

VIRGINIA STANDARDS OF LEARNING

Spring 2008 Released Test

# END OF COURSE ALGEBRA I

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Form M0118, CORE 1

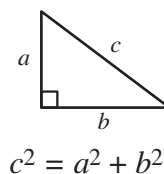
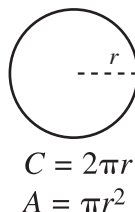
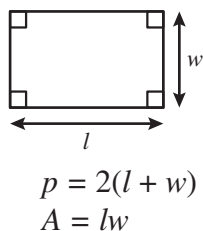
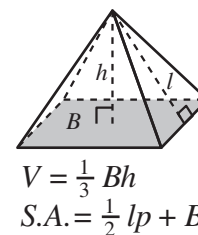
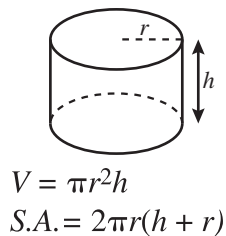
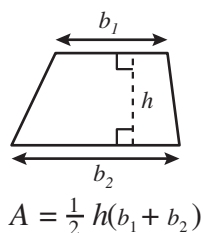
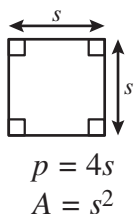
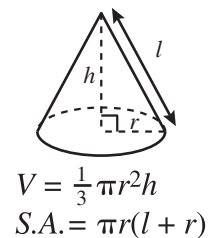
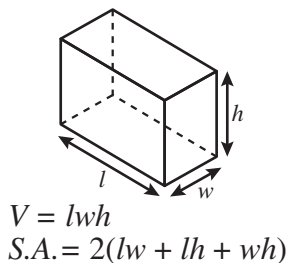
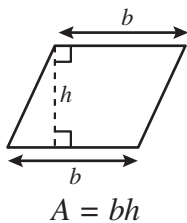
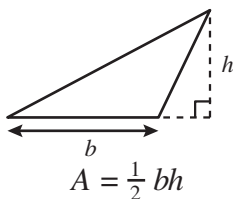
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# Algebra I Formula Sheet

## 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**

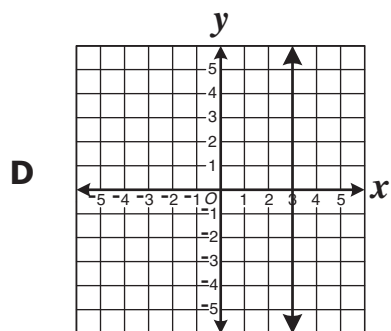
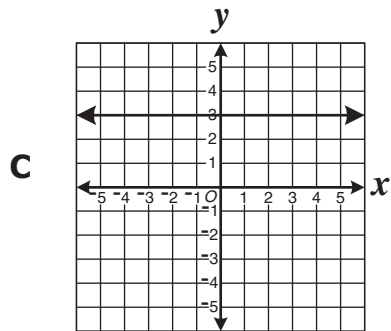
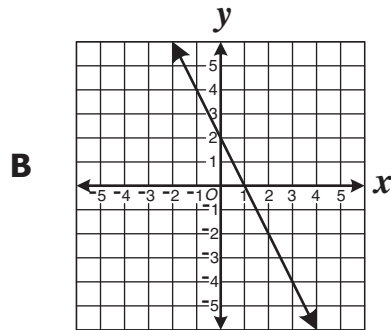
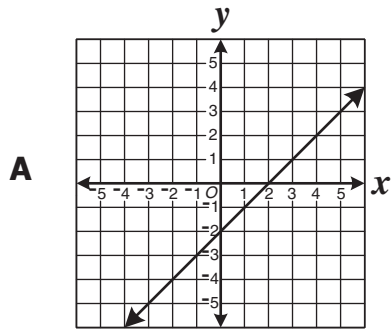
Read each question and choose the best answer. Then fill in the circle on your answer document for the answer you have chosen. For this test you may assume that the value of the denominator is not zero.

**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 Which is most likely the graph of a line with a positive slope?



2 Given the following equation, which could be the value of  $x$  ?

$$(x - 1)(x + 3) = 5$$

- F 1
- G -2
- H -3
- J -4

3 Line  $l$  has slope 2 and goes through  $(1, 3)$ . Which is one form of the equation for line  $l$  ?

- A  $y = x + 2$
- B  $y = 2x + 1$
- C  $y = 3x + 2$
- D  $y = 2x + 5$

4 What is the solution set for the following quadratic equation?

$$x^2 - 4x + 4 = 0$$

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

5 
$$\begin{cases} 4x - 3y = 10 \\ x + 4y = -7 \end{cases}$$

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

A  $(1, -2)$

B  $(-11, 1)$

C  $\left(-2, \frac{-5}{4}\right)$

D  $(-15, 2)$

6 What is the slope of the line  $y = \frac{-1}{3}x - \frac{2}{3}$ ?

F 3

G  $\frac{-1}{3}$

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

J -3



**7** What are the  $x$ -intercepts of the graph of the following equation?

$$y = x^2 + 6x - 7$$

- A** -7 and -1
- B** 1 and 7
- C** -1 and 7
- D** -7 and 1

**8** What is the solution to the following inequality?

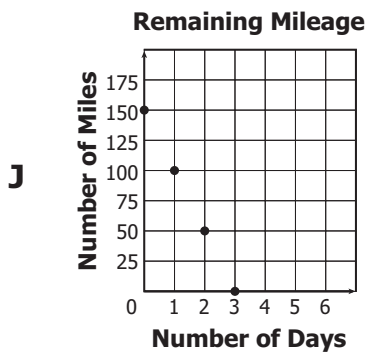
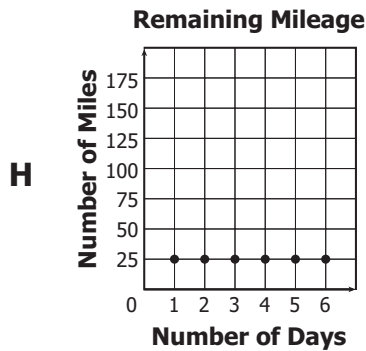
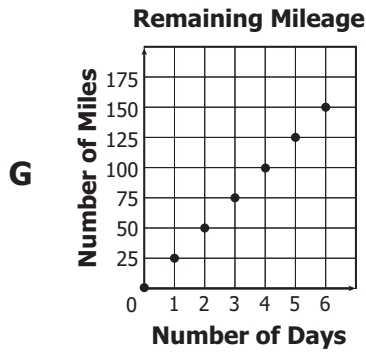
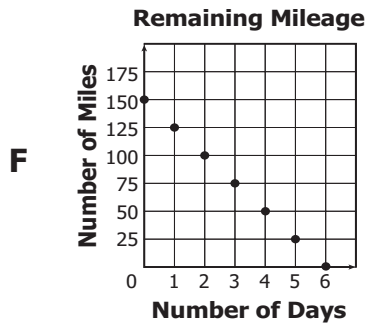
$$6(x + 1) \geq 7$$

- F**  $x \geq \frac{13}{6}$
- G**  $x \geq \frac{1}{6}$
- H**  $x \geq 1$
- J**  $x \geq 6$

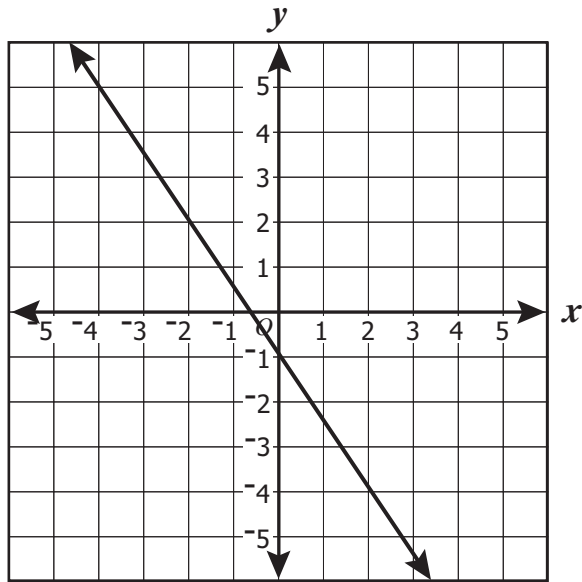
**9** Andrea has 37 coins, all nickels and dimes. The value of the 37 coins is \$3.10. How many dimes does Andrea have?

- A** 12
- B** 19
- C** 25
- D** 31

- 10 To train for a bicycle road race, Enrique needs to ride 150 miles per week at an average rate of 25 miles per day. The equation  $M = 150 - 25d$  gives the number of miles,  $M$ , left to ride after  $d$  days. Which graph shows the number of miles Enrique has left to ride after  $d$  days?



11



Which is closest to the slope of the line graphed above?

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

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

C  $\frac{2}{3}$

D  $\frac{3}{2}$

12 What is the slope of the line that passes through  $(-3, -5)$  and  $(4, -2)$ ?

F 1

G  $\frac{3}{7}$

H  $-\frac{3}{7}$

J -1

13 What is the solution to the following system of equations?

$$\begin{cases} x + 2y = 5 \\ 3x + 2y = 7 \end{cases}$$

A  $x = 3, y = 4$

B  $x = 1, y = 3$

C  $x = 1, y = 2$

D  $x = 3, y = 1$

14 What is the solution to the following equation?

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

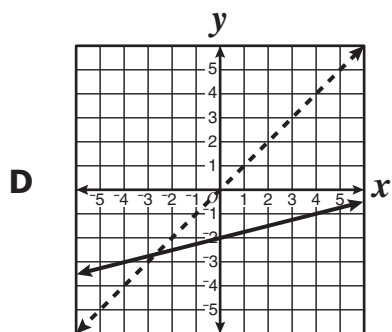
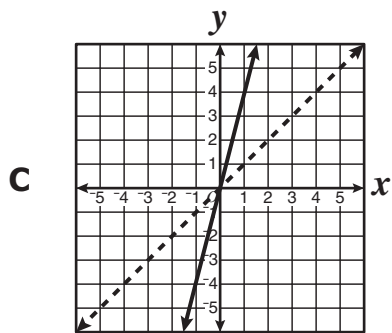
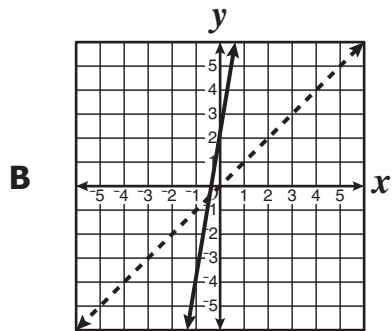
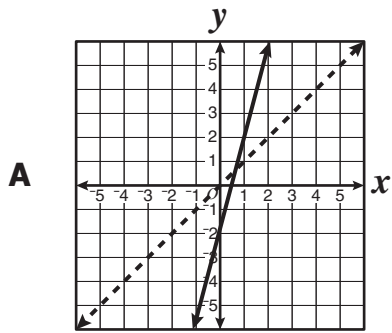
F  $x = 2$

G  $x = 3$

H  $x = 4$

J  $x = 5$

- 15 The dashed line on each grid represents  $y = x$ . On which grid is  $y = 4x - 2$  apparently represented as well?



**16** Jerri wrote these steps when solving an equation.

$$17(x + 3) = 6 - 4$$

**Step 1:**  $17x + 51 = 6 - 4$

**Step 2:**  $17x + 51 = 2$

**Step 3:**  $17x = -49$

**Step 4:**  $x = \frac{-49}{17}$

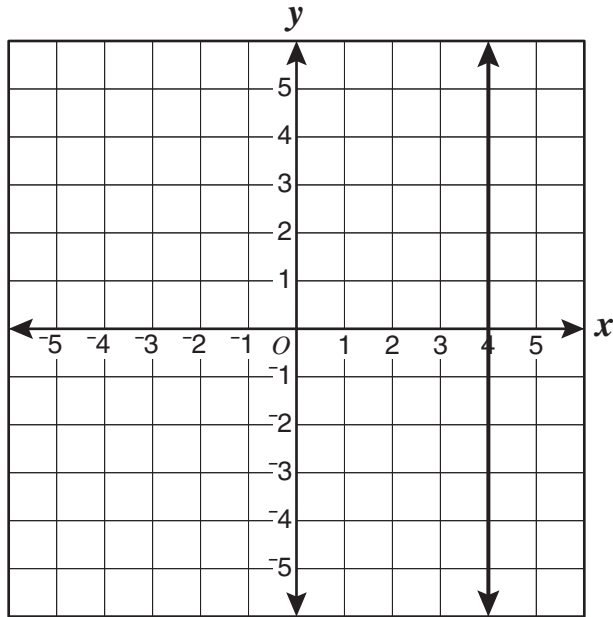
**Which property justifies Step 1 ?**

- F** Associative property for addition
- G** Commutative property for addition
- H** Distributive property
- J** Additive identity property

**17** What value of  $m$  satisfies the equation shown below?

$$5(m - 5) = 3(m + 1)$$

- A** 14
- B** 9
- C** 3.5
- D** -7.5



Which equation best represents the line shown on the grid?

- F**  $y = x - 4$
- G**  $y = 4x$
- H**  $x = 4$
- J**  $y = 4$

19 Which expression is *not* equivalent to the following expression?

$$3 \times 3 \times 3 \times 3 \times 3 \times 3$$

- A**  $3^3 \cdot 3^2$
- B**  $3^1 \cdot 3^5$
- C**  $9^3$
- D**  $27^2$

**20** Which is a factored form of the following expression?

$$2x^2 - 6x$$

**F**  $2(x^2 - 3)$

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

**H**  $2x(1 - 3x)$

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

**21** Written in simplest radical form,  $\sqrt{32}$  is equal to —

**A**  $2\sqrt{4}$

**B**  $2\sqrt{16}$

**C**  $4\sqrt{2}$

**D**  $8\sqrt{2}$



22 If  $x \neq 0$ , what is the quotient when the following division is performed?

$$2x \overline{)6x^3 + 4x^2 + 2x}$$

- F  $3x^2 + 2x$
- G  $3x^2 + 2x + 1$
- H  $6x^3 + 4x^2$
- J  $6x^2 + 4x + 2$

23 If 112 children sign up for a field trip and each vehicle carries  $x$  children, which expression could be used to determine the number of vehicles needed for the trip?

- A  $112 - x$
- B  $112x$
- C  $\frac{112}{x}$
- D  $\frac{x}{112}$

24 Which is equivalent to the following expression?

$$3a(2a + b)$$

- F  $6a^2 + b$
- G  $6a^2 + 3ab$
- H  $5a^2 + b$
- J  $5a^2 + 3ab$

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

$$\frac{2x^4 - 6x^3 + 4x^2 + 10x}{2x}$$

- A  $x^3 - 3x^2 + 2x + 5$
- B  $x^3 - 6x^3 + 4x^2 + 5x$
- C  $2x^3 - 6x^2 + 4x + 5$
- D  $2x^4 - 6x^3 + 4x^2 + 5x$

26 Which expression is equivalent to the following expression?

$$(3x^2y^2)^3$$

- F  $3x^5y^5$
- G  $9x^5y^5$
- H  $9x^6y^6$
- J  $27x^6y^6$

27 Which is equivalent to the following expression?

$$(3x + 1)(4x - 1)$$

- A  $12x^2 - 1$
- B  $12x^2 - x - 1$
- C  $12x^2 + x - 1$
- D  $12x^2 + 7x - 1$

**28** Which is a factor of  $a^2 - 81$  ?

- F**  $a + 3$
- G**  $a + 9$
- H**  $a + 27$
- J**  $a + 81$

**29** What is the value of the expression  $\frac{x^y + z}{z}$  if  $x = 4$ ,  $y = 2$ , and  $z = 2$  ?

- A** 5
- B** 9
- C** 10
- D** 16

**30** What is the following product?

$$(2pq^2r^3)(5q^3r^4s)$$

- F**  $7q^5r^7$
- G**  $7q^6r^{12}$
- H**  $10pq^5r^7s$
- J**  $10pq^6r^{12}s$

31 Which equation fits the pattern in the table?

$x$	$y$
2	3
4	4
6	5
8	6

A  $y = \frac{1}{3}x + 3$

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

C  $y = x + 1$

D  $y = 2x - 1$

32 In which table does  $y$  *not* vary directly as  $x$  ?

F

$x$	-2	-1	0	1
$y$	-10	-5	0	5

G

$x$	1	2	3	4
$y$	10	20	30	40

H

$x$	0	1	2	3
$y$	0	3	6	9

J

$x$	-2	-1	1	2
$y$	-1	-2	2	1

**33** The following equation defines a function of  $x$ .

$$f(x) = -2x + 3$$

If  $(6, n)$  is an element of the function, what is the value of  $n$  ?

- A** -9
- B** -6
- C** -4
- D** 0

**34** The number of water bottles used during a team's football practice varies directly with the temperature. If a team uses 75 bottles when the temperature is  $60^\circ$ , what is the temperature if they use 120 bottles?

- F**  $96^\circ$
- G**  $92^\circ$
- H**  $84^\circ$
- J**  $80^\circ$

**35** If  $f(2) = 13$ , which could be the equation for  $f(x)$  ?

- A**  $f(x) = x^2 + 8$
- B**  $f(x) = x + x^2$
- C**  $f(x) = 2x^3 + 5$
- D**  $f(x) = 3x^2 + 1$

**36** The points in the table lie on the graph of a linear function.

<b><i>x</i></b>	1	2	3	4	5
<b><i>y</i></b>	1	4	7	10	13

**Which could be the function?**

**F**  $y = x$

**G**  $y = 2x - 1$

**H**  $y = 3x - 2$

**J**  $y = 4x - 3$

**37** Which is a zero of the function defined by the following equation?

$$f(x) = 2x - 6$$

**A** -6

**B** -3

**C** 2

**D** 3

**38** 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**  $\{(-3, 4), (1, -9), (1, 4)\}$

**G**  $\{(0, -5), (0, 4), (0, 5)\}$

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

**J**  $\{(0, 1), (1, -1), (1, 0)\}$

**39** If  $f(x) = 3x^2 + 2x - 1$ , what is  $f(0)$ ?

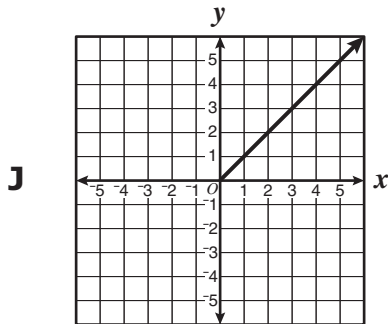
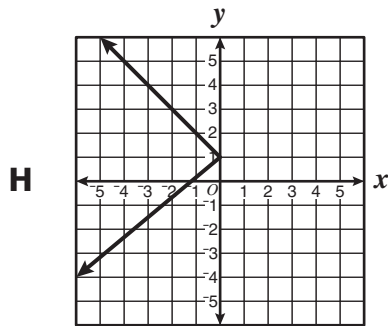
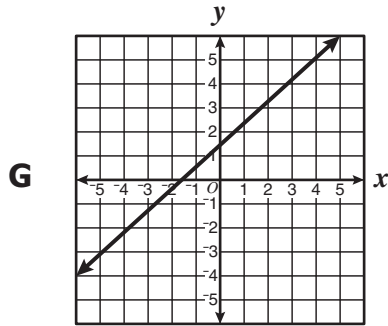
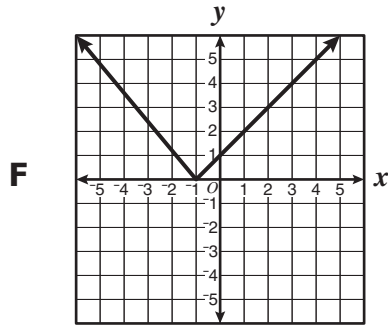
**A**  $-1$

**B**  $0$

**C**  $1$

**D**  $4$

40 Which graph does *not* represent a function of  $x$  ?





41 The depth of a lake,  $d$ , varies directly with  $r$ , the amount of rainfall last month. If  $k$  is the constant of variation, which equation represents the situation?

A  $d = \frac{r}{k}$

B  $d = \frac{k}{r}$

C  $d = k + r$

D  $d = kr$

42 Each of the following tables contains elements of an  $(x, y)$  relationship. Which table contains four points that *cannot* lie on the graph of a function of  $x$ ?

F

$x$	0	2	3	4
$y$	-1	-2	-3	-4

G

$x$	1	2	3	2
$y$	4	2	2	4

H

$x$	-1	-2	3	4
$y$	2	4	6	8

J

$x$	0	1	5	6
$y$	5	9	2	-1

- 43 Kayla works four days a week as a waitress and as a nanny. The hours she works each day are shown.

$$\begin{array}{r} \text{waitress} \\ \text{nanny} \end{array} \begin{array}{c} \text{M Tu W Th} \\ \left[ \begin{array}{cccc} 6 & 5 & 4 & 7 \\ 4 & 4 & 6 & 3 \end{array} \right] \end{array}$$

Once school starts, she wants to cut all her hours by one-half. Which matrix represents the new work schedule?

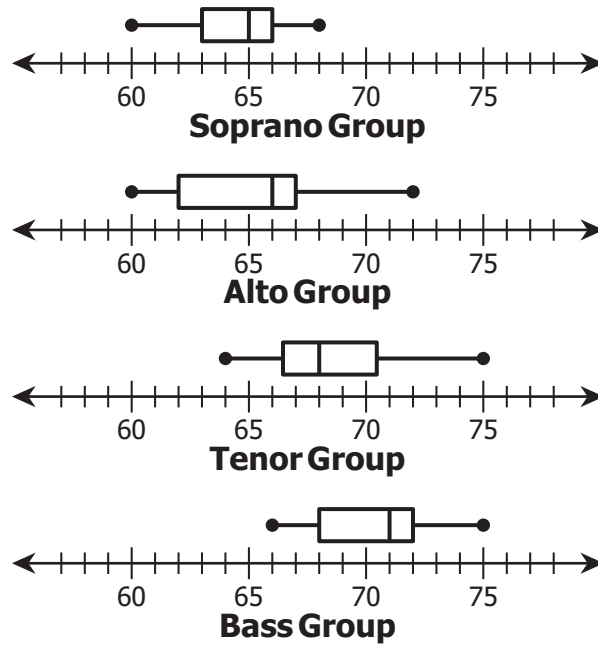
**A**  $\left[ \begin{array}{cccc} 6 & 5 & 4 & 7 \\ 2 & 2 & 3 & 1.5 \end{array} \right]$

**B**  $\left[ \begin{array}{cccc} 12 & 10 & 8 & 14 \\ 8 & 8 & 12 & 6 \end{array} \right]$

**C**  $\left[ \begin{array}{cccc} 3 & 2.5 & 2 & 3.5 \\ 2 & 2 & 3 & 1.5 \end{array} \right]$

**D**  $\left[ \begin{array}{cccc} 3 & 2.5 & 2 & 3.5 \\ 4 & 4 & 6 & 3 \end{array} \right]$

- 44 The heights in inches of each member of the four groups of a choir are represented in the box-and-whisker plots.



Which group has the median with the *greatest* value?

- F Soprano
- G Alto
- H Tenor
- J Bass

- 45 Alvin and Ben compared the weights of the members of each of their respective teams in their Physical Education class.

Alvin's Team Weights (pounds)	Ben's Team Weights (pounds)
135	134
126	127
119	120
123	122
131	130
125	126
120	122
132	133

What is the difference in the median weights of the two teams?

- A 0.250 lb
- B 0.375 lb
- C 0.500 lb
- D 1.000 lb

- 46 The enrollment at an elementary school is represented by the following matrix.

$$\begin{array}{l} \text{boys} \\ \text{girls} \end{array} \begin{bmatrix} 150 \\ 145 \end{bmatrix}$$

If 60% of the boys and 60% of the girls are selected for a field trip, which matrix represents the number of students going on the field trip?

F  $\begin{bmatrix} 90 \\ 58 \end{bmatrix}$

G  $\begin{bmatrix} 150 \\ 145 \end{bmatrix}$

H  $\begin{bmatrix} 60 \\ 58 \end{bmatrix}$

J  $\begin{bmatrix} 90 \\ 87 \end{bmatrix}$

47 What is the difference of the two matrices?

$$\begin{bmatrix} 5 & -2 & 10 \\ 4 & -5 & 20 \\ 1 & -3 & 30 \end{bmatrix} - \begin{bmatrix} 9 & -3 & 15 \\ 1 & -4 & 21 \\ 8 & -7 & 30 \end{bmatrix}$$

**A**  $\begin{bmatrix} 4 & 1 & 5 \\ 3 & 1 & 1 \\ 7 & 4 & 0 \end{bmatrix}$

**B**  $\begin{bmatrix} 14 & -5 & 25 \\ 5 & -9 & 41 \\ 9 & -10 & 60 \end{bmatrix}$

**C**  $\begin{bmatrix} -4 & 1 & -5 \\ 3 & -1 & -1 \\ -7 & 4 & 0 \end{bmatrix}$

**D**  $\begin{bmatrix} -4 & 7 & -14 \\ -3 & -1 & -24 \\ 2 & 4 & 0 \end{bmatrix}$

- 48 Sally believes that the more time she spends in the grocery store, the more money she spends. Her recent purchases are recorded in the table.

Minutes in Store, $x$	Dollars Spent, $y$
5	8
12	29
15	31
18	45
22	73
26	68

Which linear equation best fits the data?

- F**  $y = -3 + 10x$   
**G**  $y = -10 + 3x$   
**H**  $y = 10 + 3x$   
**J**  $y = -10 - 3x$

- 49 Debbie recorded the time it took seven children of different ages to run one lap around the track.

Age of Child (years)	Time (seconds)
4	225
8	185
10	138
11	130
14	112
14	106
18	52

Using a linear equation of best fit, which is closest to the length of time it should take Debbie's 6-year-old niece to run one lap?

- A 200 sec
- B 185 sec
- C 170 sec
- D 140 sec



50 Which is equivalent to the following scalar product?

$$-2.1 \begin{bmatrix} 0.0 & 3.0 & 5.0 \\ 9.0 & 0.0 & 4.0 \\ 8.0 & 6.0 & 0.0 \end{bmatrix}$$

**F**  $\begin{bmatrix} 0.0 & -6.3 & -10.5 \\ 9.0 & 0.0 & 4.0 \\ 8.0 & 6.0 & 0.0 \end{bmatrix}$

**G**  $\begin{bmatrix} 0.0 & 3.0 & 5.0 \\ -18.9 & 0.0 & 4.0 \\ -16.8 & 6.0 & 0.0 \end{bmatrix}$

**H**  $\begin{bmatrix} -2.1 & -6.3 & -10.5 \\ -18.9 & -2.1 & -8.4 \\ -16.8 & -12.6 & -2.1 \end{bmatrix}$

**J**  $\begin{bmatrix} 0.0 & -6.3 & -10.5 \\ -18.9 & 0.0 & -8.4 \\ -16.8 & -12.6 & 0.0 \end{bmatrix}$



### Answer Key-EOC020-M0118

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

### Algebra I, Core 1

If you get this many items correct:	Then your converted scale score is:
0	000
1	212
2	244
3	264
4	278
5	290
6	299
7	308
8	315
9	322
10	328
11	334
12	340
13	345
14	350
15	355
16	360
17	364
18	369
19	373
20	377
21	382
22	386
23	390
24	394
25	398
<b>26</b>	<b>402</b>
27	406
28	410
29	414
30	418
31	423
32	427
33	431
34	436
35	440
36	445
37	450
38	456
39	461
40	467
41	473
42	480
43	487
44	496
<b>45</b>	<b>505</b>
46	517
47	531
48	551
49	583
50	600

