VIRGINIA
STANDARDS OF LEARNING ASSESSMENTS

Spring 2004 Released Test

END OF COURSE
ALGEBRA II
CORE 1

Property of the Virginia Department of Education

DIRECTIONS

Read and solve each question. Then mark the space on the answer sheet for the best answer. 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 $\dfrac{6}{a^2}$

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

C $6a^2$

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

---

1 **Which indicates a correct application of the distributive property?**

A $a(b + c) = (ab) + (ac)$
B $(a + b) + c = a + (b + c)$
C $(a + b) + c = c + (a + b)$
D $a - (b + c) = (a - b) + c$

2 **Which of the following may *not* be true?**

F If $a = b$ and $b = c$, then $a = c$.

G If $a \neq b$ and $b \neq c$, then $a \neq c$.

H If $a = b$, then $b = a$.

J If $a \neq b$, then $b \neq a$.

3 **Which is equivalent to**

$$\frac{(a + b)^3}{18} \cdot \frac{2}{(a + b)^2}?$$

A $\dfrac{a + b}{9}$

B $\dfrac{(a + b)^2}{9}$

C $\dfrac{(a + b)^5}{36}$

D $18a + 9b$

4 **Which is a factored form of**

$$1 - y^3?$$

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

5 **Which is equivalent to $25^{\frac{3}{2}}$?**

A 125
B 75
C 15
D 5

GO ON

6 Which is equivalent to

$$(1 - 2i)^3?$$

F $^-11 + 2i$

G $13 - 10i$

H $13 + 2i$

J $1 + 8i$

7 Which is a factored form of

$$x^2 - 18x + 81?$$

A $(x + 9)^2$

B $(x - 3)(x + 27)$

C $(x - 9)^2$

D $(x + 9)(x - 9)$

8 Which expression is equivalent to

$$8^{\frac{1}{3}} + 16^{\frac{1}{4}}?$$

F $\dfrac{20}{3}$

G 4

H $6^{\frac{1}{2}}$

J $24^{\frac{1}{12}}$

9 Which is equivalent to

$$(6)^{-2}(3^0)(2^3)?$$

A $^-288$

B $^-216$

C $\dfrac{1}{6}$

D $\dfrac{2}{9}$

10 Which is equivalent to

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

F $2 - 3i$

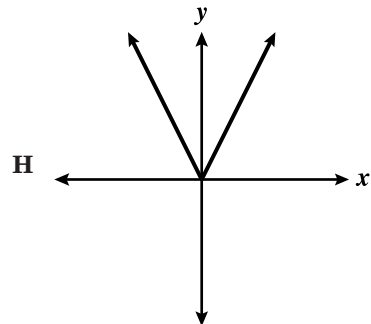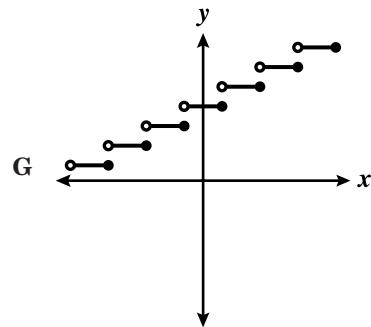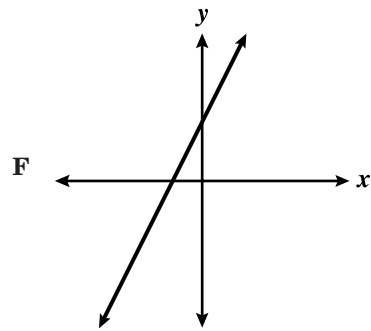**G** $2 - 7i$

H $^-2 + i$

J $^-2 - 3i$

11
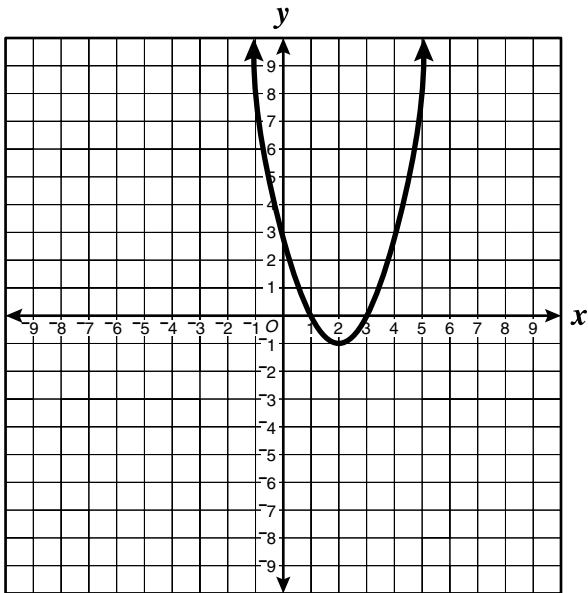
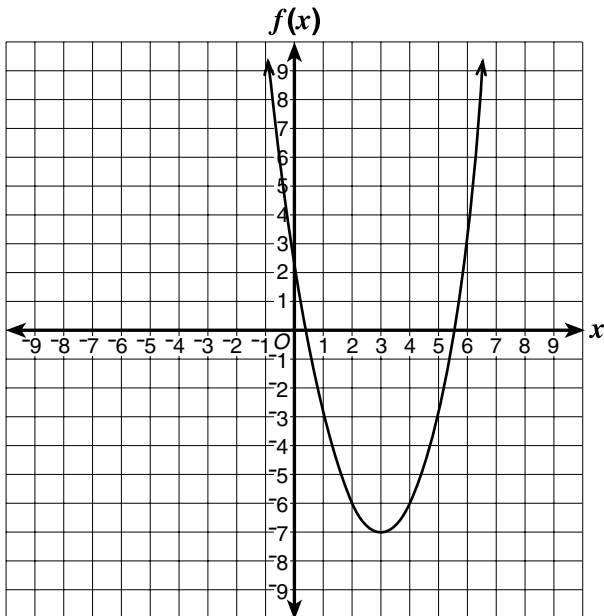**Which of the following is most likely the equation graphed above?**

A $y = (x + 2)^2 + 1$

B $y = 5(x - 1)^2 - 2$

C $y = (x - 2)^2 + 2$

D $y = (x - 2)^2 - 1$

12 **Which of the following sketches could represent the graph of $y = |x - a|$?**

F

G

H

J

GO ON
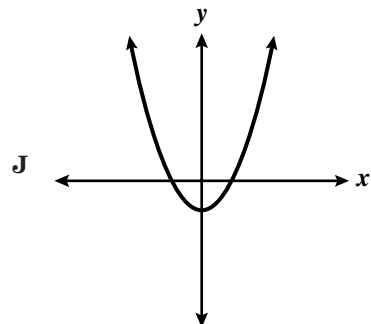
13

Which type of function is shown?

A   Absolute value

B   Exponential

C   Linear
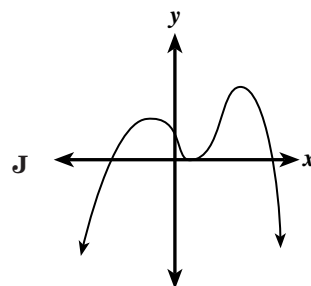
D   Quadratic

14   Which is a zero of the function
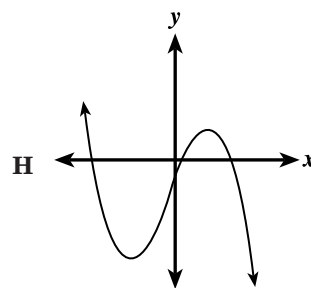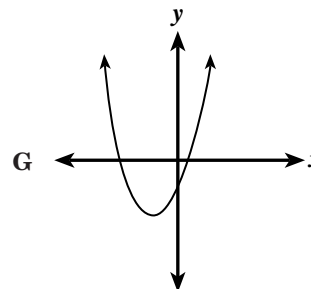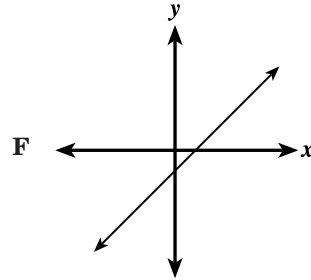
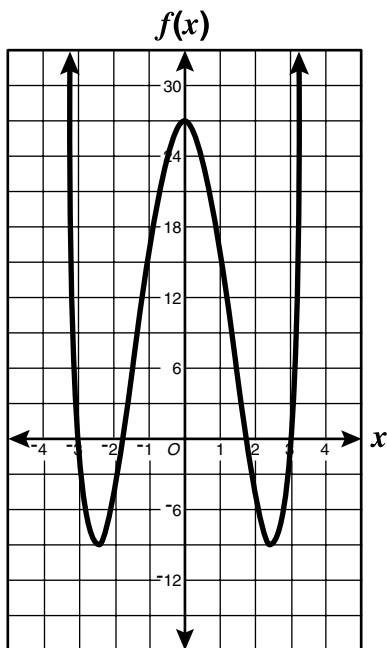$$f(x) = x^2 - 2x - 24?$$

F $^-6$

G $^-3$

H   4

J   6

15   Given: $f(x) = x^3 - 3x$ **and** $g(x) = x^2 - 8.$
What is $f(10) - g(10)$?

A   608

B   783

C   862

D   878

16   Which could be a graph of
$y = ax^3 + bx^2 + cx + d$ **if** $a, b, c,$ **and** d
are real numbers and $a < 0$?

F

G

H

J

GO ON

17

Which function most likely represents the graph shown above?

A $f(x) = x^4 - 12x^2 + 27$
B $f(x) = x^3 + 12x^2 - 27$
C $f(x) = x^4 + 10x^2 - 5$
D $f(x) = x^4 - 10x^2 + 27$

18 If the fifth and eighth terms of an arithmetic sequence are ⁻9 and ⁻21, respectively, what are the first four terms of the sequence?

F 2, ⁻1, ⁻4, ⁻7
G 3, ⁻1, ⁻5, ⁻9
H 5, 2, ⁻1, ⁻4
J 7, 3, ⁻1, ⁻5

19 What is the value of

$$\sum_{n=0}^{3} 2^{n+1}?$$

A 12
B 14
C 28
D 30

20 Wind chill factor (*W*) varies directly with temperature (*T*) and inversely with the wind velocity (*v*). If *k* is the constant of proportionality, which formula represents this relationship?

F $W = kTv$

G $W = \dfrac{kv}{T}$

H $W = \dfrac{kT}{v}$

J $W = \dfrac{kT}{v^2}$

21
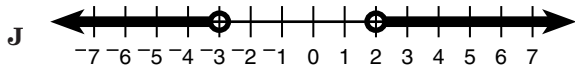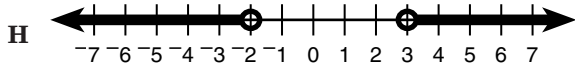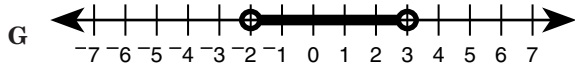
x	⁻2	0.5	3	4
y	⁻3	0.75	⁻8	⁻15

Which is a general rule for the function containing the values shown in the table?

A $y = 3^{-x} + 1$
B $y = x^2 - 7$
C $y = ^-x^2 + 1$
D $y = ^-3x - 3$

GO ON

22 Which best represents the graph of

$$|2x - 1| > 5?$$

F

-7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7

G

-7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7

H

-7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7

J

-7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7
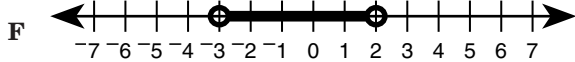
23 What is the solution set for

$$|2x + 5| = 7?$$

A {⁻6, 1}

B {⁻1, 1}

C {⁻6}

D {1}

24

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5
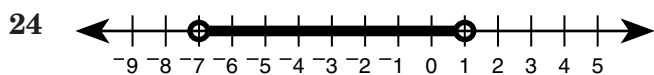
Which of the following inequalities best represents the graph above?

F $|x - 1| < 3$

G $|x - 7| < 4$

H $|x + 3| < 7$

J $|x + 3| < 4$

25 Which graph represents a quadratic equation with *no* real solutions?

A

B

C

D
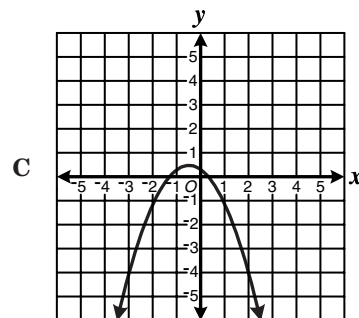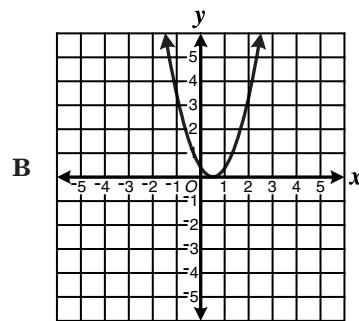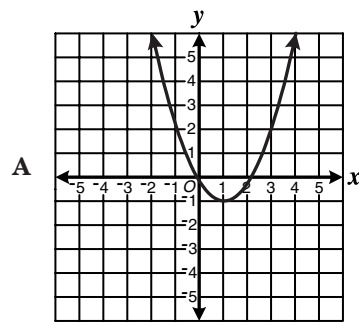
26 What is the solution set for

$$x^2 - 16 = 0?$$

F　{⁻4}

G　{⁻4, 4}

H　{0, 4}

J　{4}

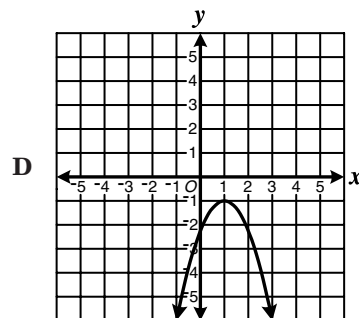**27** What is the solution set for

$$(3x + 1)^2 = 0?$$

A　$\left\{ \dfrac{1}{3}, 1 \right\}$

B　$\left\{ -1, \dfrac{^-1}{3} \right\}$

C　$\left\{ \dfrac{^-1}{3} \right\}$

D　{⁻1}

28 Which is a solution to

$$2x^2 - 7x + 3 = 0?$$

F　$x = 3$

G　$x = 2$

H　$x = \dfrac{^-1}{2}$

J　$x = ^-3$

29 What is the solution to

$$\frac{3x^2 - 2}{x} = \frac{6x - 2}{x}?$$

A　6

B　2

C　$\sqrt{2}$

D　0

30 What is the solution set for

$$\sqrt{x - 2} = 4?$$

F　{2}

G　{14}

H　{16}

J　{18}

31 What is the solution set for

$$\sqrt{3y} + 4 = 5?$$

A　{3}

B　{1}

C　$\left\{ \dfrac{1}{3} \right\}$

D　$\left\{ \dfrac{1}{9} \right\}$

32 Two factors of a polynomial, $P(x)$, are $(x + 6)$ and $(x - 3)$. Which is a zero of $P(x)$?

    F   6

    G   3

    H   1

    J   ⁻3

33 What are the factors of a polynomial function if its graph has x-intercepts at ⁻1, 0, and 4?

    A x, $(x - 1)$, and $(x + 4)$

    B x, $(x + 1)$, and $(x - 4)$

    C $(x + 1)$ and $(x - 4)$

    D $(x - 1)$ and $(x + 4)$

34 Which of the following is a zero of the function

$$f(x) = x^3 - x^2 - 14x + 24?$$

    F   ⁻4

    G   ⁻3

    H   ⁻2

    J   0

35 What are the coordinates of the vertex of

$$y = \frac{2}{3}(x - 4)^2 + 1?$$

    A $(4, 1)$

    B $(\text{⁻}4, 1)$

    C $(\text{⁻}4, \text{⁻}1)$

    D $(4, \text{⁻}1)$

36
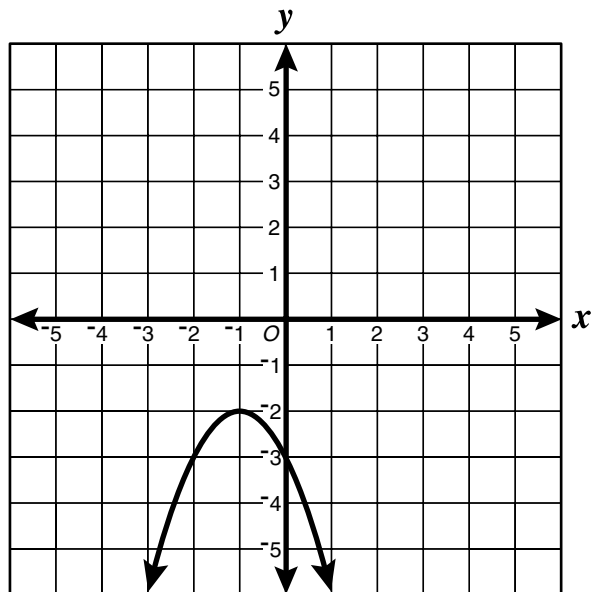
Which equation most likely represents the function shown by the graph?

    F $y = \text{⁻}(x + 1)^2 - 1$

    G $y = \text{⁻}(x + 1)^2 - 2$

    H $y = \text{⁻}(x + 2)^2 - 1$

    J $y = \text{⁻}(x - 1)^2 - 2$

GO ON

37 What is the graph of

$(x - 2)^2 + (y + 3)^2 = 4$?

A   An ellipse

B   A circle

C   A parabola

D   A hyperbola

38 Which matrix product is *not* defined?

F $U_{4\times2} \cdot V_{2\times3}$

G $H_{2\times2} \cdot I_{2\times2}$

H $C_{2\times4} \cdot D_{4\times3}$

J $P_{1\times3} \cdot Q_{1\times3}$

39 The matrix shows the ways points can be scored in a football game, and the number of points given for each.

$$\begin{array}{r} & \text{Points} \\ \text{Touchdown} \\ \text{Field Goal} \\ \text{Safety} \\ \text{Extra Point Conversion} \end{array} \begin{bmatrix} 6 \\ 3 \\ 2 \\ 1 \end{bmatrix}$$

This matrix shows the ways points were scored by each team in a game between Alton and Bakey.

	Touchdowns	Field Goals	Safeties	Extra Points
Alton	3	0	1	2
Bakey	2	2	0	1

Which product could be used to give the final score of the game?

A $\begin{bmatrix} 6 \\ 3 \\ 2 \\ 1 \end{bmatrix} \begin{bmatrix} 3 & 0 & 1 & 2 \\ 2 & 2 & 0 & 1 \end{bmatrix}$

B $\begin{bmatrix} 6 & 3 & 2 & 1 \end{bmatrix} \begin{bmatrix} 3 & 0 & 1 & 2 \\ 2 & 2 & 0 & 1 \end{bmatrix}$

C $\begin{bmatrix} 3 & 0 & 1 & 2 \\ 2 & 2 & 0 & 1 \end{bmatrix} \begin{bmatrix} 6 \\ 3 \\ 2 \\ 1 \end{bmatrix}$

D $\begin{bmatrix} 3 & 0 & 1 & 2 \\ 2 & 2 & 0 & 1 \end{bmatrix} \begin{bmatrix} 6 & 3 & 2 & 1 \end{bmatrix}$

GO ON

40 Mel and Ann were having breakfast at a restaurant. Mel paid $3.28 for 3 eggs and 1 sausage patty. Ann paid $3.56 for 2 eggs and 3 sausage patties. Which of the following equations could be solved to determine the cost of each item?

F $\begin{bmatrix} 3 & 1 \\ 2 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3.28 \\ 3.56 \end{bmatrix}$

G $\begin{bmatrix} 3 & 3 \\ 1 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3.28 \\ 3.56 \end{bmatrix}$

H $\begin{bmatrix} x & y \end{bmatrix} \begin{bmatrix} 3 & 1 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 3.28 & 3.56 \end{bmatrix}$

J $\begin{bmatrix} x & y \end{bmatrix} \begin{bmatrix} 3 & 2 \\ 1 & 3 \end{bmatrix} = \begin{bmatrix} 3.28 & 3.56 \end{bmatrix}$

41 $\begin{cases} 3x - 2y = 5 \\ 8x + 9y = {}^-2 \end{cases}$

Which matrix equation represents the given system of linear equations?
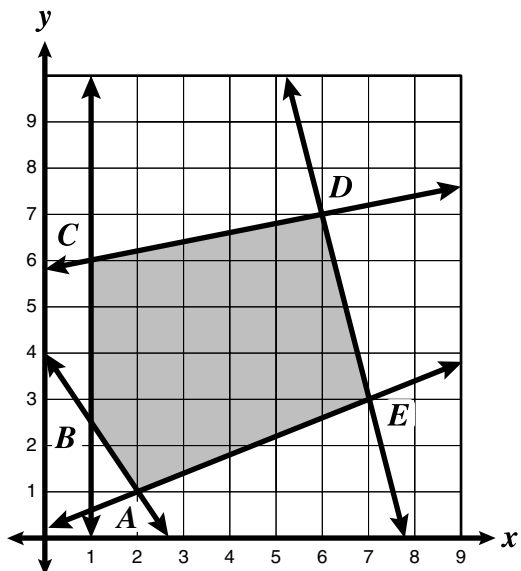
A $\begin{bmatrix} x \\ y \end{bmatrix} \begin{bmatrix} 3 & {}^-2 \\ 8 & 9 \end{bmatrix} = \begin{bmatrix} 5 \\ {}^-2 \end{bmatrix}$

B $\begin{bmatrix} 3 & 8 \\ {}^-2 & 9 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ {}^-2 \end{bmatrix}$

C $\begin{bmatrix} 3 & {}^-2 \\ 8 & 9 \end{bmatrix} \begin{bmatrix} xy \\ xy \end{bmatrix} = \begin{bmatrix} 5 \\ {}^-2 \end{bmatrix}$

D $\begin{bmatrix} 3 & {}^-2 \\ 8 & 9 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ {}^-2 \end{bmatrix}$
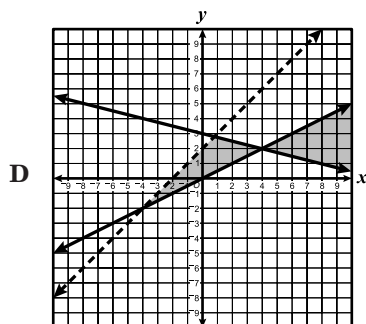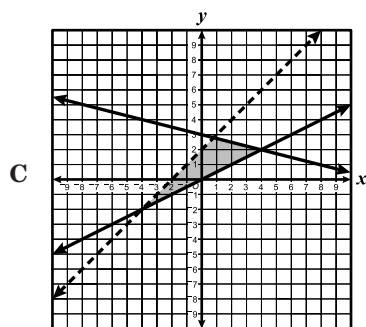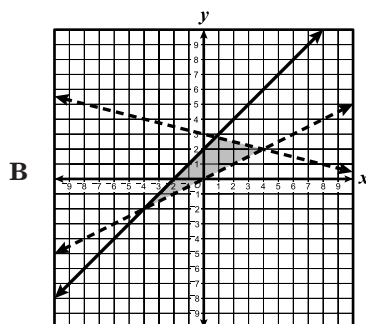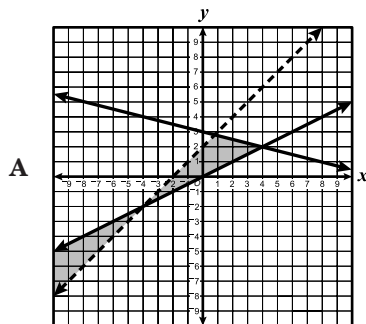
GO ON

42

The graph of the linear programming model consists of polygon *ABCDE* and its interior. Under these constraints, which is the point where the *maximum* value of $2x + 4y$ occurs?

F *A*

G *C*

H *D*

J *E*

43 Which graph shows a solution to the following system?

$$\begin{cases} 2y - x \geq 0 \\ x + 4y \leq 12 \\ y < x + 2 \end{cases}$$

A

B

C

D

GO ON

44
$$\begin{cases} y = x^2 - 2x - 1 \\ y = {}^-x^2 + 4x - 1 \end{cases}$$

**Which set of ordered pairs is the solution to the system of equations shown?**

F {(0, 3), (⁻1, 2)}

G {(0, ⁻1), (3, 2)}

H {(0, ⁻1), (6, 23)}

J {(3, 2), (6, ⁻11)}

45
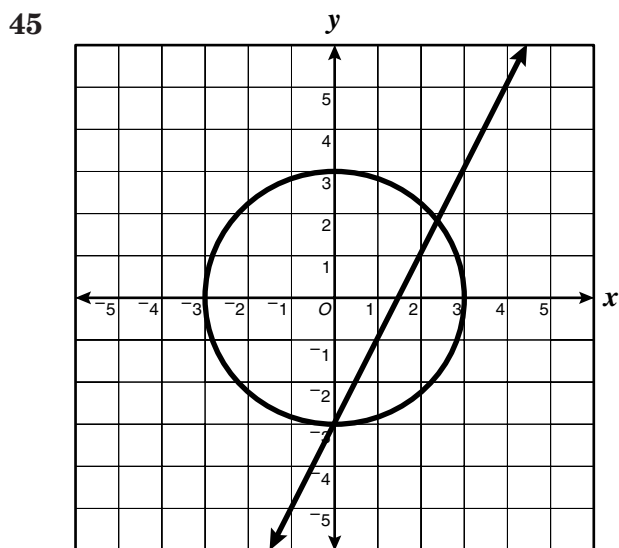
This is a portion of the graph of a system of equations. Which is most likely the solution set for the system?

A {(0, ⁻3), (2.4, 1.8)}

B {(⁻3, 0), (3, 0)}

C {(0, ⁻3), (2.4, ⁻1.8)}

D {(0, ⁻3), (1.8, 2.4)}

46 **Which of the following scatterplots would most likely be a representation of the correlation between the heights of a group of high school seniors and their grade point averages, if y represents the height and x represents the grade point average?**

F

G

H

J

GO ON
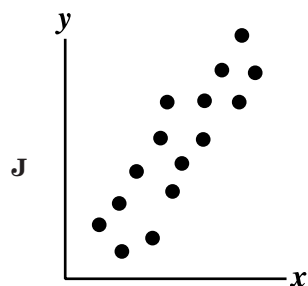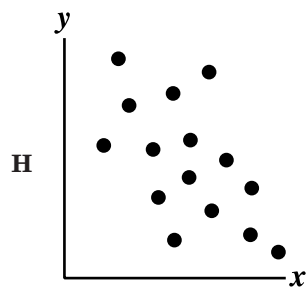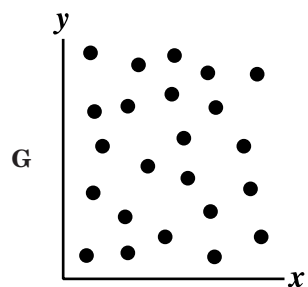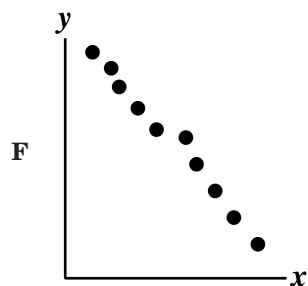
47 For a psychology report, Cathy compared the length in minutes of her little brother's afternoon nap with the hours of sleep he received the previous night.

Hours of Sleep x	Minutes of Naptime y
4.5	160
5.5	160
6.0	170
7.0	130
7.5	120
8.0	90
8.0	180
8.5	80
8.5	120
9.0	100
9.5	60
10.0	90
10.5	0
11.0	30

Which is most likely the line of best fit for the data?

A $y = {}^-23.39x + 296.04$

B $y = {}^-0.03x + 11.26$

C $y = 11.26x - 0.03$

D $y = 296.04x - 23.39$

48 The table shows the number of students enrolled in the advanced algebra program at Fair Oaks High School during its first 6 years.

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

Assuming the trend continues, which is the *best* prediction for the number of students that will be enrolled during the 12th year of the program?

F 212

G 157

H 142

J 126

49 A city began recording its air pollution index in 1980. The scatterplot shows the index related to various numbers of years since 1980.

Years since 1980, *t*
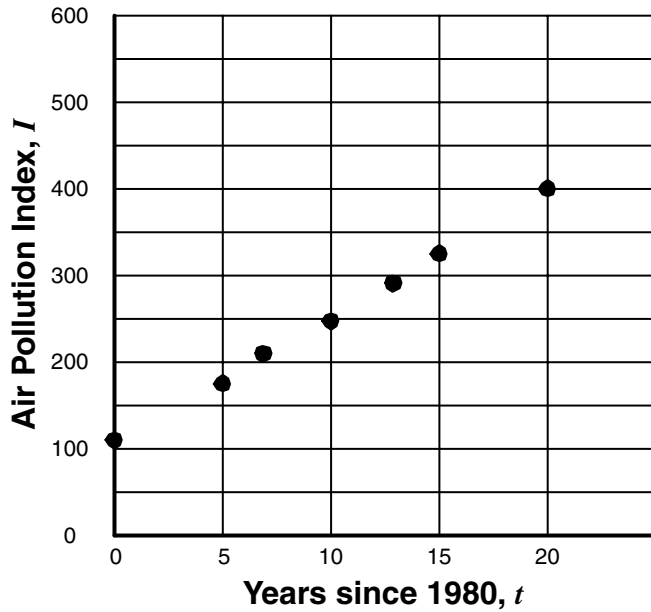
If no steps are taken to control city air pollution, which is the best estimate for the pollution index in 2005?

A 425

B 475

C 525

D 600

50 Larry made a scatterplot showing the apparent height of a football at one-second intervals during the time period the ball was in the air.

Time (seconds)
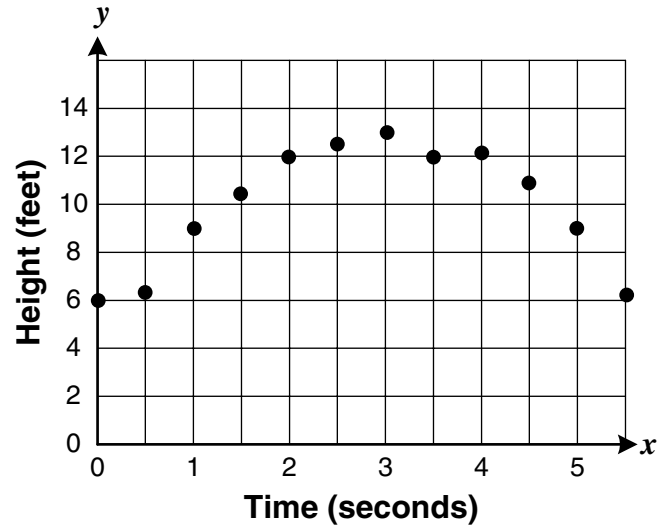
Which is most likely the equation for the curve of best fit for the relationship?

F $y = {}^-0.4x + 9.0$

G $y = 9.0x + 0.4$

H $y = 5.3x^2 - 0.9x + 4.9$

J $y = {}^-0.9x^2 + 5.3x + 4.9$

STOP