

VIRGINIA STANDARDS OF LEARNING

Spring 2009 Released Test

# END OF COURSE ALGEBRA II (2001 Revised)

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Form M0119, CORE 1

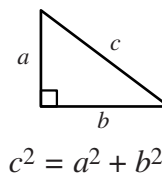
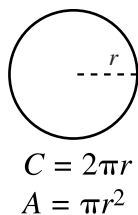
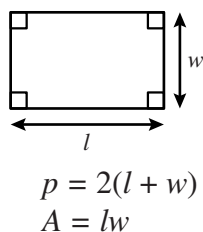
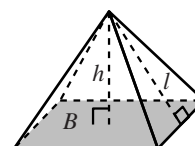
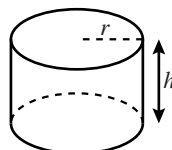
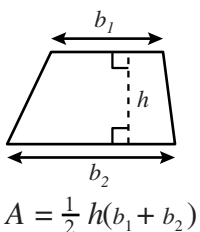
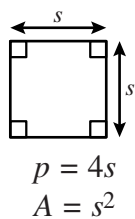
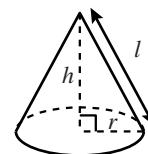
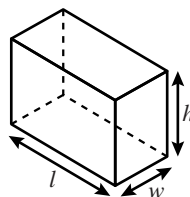
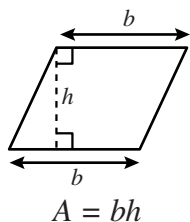
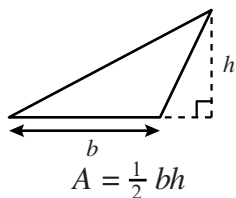
This released test contains 2 fewer test items (#1-48 only)  
than an original SOL EOC Algebra II test.

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# Algebra II Formula Sheet

## Geometric Formulas



## Abbreviations

milligram	mg
gram	g
kilogram	kg
milliliter	mL
liter	L
kiloliter	kL
millimeter	mm
centimeter	cm
meter	m
kilometer	km
square centimeter	cm <sup>2</sup>
cubic centimeter	cm <sup>3</sup>

volume	V
total surface area	S.A.
area of base	B

ounce	oz
pound	lb
quart	qt
gallon	gal.
inch	in.
foot	ft
yard	yd
mile	mi.
square inch	sq in.
square foot	sq ft
cubic inch	cu in.
cubic foot	cu ft

year	yr
month	mon
hour	hr
minute	min
second	sec

## Pi

$$\pi \approx 3.14$$

$$\pi \approx \frac{22}{7}$$

## Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

**Directions**

Read each question and choose 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**  $\frac{6}{a^2}$

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

**C**  $6a^2$

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

1 Which number is equivalent to  $(32)^{\frac{3}{5}}$  ?

- A 2
- B 6
- C 8
- D 16

2 For non-zero denominators, which expression is equivalent to  $\frac{5x - 15}{(x - 3)(x + 3)}$  ?

F  $\frac{-10}{x - 9}$

G  $\frac{5}{x - 3}$

H  $\frac{10}{9}$

J  $\frac{5}{x + 3}$

**3** If  $x \neq 0$ , which is equivalent to the following expression?

$$\frac{y+z}{x} - \frac{z}{x}$$

**A**  $\frac{y+2z}{x}$

**B**  $\frac{y}{x}$

**C**  $\frac{y}{x-z}$

**D**  $\frac{y-x}{x-z}$

**4** When completely factored,  $2x^2 + 2x - 24$  is equivalent to —

**F**  $2(x-3)(x+4)$

**G**  $2(x+3)(x-4)$

**H**  $2(x+6)(x-2)$

**J**  $(2x-3)(x+8)$

5 Which of the following is equivalent to  $\sqrt{-72} + \sqrt{-50}$  ?

- A  $11i$
- B  $-11i$
- C  $11i\sqrt{2}$
- D  $i\sqrt{122}$

6 Assuming no denominator is equal to zero, which is equivalent to the following expression?

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

- F  $\frac{x-2}{x-4}$
- G  $\frac{x(x-2)}{x-4}$
- H  $\frac{x}{2}$
- J  $\frac{(x-2)}{-4}$

**7** Which expression is equivalent to  $\sqrt[6]{x^3y^4}$  ?

**A**  $x^{\frac{1}{2}}y^{\frac{2}{3}}$

**B**  $x^{\frac{1}{2}}y^{\frac{3}{2}}$

**C**  $x^2y^4$

**D**  $x^2y^{\frac{2}{3}}$

**8** Which expression is equivalent to  $64x^2 - 81y^2$  ?

**F**  $(8x + 9y)^2$

**G**  $(8x - 9y)^2$

**H**  $(8x + 9y)(8x - 9y)$

**J**  $(8x + 9)(8x - 9)$

**9** For which of the following sets is multiplication *not* commutative?

**A** Complex numbers

**B** Matrices

**C** Real numbers

**D** Whole numbers

**10** The graph of  $y = 3x - 2$  is translated up 5 units. What is the equation of the new graph?

**F**  $y = 8x - 2$

**G**  $y = 3x + 3$

**H**  $y = 3x - 7$

**J**  $y = 3x + 5$

**11** Which equation *best* represents the data in this table?

$x$	$y$
0	1
1	3
2	9
3	19

**A**  $y = 2x + 1$

**B**  $y = x^2 + 1$

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

**D**  $y = x + 1$



**12** Which is a zero of  $f(x) = 6x^2 + 5x - 6$  ?

**F**  $-\frac{3}{2}$

**G**  $-\frac{2}{3}$

**H**  $\frac{3}{2}$

**J** 6

**13**  $y = x^2 - 8x + 15$

**What are the  $x$ -intercepts of the graph that represents the equation?**

**A** (0, 3) and (0, 5)

**B** (3, 0) and (5, 0)

**C** (-8, 0) and (15, 0)

**D** (0, -8) and (0, 15)

14 Given:  $a_n = a_1 r^{n-1}$

Which is the 6th term of the geometric sequence for which  $a_1 = 4$  and  $r = \frac{-1}{2}$ ?

F  $\frac{-1}{8}$

G  $\frac{1}{16}$

H  $\frac{1}{2}$

J 1

15 If  $y$  varies jointly with  $x$  and  $z$ , what is the constant of proportionality when  $y = 30$ ,  $x = 4$ , and  $z = 5$ ?

A  $\frac{2}{3}$

B  $\frac{3}{2}$

C 21

D 24

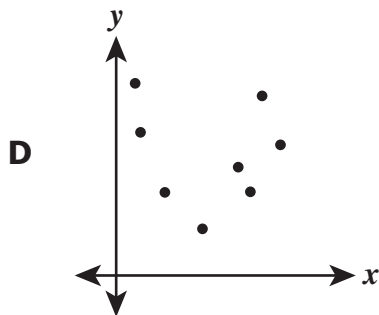
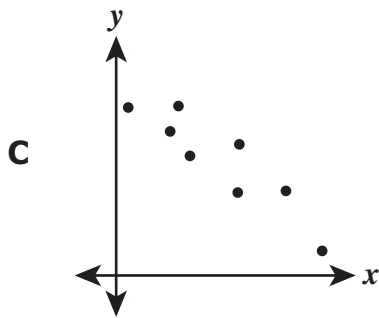
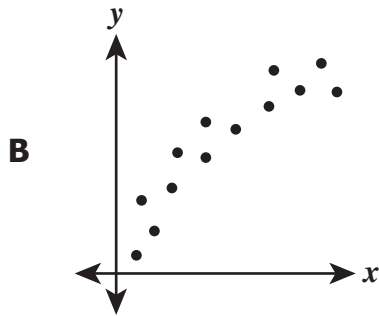
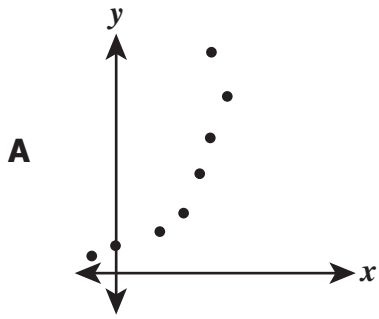
- 16 Bill rode his bike to a store 5 kilometers from his house. The table shows the distance from the store paired with the number of minutes after leaving his house.

Minutes ( $x$ )	Kilometers from Store ( $y$ )
0	5
3	4
5	3.2
8	2.9

Which equation best models a line of best fit for the data?

- F**  $y = -0.2x + 4.5$   
**G**  $y = -0.2x + 6.1$   
**H**  $y = -0.3x + 4.9$   
**J**  $y = -0.3x + 6.4$

17 For which set of data would the equation for the curve of best fit most likely be linear?



**18** The height of an object when projected upward can be described by the equation  $h = 270t - 4.9t^2$ , where  $h$  is height and  $t$  is time. The relationship between the height of the object and the elapsed time is —

- F** an exponential function
- G** a linear function
- H** a quadratic function
- J** a step function

**19** These are the first three terms of an arithmetic sequence.

$$\frac{1}{2}, \frac{3}{4}, 1$$

What are the fourth and fifth terms of the sequence?

- A**  $\frac{5}{4}, \frac{7}{4}$
- B**  $\frac{5}{4}, \frac{3}{2}$
- C**  $\frac{3}{2}, \frac{5}{2}$
- D**  $\frac{3}{2}, 2$

**20** If  $f(x) = x^5$  and  $g(x) = -2 - 3x^2$ , which is  $f(g(x))$  ?

**F**  $\frac{x^5}{-2x - 3x^{10}}$

**G**  $(-2 - 3x^2)^5$

**H**  $(-2 - 3x^{10})^5$

**J**  $-2x^5 - 3x^7$

**21** What is the number of turning points in the graph of the function of  $x$  defined below?

$$y = 2x^2 + 5x - 7$$

**A** 4

**B** 3

**C** 2

**D** 1

22 What is the value of  $\sum_{k=1}^4 \left(\frac{1}{4}\right)^k$  ?

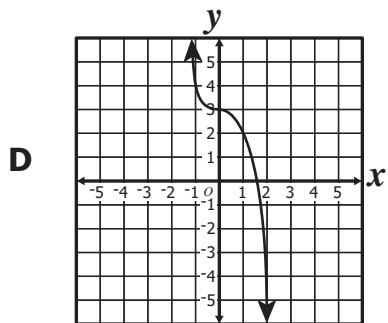
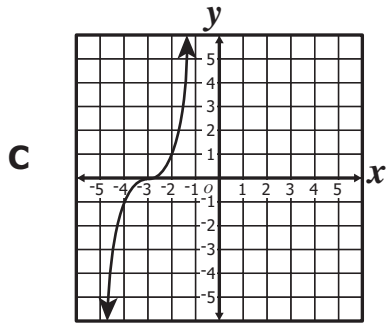
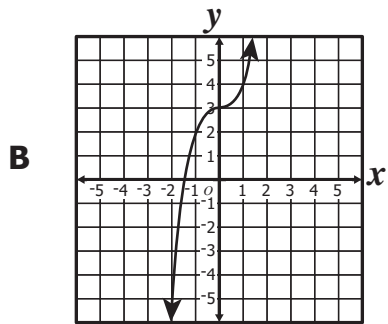
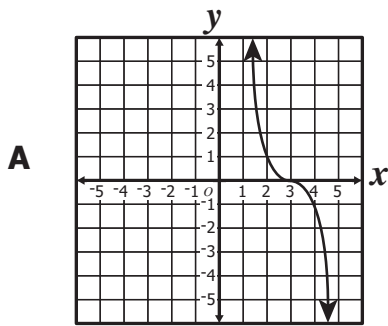
F  $\frac{85}{4}$

G  $\frac{85}{64}$

H  $\frac{85}{256}$

J  $\frac{21}{64}$

23 Which graph *most* accurately represents the function  $f(x) = -x^3 + 3$  ?





**24** Which equation represents the statement

“ $z$  varies directly with  $x$  and inversely with  $y$ ” ?

**F**  $z = kxy$

**G**  $z = \frac{kx}{y}$

**H**  $z = \frac{ky}{x}$

**J**  $z = \frac{k}{xy}$

**25** Which is the solution set for  $2x^2 - 7x + 6 = 0$  ?

**A**  $\{1.5, 2\}$

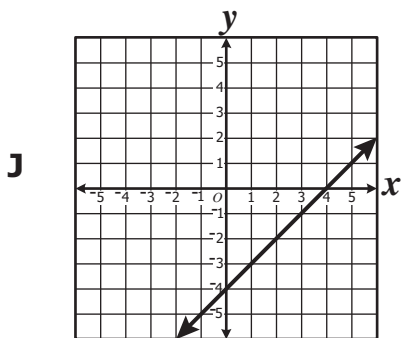
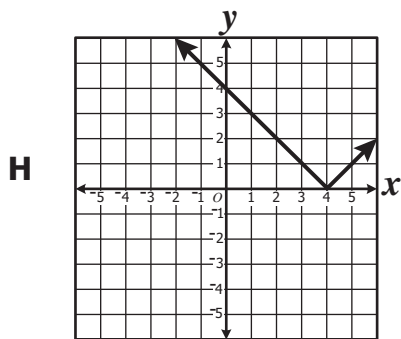
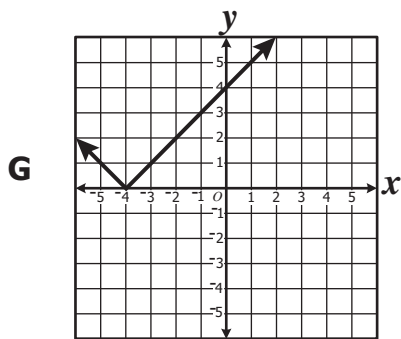
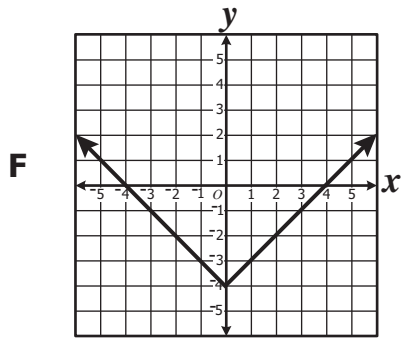
**B**  $\{-1.5, 2\}$

**C**  $\{1.5, -2\}$

**D**  $\{-1.5, -2\}$

26 Which graph best represents the following equation?

$$y = |x - 4|$$



**27** What is the solution set for the following equation?

$$3\sqrt{x-3} = 15$$

**A**  $\left\{ \frac{34}{3} \right\}$

**B**  $\left\{ \frac{41}{3} \right\}$

**C**  $\{ 24 \}$

**D**  $\{ 28 \}$

**28** The width of a rectangular window is 2 feet more than its height. If the area is 35 square feet, what is the height?

**F** 9 ft

**G** 7 ft

**H** 5 ft

**J** 3 ft

29 Which value of  $x$  is a solution to the equation below?

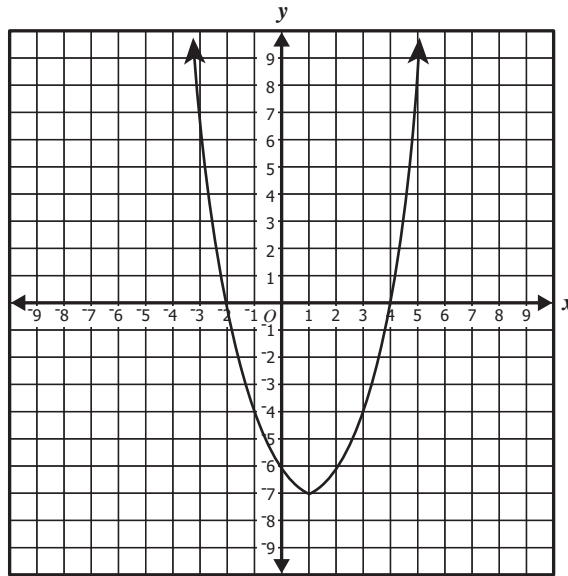
$$\frac{\sqrt{2x} + 2}{4} = 3$$

- A 12.5
- B 25
- C 50
- D 70

30 Which is the solution set of  $\left| \frac{1}{2}x - 5 \right| = 3$ ?

- F {16}
- G {-16, 16}
- H {-1, 11}
- J {4, 16}

31 Which are the apparent zeros of the function shown in the graph?



- A  $-6, -2, 4$
- B  $-2, 4$
- C  $1, -7$
- D  $2, -4$

32 When  $x \neq 0$ , what is the solution set for  $\frac{x-4}{4} = \frac{x-3}{x}$ ?

- F  $\{4\}$
- G  $\{6\}$
- H  $\{2, 6\}$
- J  $\{3, 4\}$

**33** What is the solution set to  $2x^2 + 5x - 3 = 0$  ?

**A**  $\left\{ \frac{-3}{2}, -1 \right\}$

**B**  $\left\{ \frac{-1}{2}, 3 \right\}$

**C**  $\left\{ -3, \frac{1}{2} \right\}$

**D**  $\left\{ \frac{3}{2}, 1 \right\}$

**34** What are all the roots for the equation  $|2u - 9| = 5$  ?

**F** -2 and -7

**G** -2 and 7

**H** 2 and -7

**J** 2 and 7

**35** What are the coordinates of the vertex of the graph of  $y + 5 = (x - 2)^2$  ?

**A** (2, -5)

**B** (2, 5)

**C** (-2, 5)

**D** (-2, -5)

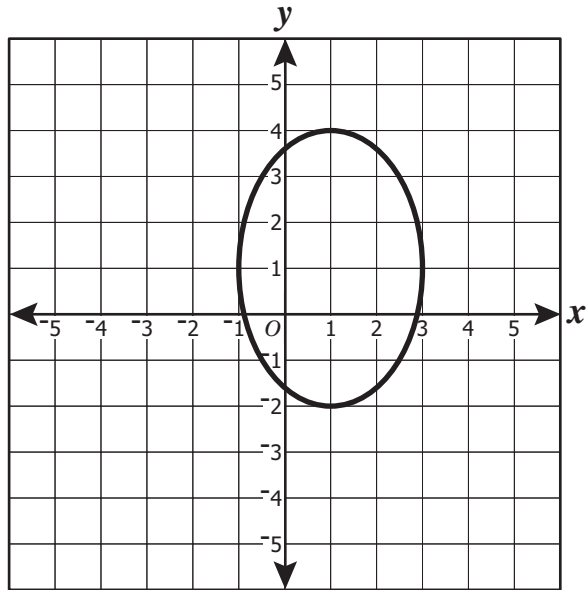
**36** A polynomial function has a zero at  $x = 6$ . Which expression *must* be a factor of the polynomial?

**F**  $x - 36$

**G**  $x - 6$

**H**  $x + 6$

**J**  $x + 36$

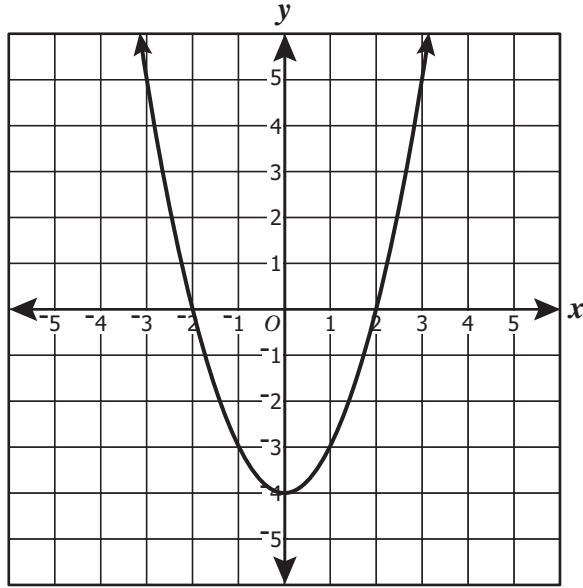


The conic section graphed above is —

- A a parabola
- B a hyperbola
- C a circle
- D an ellipse



38 A polynomial function,  $P(x)$ , is graphed as follows.



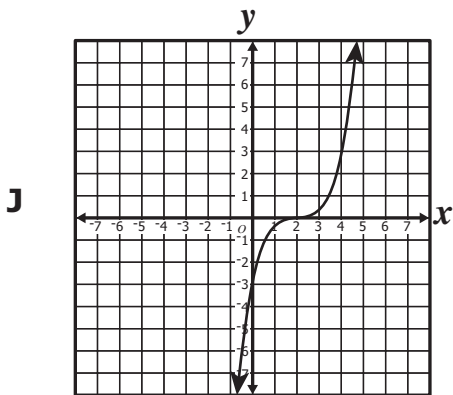
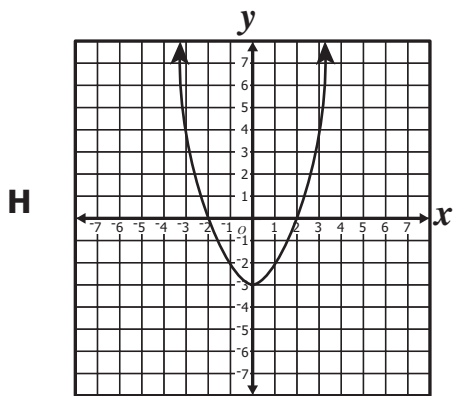
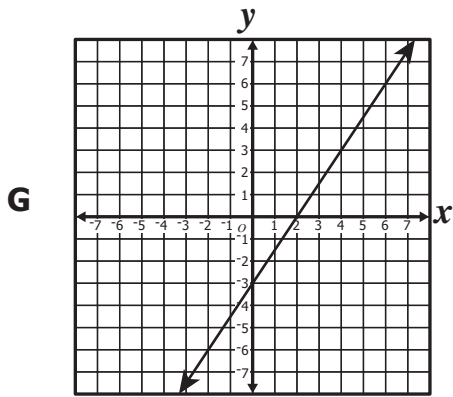
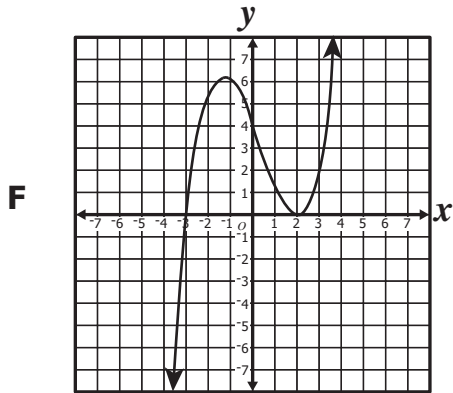
What is the apparent solution set for  $P(x) = 0$  ?

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

39 What are the  $x$ -intercepts for the graph of  $y = x^2 + 5x - 6$  ?

- A  $(0, 1)$  and  $(0, -6)$
- B  $(1, 0)$  and  $(-6, 0)$
- C  $(0, -1)$  and  $(0, 6)$
- D  $(-1, 0)$  and  $(6, 0)$

40 The graph of which function *appears* to have 2 and  $-3$  as zeros?



**41** The dimensions of matrix  $A$  are  $2 \times 3$ . The dimensions of matrix  $B$  are  $3 \times 17$ . What are the dimensions of matrix  $AB$  ?

- A**  $2 \times 17$
- B**  $3 \times 17$
- C**  $17 \times 2$
- D**  $17 \times 3$

**42** What is the solution set for the following system of equations?

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

- F**  $\{(0, 3), (1, 2)\}$
- G**  $\{(-2, -5), (-1, 4)\}$
- H**  $\{(-2, 5), (1, 2)\}$
- J**  $\{(-1, 4), (2, 1)\}$

43 Which of the following represents this system?

$$\begin{array}{l} 2x - 3y = 7 \\ 5x + 4y = -1 \end{array}$$

**A**  $\begin{bmatrix} 2 & 5 \\ -3 & 4 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 7 \\ -1 \end{bmatrix}$

**B**  $\begin{bmatrix} 4 & 3 \\ -5 & 2 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 7 \\ -1 \end{bmatrix}$

**C**  $\begin{bmatrix} 2 \\ 5 \end{bmatrix} - \begin{bmatrix} 3 \\ 4 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$

**D**  $\begin{bmatrix} 2 & -3 \\ 5 & 4 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 7 \\ -1 \end{bmatrix}$

44 The matrix shows the number of flowers in four types of flower arrangements.

	Roses	Daisies	Lilies
Type 1	3	0	0
Type 2	3	4	0
Type 3	0	4	3
Type 4	1	3	2

If roses cost \$3, daisies cost \$1, and lilies cost \$2, which product would represent the cost of each type of flower arrangement?

**F**  $\begin{bmatrix} 3 & 0 & 0 \\ 3 & 4 & 0 \\ 0 & 4 & 3 \\ 1 & 3 & 2 \end{bmatrix} \begin{bmatrix} 3 & 1 & 2 \end{bmatrix}$

**G**  $\begin{bmatrix} 3 & 0 & 0 \\ 3 & 4 & 0 \\ 0 & 4 & 3 \\ 1 & 3 & 2 \end{bmatrix} \begin{bmatrix} 3 \\ 1 \\ 2 \end{bmatrix}$

**H**  $\begin{bmatrix} 3 & 0 & 0 \\ 3 & 4 & 0 \\ 0 & 4 & 3 \\ 1 & 3 & 2 \end{bmatrix} \begin{bmatrix} 1 & 2 & 3 \end{bmatrix}$

**J**  $\begin{bmatrix} 3 & 0 & 0 \\ 3 & 4 & 0 \\ 0 & 4 & 3 \\ 1 & 3 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$

- 45 Which set of ordered pairs represents the vertices of the region that is the solution to the following system of inequalities?

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

- A  $\{(-2, 1), (0, 1), (-2, 0)\}$   
B  $\{(2, -1), (0, -1), (2, 0)\}$   
C  $\{(2, -1), (2, 0), (1, 0)\}$   
D  $\{(1, -2), (1, 0), (0, -2)\}$

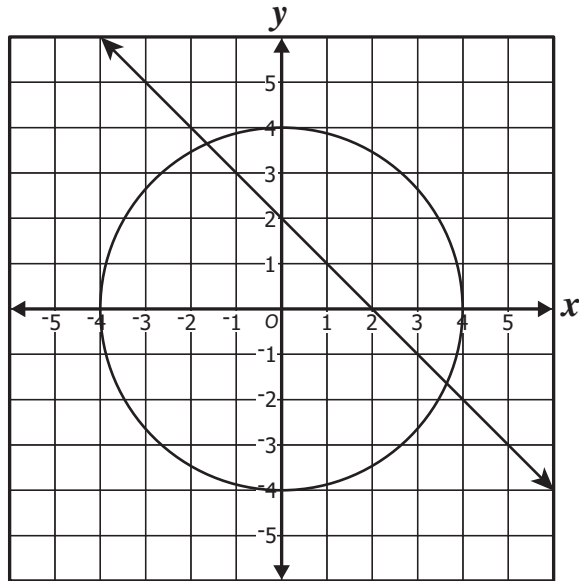
46 If  $\begin{bmatrix} 4 & -2 \\ 1 & 3 \end{bmatrix} \cdot N = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ , what is  $N$  ?

**F**  $\begin{bmatrix} \frac{3}{14} & \frac{1}{7} \\ -\frac{1}{14} & \frac{2}{7} \end{bmatrix}$

**G**  $\begin{bmatrix} \frac{2}{7} & -\frac{1}{7} \\ -\frac{1}{14} & \frac{3}{14} \end{bmatrix}$

**H**  $\begin{bmatrix} \frac{3}{10} & \frac{1}{5} \\ -\frac{1}{10} & \frac{2}{5} \end{bmatrix}$

**J**  $\begin{bmatrix} \frac{2}{5} & -\frac{1}{5} \\ \frac{1}{10} & \frac{3}{10} \end{bmatrix}$



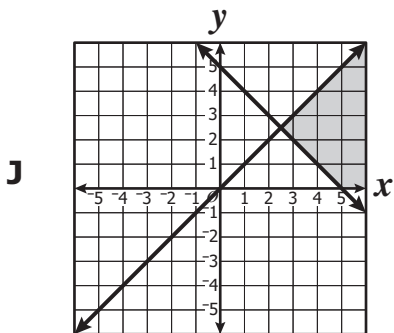
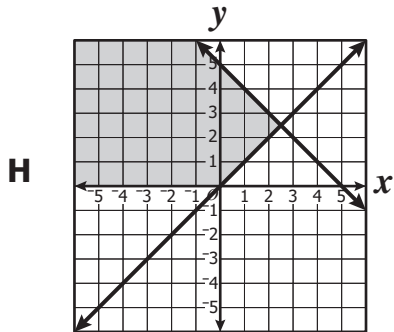
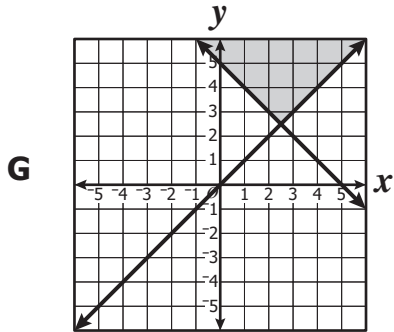
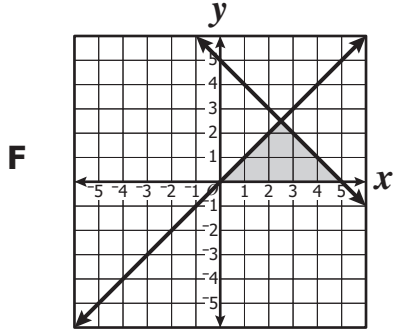
Which is the apparent solution set for the system of equations shown on the graph?

- A  $\{(0, 2), (2, 0)\}$
- B  $\{(-4, 0), (0, -4), (0, 4), (4, 0)\}$
- C  $\{(-1.6, 3.6), (3.6, -1.6)\}$
- D  $\{(-4, 0), (-1.6, 3.6), (0, -4), (3.6, -1.6), (4, 0)\}$



48 Which graph shows the feasibility region of the following system of inequalities?

$$\begin{cases} y \geq 0 \\ y \leq x \\ x + y \leq 5 \end{cases}$$



**Answer Key-EOC041-M0119**

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

**Algebra II (2001 Revised),  
Core 1**

If you get this many items correct:	Then your converted scale score is:
0	000
1	168
2	205
3	227
4	244
5	257
6	268
7	277
8	286
9	293
10	301
11	307
12	313
13	319
14	325
15	330
16	336
17	341
18	346
19	350
20	355
21	360
22	364
23	369
24	373
25	378
26	383
27	387
28	392
29	396
<b>30</b>	<b>401</b>
31	405
32	410
33	415
34	420
35	425
36	431
37	436
38	442
39	448
40	455
41	462
42	470
43	478
44	488
45	498
<b>46</b>	<b>511</b>
47	527
48	550
49	586
50	600

