation for the curve of best fit for the scatterplot above?

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

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

H $y = x + 2$

J $y = x - 3$

GO ON

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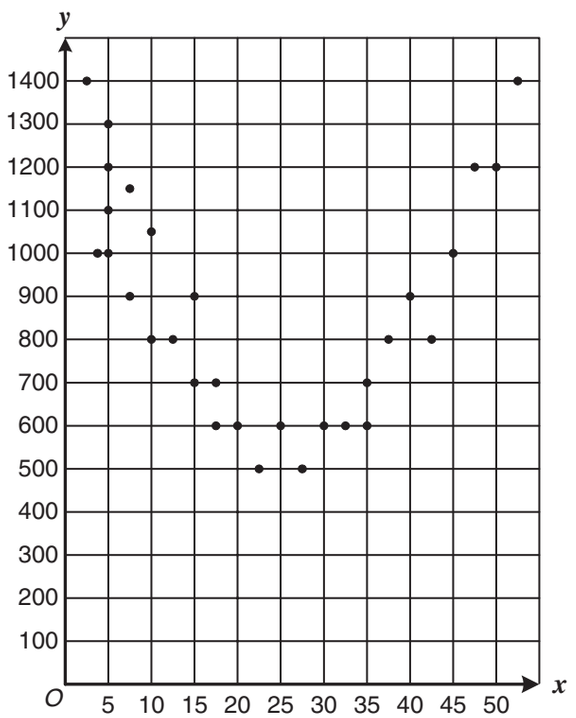

Which type of function would best fit the data in this scatterplot?

A Linear
B Exponential
C Logarithmic
D Quadratic

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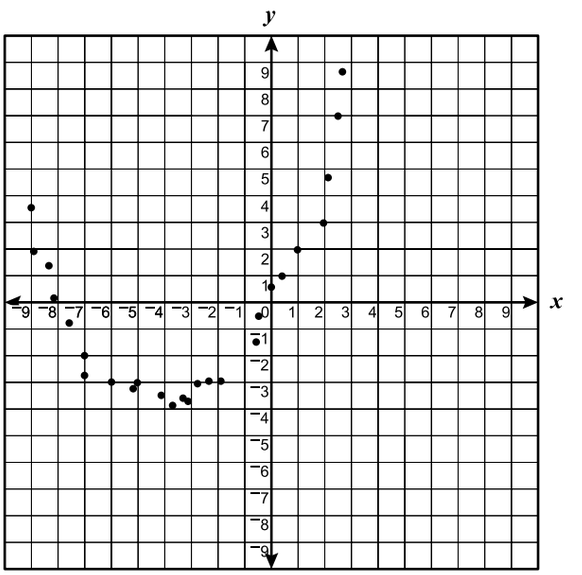

Which equation most closely fits the data in this scatterplot?

F $y = \frac{2}{x} + 2$

G $4y^2 = x^2 + 4$

H $4y = x^2 + 8x$

J $y = 2x - x^2$

STOP