VIRGINIA STANDARDS OF LEARNING

Spring 2006 Released Test

END OF COURSE ALGEBRA I

CORE 1

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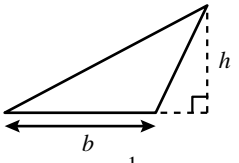
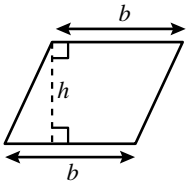
Algebra I Formula Sheet

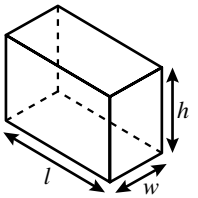
Geometric Formulas



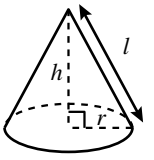
$A = \frac{1}{2}bh$



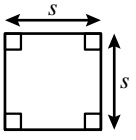
$A = bh$



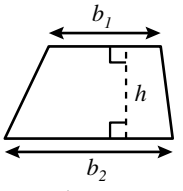
$V = lwh$
$S.A. = 2(lw + lh + wh)$



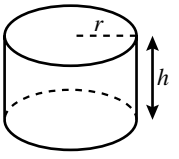
$V = \frac{1}{3}\pi r^2 h$
$S.A. = \pi r(l + r)$



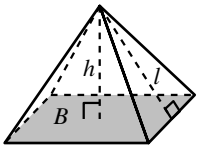
$p = 4s$
$A = s^2$



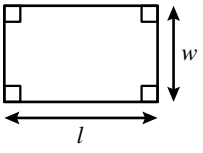
$A = \frac{1}{2}h(b_1 + b_2)$



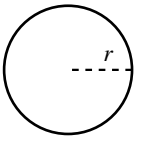
$V = \pi r^2 h$
$S.A. = 2\pi r(h + r)$



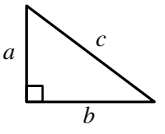
$V = \frac{1}{3}Bh$
$S.A. = \frac{1}{2}lp + B$



$p = 2(l + w)$
$A = lw$



$C = 2\pi r$
$A = \pi r^2$



$c^2 = a^2 + b^2$

Abbreviations

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

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

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

year	yr
month	mon
hour	hr
minute	min
second	sec

Pi

$\pi \approx 3.14$

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

Quadratic Formula

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

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DIRECTIONS

Read and solve each question. Then mark the space on your answer document for the best answer. For this test you may assume that the value of a denominator is not zero.

SAMPLE

If $f(x) = x^2 + 2x + 3$, what is the value of $f(x)$ when $x = 6$?

A 27
B 42
C 51
D 60

1 A repairman estimated the cost of replacing a part in Mrs. James' computer would be at most $225. The estimate included $35 for the part, a $40 service charge, and $30 per hour for labor. What is the maximum number of hours the repairman estimated for the job?

A $4\frac{1}{2}$

B 5

C $5\frac{1}{2}$

D 6

2 What is the solution to the following equation?

$$4x - 1 = 2x + 5$$

F $x = 1$
G $x = 2$
H $x = 3$
J $x = 4$

3 If $\frac{1}{4}x + 1 > \frac{15}{2}$, then —

A $x > 26$

B $x > 29$

C $x > \frac{13}{2}$

D $x > 28$

4 The statement

"If $\frac{1}{2}x = 5$, then $x = 10$"

is justified by the —

F associative property of multiplication
G commutative property of multiplication
H addition property of equality
J multiplication property of equality

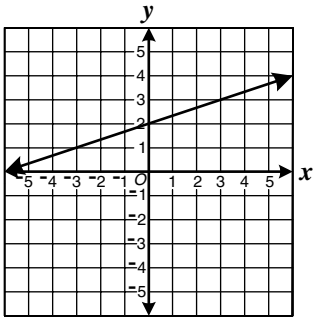
5 What are the x- and y-intercepts of the line with equation $4x + 5y = 40$?

A x-intercept 10, y-intercept 8
B x-intercept 8, y-intercept 10
C x-intercept $^{-}10$, y-intercept $^{-}8$
D x-intercept $^{-}8$, y-intercept $^{-}10$

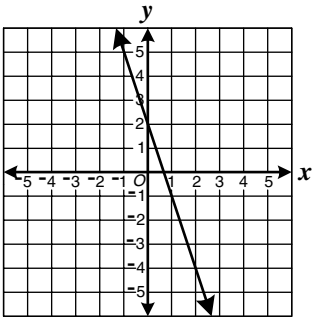
6 Which graph best represents the line

$$y = \frac{1}{3}x - 2?$$

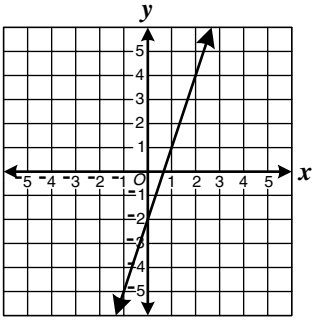
F



G



H



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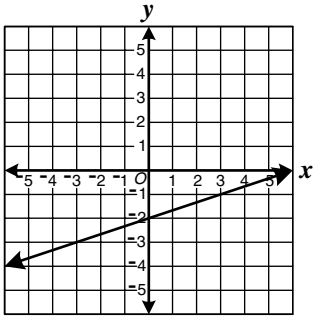


GO ON

7 Which is an equation for the line that passes through the origin and has a slope of $\frac{3}{5}$?

A $y = \frac{3}{5}$

B $x = \frac{3}{5}$

C $y = x$

D $y = \frac{3}{5}x$

8 What is the slope of the line

$$y = 4x - 2?$$

F 4

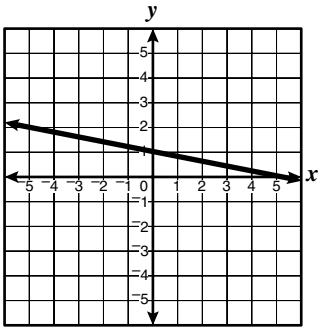
G 2

H $\frac{1}{4}$

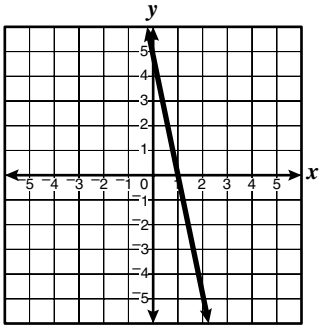
J -2

9 Which line has a *y*-intercept of -5 and an *x*-intercept of 1?

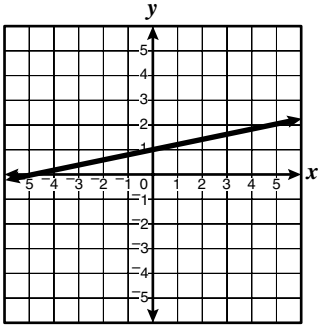
A



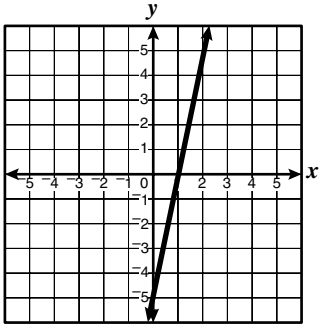
B



C

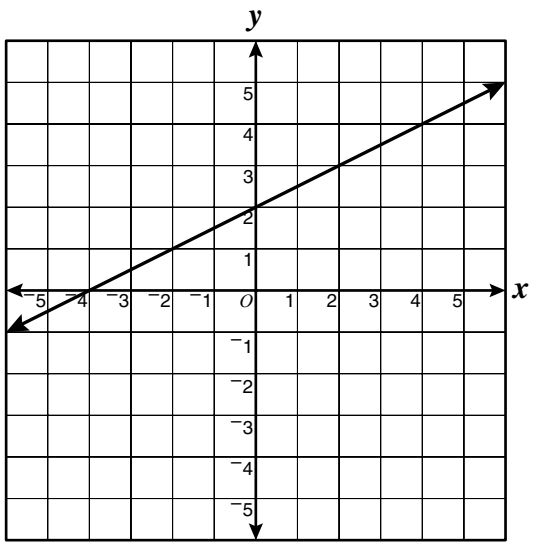


D



GO ON

10



Which equation best represents the line shown?

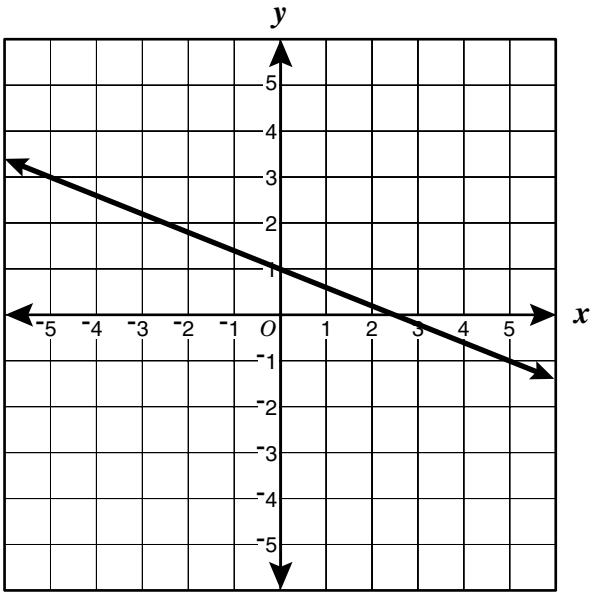
F $y = 2x + 2$

G $y = 2x + 1$

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

J $y = x + 2$

11



What is the apparent slope of the line graphed above?

A $\frac{5}{2}$

B $\frac{2}{5}$

C $-\frac{2}{5}$

D $-\frac{5}{2}$

12 The difference in cost between a large bag of chips and a small bag of chips was 90¢. Alicia bought 5 large bags and 3 small bags of chips for her party and spent $17.22. What was the cost of a small bag of chips?

F $5.74

G $2.49

H $2.15

J $1.59

GO ON

13 **Which is an equation for the line that passes through the points (3, 0) and (0, 2)?**

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

B $y = -\frac{2}{3}x + 2$

C $y = \frac{2}{3}x + 3$

D $y = \frac{3}{2}x + 3$

14 **The length of a rectangle is 6 meters more than its width. If the area is 135 square meters, what is its width?**

F 5 m
G 9 m
H 15 m
J 27 m

15 $\begin{cases} -4x + 5y = 27 \\ x - 6y = -2 \end{cases}$

What is the solution to the system of equations shown above?

A $(-8, -1)$

B $\left(0, \frac{1}{3}\right)$

C $\left(-1, \frac{1}{6}\right)$

D $(5, -6)$

16 **Which is a solution to the following equation?**

$$x^2 - 12x - 28 = 0$$

F $x = 14$
G $x = 12$
H $x = 2$
J $x = 0$

17 **What is the slope of the line through (3, 2) and $(-1, -4)$?**

A 3

B $\frac{3}{2}$

C $\frac{2}{3}$

D $-\frac{3}{2}$

18 $x^2 - 3x = 0$

Which is the solution set for the equation above?

F $\{0, 3\}$
G $\{-3, 0\}$
H $\{1, 3\}$
J $\{2, 3\}$

GO ON

19 **What is the value of**

$$\frac{4m + 8}{4m + 4}$$

when $m = 4$?

A 0.5

B 1.2

C 1.7

D 2.0

20 **Joe, who is the youngest member of the wrestling team at Northwood High School, is 5 years less than one-half the age of the coach. If the coach is n years old, which expression describes Joe's age?**

F $\frac{1}{2}n - 5$

G $5 - \frac{1}{2}n$

H $2n + 5$

J $2n - 5$

GO ON

21 **Which expression is equivalent to**

$$-4a(3a - 5b)?$$

A $-12a^2 + 20ab$

B $-12a^2 - 20ab$

C $-12a^2 + 20a$

D $-12a^2 + 9ab$

22 **Which is equivalent to $(2a + 3b - 2c) + (3a - 4b - c) + (a - 5b + 4c)$?**

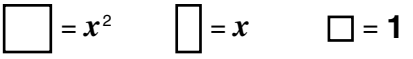
F $5a - 6b + c$

G $6a - 6b - c$

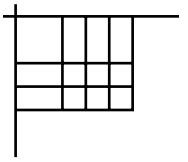
H $6a - 6b + c$

J $6a^2 - 6b^2 + c^2$

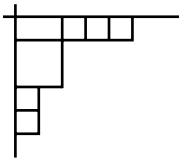
23 **Given the models below, which figure represents $(x + 2)(x + 3)$?**



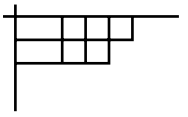
A



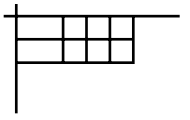
B



C



D



24 **What is $\sqrt{108}$ written in simplest radical form?**

F $2\sqrt{27}$

G $3\sqrt{12}$

H $6\sqrt{3}$

J $18\sqrt{3}$

GO ON

25 Which is equivalent to the expression shown below?

$$3^2 \cdot 3^{-3}$$

A -3

B -1

C $\frac{1}{769}$

D $\frac{1}{3}$

26 When simplified, $(2x^2y^3)^4$ equals —

F $8x^6y^7$

G $8x^8y^{12}$

H $16x^6y^7$

J $16x^8y^{12}$

27 What are factors of $2x^2 + 9x + 9$?

A $(x + 9)(x + 1)$

B $(x - 3)(2x - 3)$

C $(2x + 3)(x + 3)$

D $(2x + 9)(x + 1)$

28 $x^2 - 81y^2 = ?$

F $(x + 3y)(x - 27y)$

G $(x - 9y)(x - 9y)$

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

J $(x - 3y)(x + 27y)$

29 What is the greatest common monomial factor of

$$3x^3 + 6xy + 9x^2 + 12x^2y^2?$$

A x^3y^2

B $3x^2y^2$

C $3x$

D 3

GO ON

30 **Which is closest to the value of q if**

$$q = \sqrt{177} - \sqrt{256}\ ?$$

F 29.3
G 24.5
H -1.3
J -2.7

31 **The numbers in the table follow a linear pattern.**

x	y
2	14
4	26
6	38
8	50
28	170
30	?

What is the missing y value?

A 182
B 180
C 176
D 172

32 **The table below shows the relation between the number of members in a club selling cookies and the predicted number of boxes sold.**

Club Cookie Sales

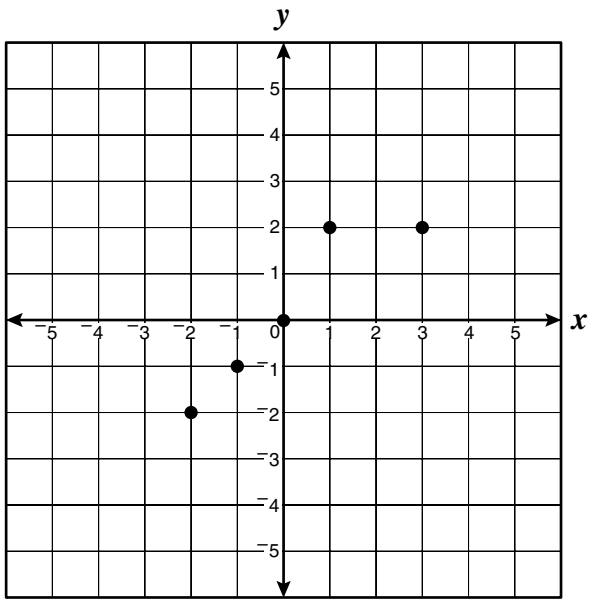
Number of Members, g	Number of Boxes Sold, b
5	350
10	650
15	950
20	1,250

Using the data shown above, which equation could be used to predict the number of boxes of cookies that the club will sell?

F $b = 60g$
G $b = 70g$
H $b = 60g + 50$
J $b = 50g + 50$

GO ON

33



What is the range of the relation plotted on the graph?

A $\{-2, -1, 0, 1, 2\}$

B $\{-2, -1, 0, 2\}$

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

D $\{-2, -1, 0, 1, 2, 3\}$

34 **The ordered pairs in the sets shown below are of the form (x, y). In which set of ordered pairs is y a function of x?**

F $\{(-6, 12), (1, 8), (1, 13)\}$

G $\{(0, 2), (0, 4), (4, 0)\}$

H $\{(7, -1), (7, -2), (7, -3)\}$

J $\{(1, 3), (2, 4), (3, 5)\}$

35 **If y varies directly as x, what is the equation for the direct variation shown in the table below?**

x	-2	-1	0	1	2
y	-14	-7	0	7	14

A $y = \frac{1}{7}x$

B $y = 7x$

C $y = \frac{7}{x}$

D $7y = x$

36 **Which of these equations is a direct variation?**

F $y = -8$

G $y = -8x$

H $y = -8x + 1$

J $y = -8x - 1$

GO ON

37 **What is the range of the function $f(x) = \frac{1}{2}x - 2$ when the domain is $\{2, 4, 6\}$?**

A $\{8, 12, 16\}$

B $\{0, 1, 2\}$

C $\{^{-}1, 0, 1\}$

D $\left\{^{-}1, 0, \frac{1}{2}\right\}$

38 **Which is a zero of $f(x) = x^2 - 15x + 54$?**

F 3
G 5
H 9
J 15

39 **If $f(x) = 7(x - 2) + 4(x + 1)$, what is $f(2)$?**

A 9
B 10
C 11
D 12

40 **The cost of fabric varies directly with the amount of fabric purchased. If $1\frac{2}{3}$ yards of fabric cost \$10.00, how much would $4\frac{1}{2}$ yards cost?**

F \$45
G \$27
H \$24
J \$14

41 **If m varies directly as p, and $m = 5$ when $p = 7$, what is the constant of variation?**

A 35

B 12

C $\frac{7}{5}$

D $\frac{5}{7}$

42 **The miles per gallon, m, of an experimental car is given by**

$$m = 75 - 0.3\left(\frac{s}{10}\right)^2$$

where s is the car's speed in miles per hour. What is the car's miles per gallon when its speed is 100 miles per hour?

F 10 mpg

G 30 mpg

H 45 mpg

J 50 mpg

43 **This matrix shows the number of points scored during the regular season by the five starting players on a basketball team organized by the kind of shot used to score the points.**

	3pt	2pt	1pt
Walters	9	30	12
Ruiz	6	42	14
Hays	9	34	8
Park	3	12	11
Kemp	12	26	16

This matrix shows the number of points scored during the playoff tournament.

	3pt	2pt	1pt
Walters	3	16	5
Ruiz	0	24	7
Hays	6	12	5
Park	0	6	2
Kemp	6	14	4

Which matrix shows the points scored by each player during the entire season including the playoffs?

A $\begin{bmatrix} 12 & 46 & 14 \\ 6 & 66 & 21 \\ 15 & 47 & 13 \\ 3 & 18 & 12 \\ 17 & 41 & 20 \end{bmatrix}$

C $\begin{bmatrix} 12 & 46 & 17 \\ 6 & 68 & 21 \\ 15 & 46 & 13 \\ 4 & 18 & 12 \\ 18 & 41 & 23 \end{bmatrix}$

B $\begin{bmatrix} 12 & 46 & 17 \\ 6 & 66 & 21 \\ 15 & 46 & 13 \\ 3 & 18 & 13 \\ 18 & 40 & 20 \end{bmatrix}$

D $\begin{bmatrix} 12 & 46 & 17 \\ 6 & 66 & 21 \\ 15 & 47 & 13 \\ 4 & 18 & 13 \\ 17 & 40 & 20 \end{bmatrix}$

44 $-0.5 \begin{bmatrix} -3 & -4 \\ 2 & 6 \end{bmatrix} =$

F $\begin{bmatrix} 3 & 4 \\ -4 & -12 \end{bmatrix}$

G $\begin{bmatrix} -3 & -4 \\ 4 & 12 \end{bmatrix}$

H $\begin{bmatrix} 1.5 & 2 \\ 1 & 3 \end{bmatrix}$

J $\begin{bmatrix} 1.5 & 2 \\ -1 & -3 \end{bmatrix}$

45 The stem-and-leaf plots show the number of miles per gallon a family's car and truck averaged over the past few months.

Car

Stem	Leaf
1	7, 7, 9
2	3, 4, 7, 7, 7
3	0, 1, 1, 2, 3, 4, 4

Truck

Stem	Leaf
1	1, 2, 3, 5, 6, 8, 8, 8
2	0, 0, 1, 1, 2, 2, 3, 4, 6
3	

What is the difference in the median number of miles per gallon for the two vehicles?

A 7
B 9
C 10
D 11

46 Tommy and Jeremy are pitchers for the baseball team and are being evaluated by the coach. The speeds in miles per hour of each of their practice pitches are shown below.

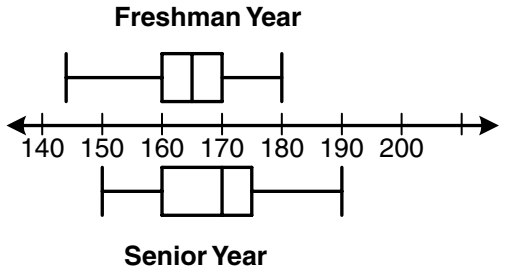
Practice Pitch Speeds

Tommy	Jeremy
60	63
69	70
85	79
68	67
80	65
73	72
65	68

Which of the following statements is true regarding their performances?

F Tommy has a lower mean speed.
G Tommy has a greater range of speeds.
H Tommy has a lower median speed.
J Jeremy's median speed is higher than Tommy's mean speed.

47 **The box-and-whisker plot shows the heights in centimeters of high school seniors compared to their heights as freshmen.**



Using the median as the measure, which is closest to the difference in heights between the freshman and senior years?

A 0 cm
B 5 cm
C 10 cm
D 15 cm

48 **The table shows the life expectancy of a person related to the year of birth.**

Year of Birth, x	Life Expectancy in Years, y
1900	47.3
1910	50.0
1920	54.1
1930	59.7
1940	62.9
1950	68.2
1960	69.7

Which equation would give the best estimate of life expectancy, given the year of one's birth?

F $y = 0.45x + 919$
G $y = 0.45x - 819$
H $y = 0.40x + 893$
J $y = 0.40x - 716$

GO ON

49 **The table below shows the number of boxes of cookies sold by members of two softball teams, the Hawks and the Tigers.**

Hawks	Tigers
14	14
17	53
32	23
37	43
67	37
28	23
37	52
24	14
27	11
18	6

What is the difference in the mean number of cookies sold by the two teams?

A 2.5

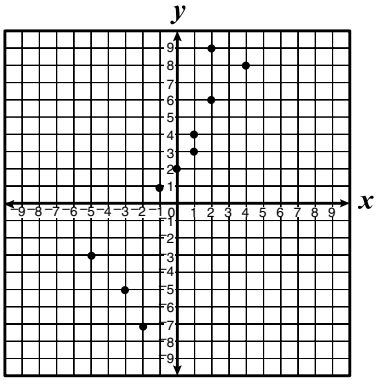
B 4.5

C 6

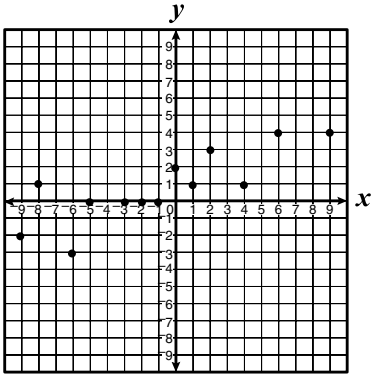
D 14

50 **Which scatterplot most likely has a line of best fit represented by $y = 3x + 1$?**

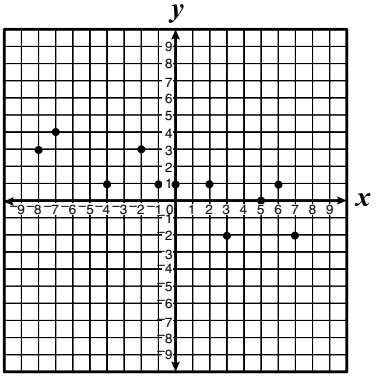
F



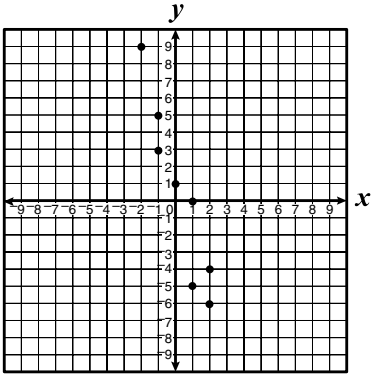
G



H



J



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