

VIRGINIA STANDARDS OF LEARNING

Spring 2008 Released Test

END OF COURSE ALGEBRA I

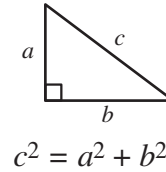
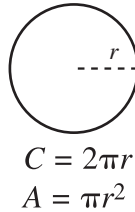
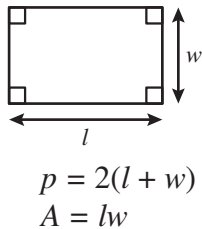
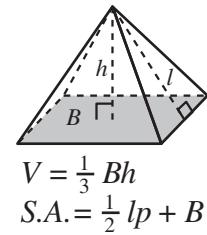
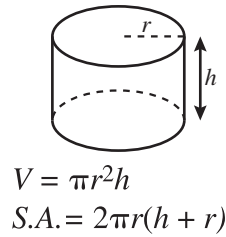
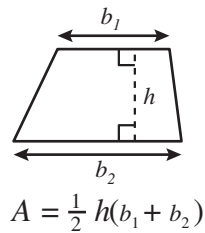
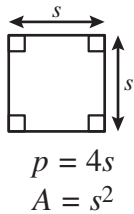
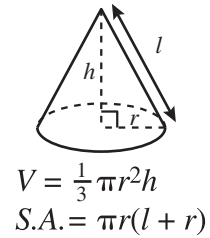
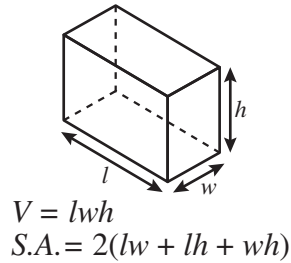
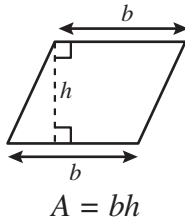
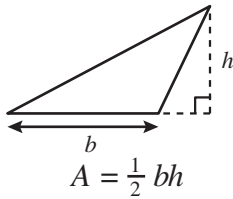
Form M0118, CORE 1

Property of the Virginia Department of Education

©2008 by the Commonwealth of Virginia, Department of Education, P.O. Box 2120, Richmond, Virginia 23218-2120. All rights reserved. Except as permitted by law, this material may not be reproduced or used in any form or by any means, electronic or mechanical, including photocopying or recording, or by any information storage or retrieval system, without written permission from the copyright owner. Commonwealth of Virginia public school educators may reproduce any portion of these released tests for non-commercial educational purposes without requesting permission. All others should direct their written requests to the Virginia Department of Education, Division of Student Assessment and School Improvement, at the above address or by e-mail to Student_Assessment@doe.virginia.gov.

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 ² |
| cubic centimeter | cm ³ |

| | |
|--------------------|------|
| 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

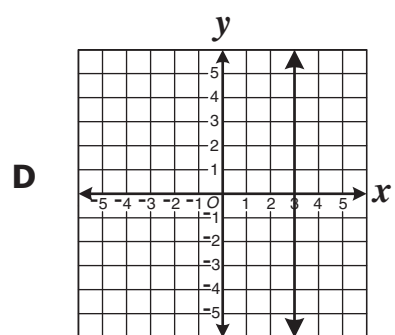
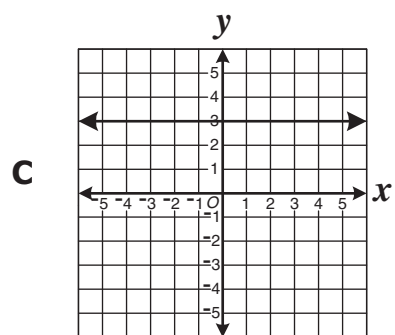
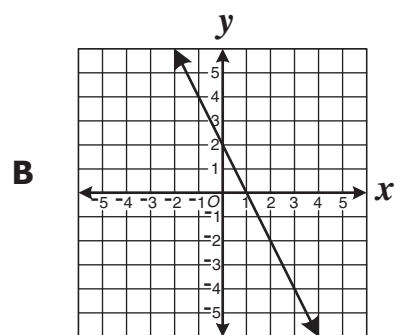
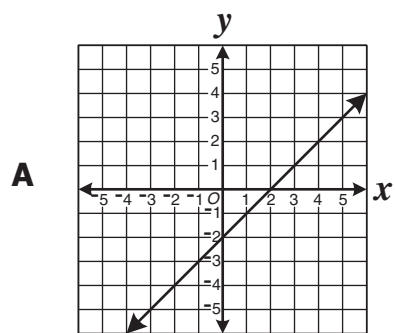
Read each question and choose the best answer. Then fill in the circle on your answer document for the answer you have chosen. For this test you may assume that the value of the denominator is not zero.

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?

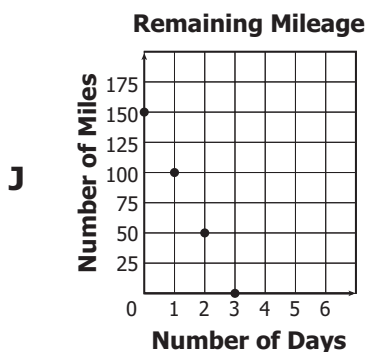
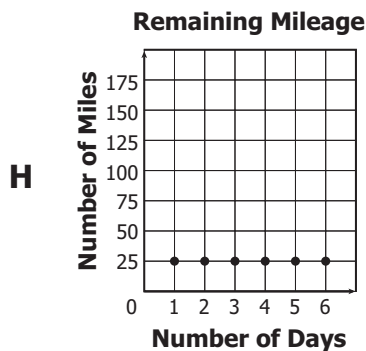
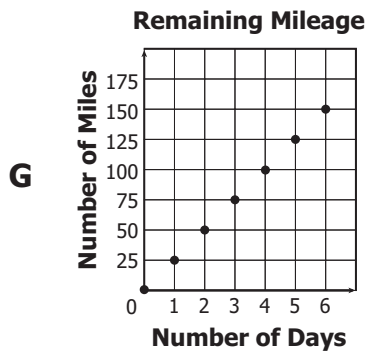
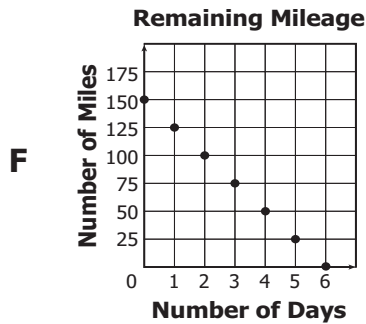
$$6(x + 1) \geq 7$$

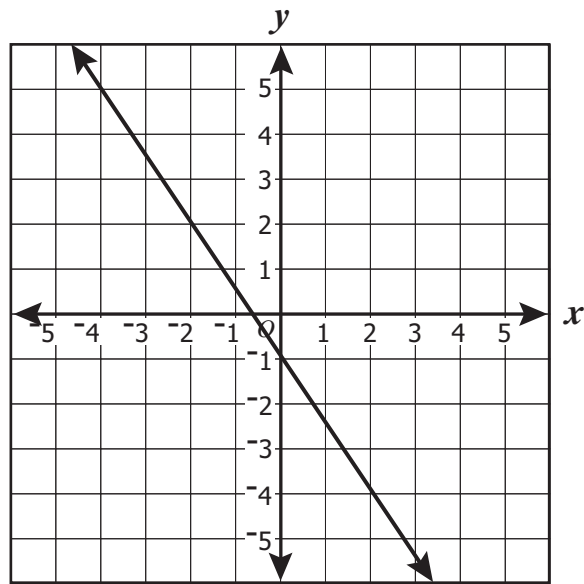
- F** $x \geq \frac{13}{6}$
- G** $x \geq \frac{1}{6}$
- H** $x \geq 1$
- J** $x \geq 6$

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?





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?

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

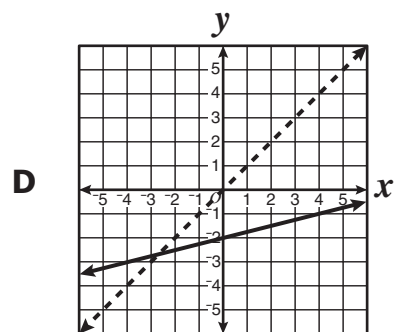
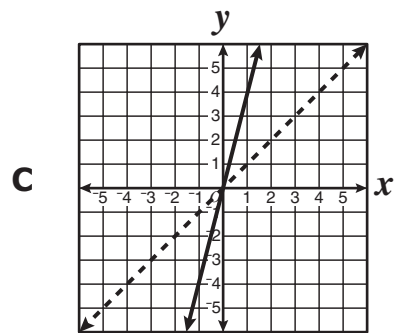
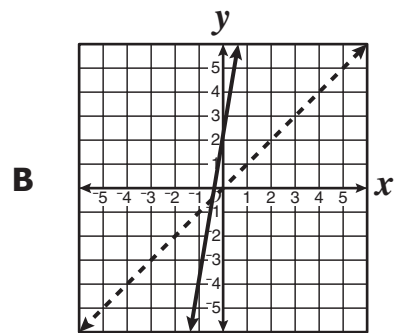
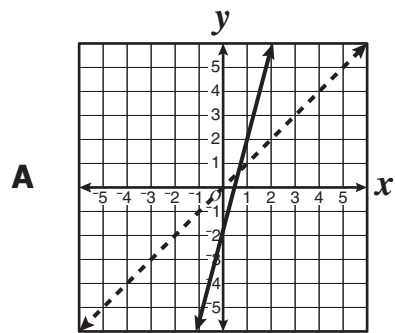
F $x = 2$

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: $x = \frac{-49}{17}$

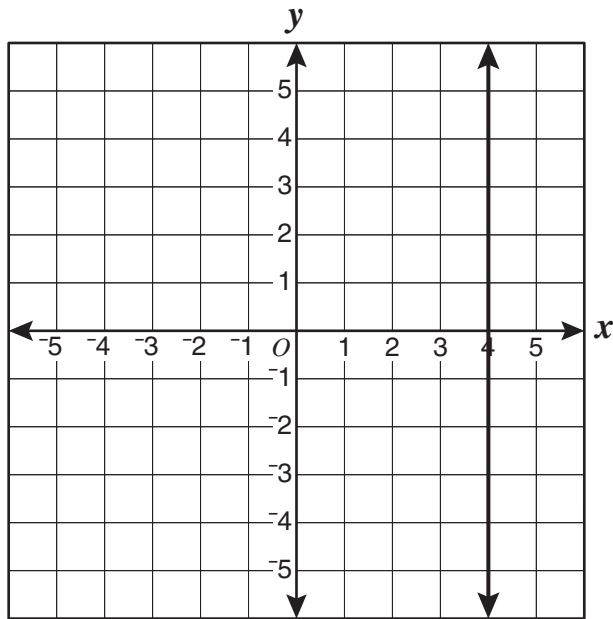
Which property justifies Step 1 ?

- 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° , what is the temperature if they use 120 bottles?

- F** 96°
- G** 92°
- H** 84°
- J** 80°

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.

| | | | | | |
|-----|---|---|---|----|----|
| x | 1 | 2 | 3 | 4 | 5 |
| y | 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 $f(0)$?

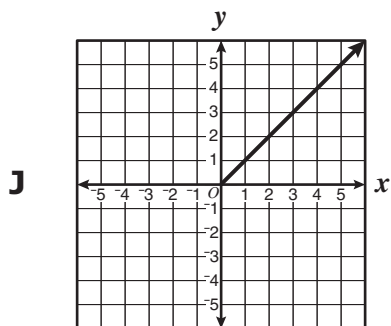
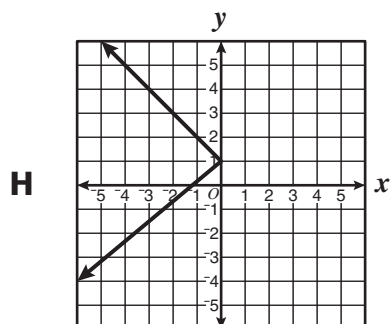
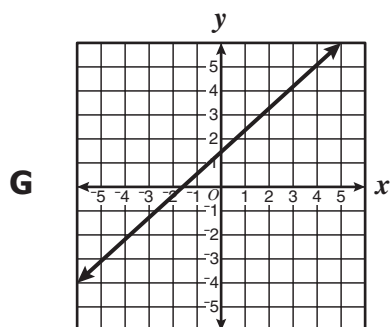
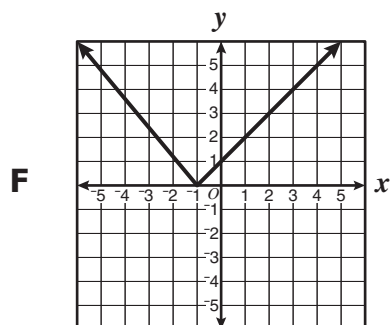
A -1

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.

| | M | Tu | W | Th |
|----------|---|----|---|----|
| waitress | 6 | 5 | 4 | 7 |
| nanny | 4 | 4 | 6 | 3 |

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

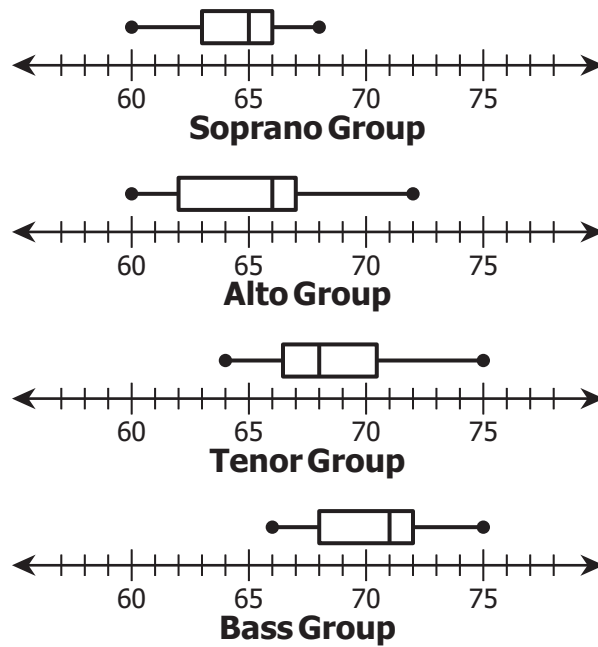
A $\begin{bmatrix} 6 & 5 & 4 & 7 \\ 2 & 2 & 3 & 1.5 \end{bmatrix}$

B $\begin{bmatrix} 12 & 10 & 8 & 14 \\ 8 & 8 & 12 & 6 \end{bmatrix}$

C $\begin{bmatrix} 3 & 2.5 & 2 & 3.5 \\ 2 & 2 & 3 & 1.5 \end{bmatrix}$

D $\begin{bmatrix} 3 & 2.5 & 2 & 3.5 \\ 4 & 4 & 6 & 3 \end{bmatrix}$

- 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?

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

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

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

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

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

