Virginia Algebra I
End-of-Course Standards of Learning (SOL) Assessment
Practice and Sample Test Workbook

Includes:
• Virginia Standards of Learning for Algebra I Correlated to Glencoe Algebra 1
• Algebra I Formula Sheet
• Student Recording Chart
• Diagnostic Test
• Numerous Practice Questions for Each SOL
• Full-Size Sample Test
Test-Taking Tips

• Go to bed early the night before the test. You will think more clearly after a good night's rest.

• Read each problem carefully and think about ways to solve the problem before you try to answer the question.

• Relax. Most people get nervous when taking a test. It's natural. Just do your best.

• Answer questions you are sure about first. If you do not know the answer to a question, skip it and go back to that question later.

• Think positively. Some problems may seem hard to you, but you may be able to figure out what to do if you read each question carefully.

• If no figure is provided, draw one. If one is furnished, mark it up to help you solve the problem.

• When you have finished each problem, reread it to make sure your answer is reasonable.

• Become familiar with a variety of formulas and when they should be used.

• Make sure that the number of the question on the answer sheet matches the number of the question on which you are working in your test booklet.
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Overview

The material in this booklet is designed to help you prepare for the Virginia Algebra I Standards of Learning Test (SOL).

It contains:

• a Student Recording Chart,
• the Algebra I Standards of Learning correlated to Glencoe’s Algebra I and Algebra: Concepts and Applications,
• a Diagnostic Test,
• practice for each SOL, and
• a Sample Test.

How to Use This Book

Diagnostic Test  This test will help you identify any weaknesses you may have as you prepare to take the SOL. Once you’ve taken the test and it’s been graded, complete the Student Recording Chart that is found on page v. Mark an × in the square for each question that you answered incorrectly.

Practice  If you missed one or two of the questions for a particular SOL, you could probably use some extra practice with that standard. The Student Recording Chart lists practice pages for each SOL. Complete the appropriate practice pages. If you are unsure about how to do some of the problems, you may want to refer to your mathematics book.

Sample Test  After you have completed your practice worksheet(s), take the Sample Test on pages 55 to 66.
# Student Recording Chart

**Directions** Mark an × by each question from the Diagnostic Test that you answered *incorrectly*. If there are one or two ×s marked for a competency goal, write *Yes* in the *Need Practice?* box. Then complete the practice pages for that competency goal.

<table>
<thead>
<tr>
<th>Standard</th>
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<tr>
<td><strong>Practice Pages</strong></td>
<td>13–15</td>
<td>16–17</td>
<td>18–19</td>
<td>20–21</td>
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<td><strong>Practice Pages</strong></td>
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<th>A.12</th>
<th>A.13</th>
<th>A.14</th>
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<tr>
<td><strong>Practice Pages</strong></td>
<td>37–38</td>
<td>39–40</td>
<td>41–42</td>
<td>43–45</td>
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<table>
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<th>A.16</th>
<th>A.17</th>
<th>A.18</th>
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<td>□ □</td>
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<td><strong>Need Practice?</strong></td>
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<tr>
<td><strong>Practice Pages</strong></td>
<td>46–47</td>
<td>48–49</td>
<td>50–52</td>
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Virginia Standards of Learning, Algebra I,
Correlated to Glencoe’s *Algebra 1* and
*Algebra: Concepts and Applications*

Lessons in which the standards are a primary focus are indicated in **bold**.

<table>
<thead>
<tr>
<th>Standards of Learning</th>
<th>Algebra 1 Lesson(s)</th>
<th>Algebra: Concepts and Applications Lesson(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1</td>
<td>The student will solve multistep linear equations and inequalities in one variable, solve literal equations (formulas) for a given variable, and apply these skills to solve practical problems. Graphing calculators will be used to confirm algebraic solutions.</td>
<td>3-2P, 3-2, 3-3, 3-4P, 3-4, 3-5, 3-6, 3-7, 3-8, 3-9, 3-9F, 4-6, 5-3P, 5-3, 6-1, 6-2P, 6-2, 6-3, 6-4, 6-5, 6-6, 6-6F, 11-3, 11-4, 11-5, 11-7, 12-2, 12-9</td>
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<tr>
<td>A.2</td>
<td>The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables. Students will choose an appropriate computational technique, such as mental mathematics, calculator, or paper and pencil.</td>
<td>1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 2-2, 2-3, 2-4, 2-7, 4-7P, 4-7, 4-8, RM4, 5-7, 5-7F, 10-7, 11-1, 11-2</td>
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<tr>
<td>A.3</td>
<td>The student will justify steps used in simplifying expressions and solving equations and inequalities. Justifications will include the use of concrete objects; pictorial representations; and the properties of real numbers, equality, and inequality.</td>
<td>3-2P, 3-2, 3-3, 3-4P, 3-4, 3-5, 3-6, 3-7, 3-8, 3-9, 4-5, 4-5F, 4-6, 5-2, 5-3, 5-4, 5-5, 5-6, 6-1, 6-2P, 6-2, 6-3, 6-4, 6-5, 6-6, 6-6F, 7-1P, 7-1, 7-1F, 7-2, 7-3, 7-4, 7-5, 8-1, 8-2, 8-4P, 8-4, 9-2, 9-3, 9-4, 9-5, 9-6, 10-2, 10-3, 10-4, 10-6, 10-7, 11-1, 11-2, 11-3, 11-4, 11-5, 11-6, 11-7, 12-2, 12-2F, 12-3, 12-4, 12-5, 12-8, 12-9</td>
</tr>
<tr>
<td>A.4</td>
<td>The student will use matrices to organize and manipulate data, including matrix addition, subtraction, and scalar multiplication. Data will arise from business, industrial, and consumer situations.</td>
<td>13-2</td>
</tr>
</tbody>
</table>

P = Preview Lesson, F = Follow-Up Lesson, RM = Reading Math
<table>
<thead>
<tr>
<th>Standards of Learning</th>
<th>Algebra 1 Lesson(s)</th>
<th>Algebra: Concepts and Applications Lesson(s)</th>
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<td>A.5</td>
<td>1-8, 1-8F, 1-9, 1-9F, 4-3P, 4-3, 4-4, 4-5, 4-5F, 4-6, 4-7P, 4-7, 4-8, 5-2, 5-3P, 5-3, 5-3F, 5-7, 7-7F, 10-7, 13-3, 13-4, 13-5, 13-5F</td>
<td>1-6, 1-7, 6-1, 6-2, 6-3, 6-4, 6-5, 6-6, Ch. 10 Investigation</td>
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<td>A.6</td>
<td>4-5, 4-5F, 4-6, 5-2, 5-3P, 5-3, 5-3F, 5-4, 5-5, 5-6, 5-7, 5-7F, 6-6, 6-6F, 7-1, 7-1F, 7-2, 7-3, 7-4, 7-5</td>
<td>6-3, 6-5, 7-2, 7-3, 7-4, 7-5, 7-6, 7-7, 12-7</td>
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<td>7-1, 7-2, 7-3, 7-5, 7-6</td>
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<td>A.8</td>
<td>4-4, 4-5, 4-5F, 4-6, 5-3P, 5-3, 5-3F, 5-4, 5-5, 5-6, 5-7, 5-7F</td>
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<td>7-1P, 7-1, 7-1F, 7-2, 7-3, 7-4</td>
<td>13-1, 13-2, 13-3, 13-4, 13-5</td>
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<td>8-4, 8-4P, 8-5, 8-6, 8-7P, 8-7, 8-8</td>
<td>9-2, 9-3, 9-4, 9-5, 15-3</td>
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<td>Standards of Learning</td>
<td>Algebra 1 Lesson(s)</td>
<td>Algebra: Concepts and Applications Lesson(s)</td>
</tr>
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<tr>
<td>A.12 The student will factor completely first- and second-degree binomials and trinomials in one or two variables. The graphing calculator will be used as a tool for factoring and for confirming algebraic factorizations.</td>
<td>9-1, 9-2P, 9-2, 9-3P, 9-3, 9-4, 9-5, 9-6, 10-2, 10-3, 10-4</td>
<td>10-2, 10-3, 10-4, 10-5, 11-3</td>
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<td>A.13 The student will express the square root of a whole number in simplest radical form and approximate square roots to the nearest tenth.</td>
<td>2-7, 11-1, 11-2, 11-3</td>
<td>8-5, 8-6, 14-3</td>
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<td>A.14 The student will solve quadratic equations in one variable both algebraically and graphically. Graphing calculators will be used both as a primary tool in solving problems and to verify algebraic solutions.</td>
<td>10-1, 10-2, 10-3, 10-4</td>
<td>11-3, 11-4, 11-5, 11-6</td>
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<tr>
<td>A.15 The student will, given a rule, find the values of a function for the elements in its domain and locate the zeros of the function both algebraically and with a graphing calculator. The value of ( f(x) ) will be related to the ordinate on the graph.</td>
<td>1-8, 4-4, 4-5, 4-6, 5-3P, 12-2, 12-2F</td>
<td>7-3, 7-5, 11-3, 11-4, 11-5, 11-6</td>
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<td>A.16 The student will, given a set of data points, write an equation for a line of best fit and use the equation to make predictions.</td>
<td>5-7, 5-7F</td>
<td>7-4</td>
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<td>A.17 The student will compare and contrast multiple one-variable data sets, using statistical techniques that include measures of central tendency, range, and box-and-whisker graphs.</td>
<td>1-9, 1-9F, 2-5, 3-9F, 5-7, 5-7F, 13-3, 13-4, 13-5, 13-5F</td>
<td>3-3, Ch. 5 Investigation</td>
</tr>
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<td>A.18 The student will analyze a relation to determine whether a direct variation exists and represent it algebraically and graphically, if possible.</td>
<td>5-2</td>
<td>6-5</td>
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Formulas

Abbreviations

<table>
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<th>Abbreviation</th>
<th>Symbol</th>
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<tr>
<td>ounce</td>
<td>oz</td>
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<tr>
<td>pound</td>
<td>lb</td>
</tr>
<tr>
<td>quart</td>
<td>qt</td>
</tr>
<tr>
<td>gallon</td>
<td>gal.</td>
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<tr>
<td>inch</td>
<td>in.</td>
</tr>
<tr>
<td>foot</td>
<td>ft</td>
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<tr>
<td>yard</td>
<td>yd</td>
</tr>
<tr>
<td>mile</td>
<td>mi.</td>
</tr>
<tr>
<td>square inch</td>
<td>sq in.</td>
</tr>
<tr>
<td>square foot</td>
<td>sq ft</td>
</tr>
<tr>
<td>cubic inch</td>
<td>cu in.</td>
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<tr>
<td>square centimeter</td>
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<tr>
<td>cubic centimeter</td>
<td>cm³</td>
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Geometric Figures

- Triangle: $A = \frac{1}{2}bh$
- Parallelogram: $A = bh$
- Cylinder: $V = \pi r^2h$, $S.A. = 2\pi r(h + r)$
- Cone: $V = \frac{1}{3}\pi r^2h$, $S.A. = \pi r(\ell + r)$
- Rectangular Prism: $V = \ell wh$, $S.A. = 2(\ell w + \ell h + wh)$
- Pyramid: $V = \frac{1}{3}bh$

Quadratic Formula

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

$$\pi \approx 3.14$$
$$\pi \approx \frac{22}{7}$$
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1. If 3 computer disks and 5 notebooks cost $7.50 and 4 computer disks and 2 notebooks cost $6.50, how much does 1 computer disk cost?  
   A. $0.75  
   B. $1.00  
   C. $1.25  
   D. $1.50

2. If you solve $2x + 3y = 12$ for $y$, what does $y$ equal?  
   A. $\frac{2}{3}x + 4$  
   B. $\frac{3}{2}x + 6$  
   C. $\frac{-2}{3}x + 12$  
   D. $\frac{-2}{3}x + 4$

3. Given $2x + 3 < 7$, which is an example of the result after applying the Addition Property of Inequality?  
   A. $2x + 3 + (-3) < 7 + (-3)$  
   B. $\frac{1}{2}(2x + 3) < \frac{1}{2}(7)$  
   C. $2x + 3 + (-3) > 7 + (-3)$  
   D. $7 > 2x + 3$

4. Which table shows ordered pairs that satisfy $y = 2x + 3$?  
   A. $x$ 1 2 3  
     $y$ 4 5 6  
   B. $x$ 1 3 6  
     $y$ 5 9 15  
   C. $x$ 1 3 5  
     $y$ 5 9 12  
   D. $x$ 2 4 6  
     $y$ 7 10 13

5. Which situation could be a direct variation relationship?  
   A. The number of hours Saul works and the amount of money he makes.  
   B. The distance a freshman can jump and the number of siblings he has.  
   C. The length of your car and the cost of parking it in a city garage.  
   D. The time it takes 3-year-old Jenny to say the alphabet and the number of times she practices it.
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

6 Virginia cotton and peanut production and acreage for 2002 is shown in this matrix. If the state wanted to double the production but keep the acreage the same, which matrix would represent this new situation? A.4

<table>
<thead>
<tr>
<th>production (thousands of pounds)</th>
<th>cotton (thousands of pounds)</th>
<th>peanuts (thousands of pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>100</td>
<td>58</td>
</tr>
<tr>
<td>95</td>
<td>95</td>
<td>120</td>
</tr>
</tbody>
</table>

A. [100 116]  
B. [95 240]  
C. [200 116]  
D. [95 120]  
E. [200 120]

7 What is the simplified form of \( \frac{5x^3 + 10x^2 - 20x}{5x} \)? A.11

A. \( 11x^2 - 20x \)  
B. \( 5x^2 + 2x - 15 \)  
C. \( x^3 + 5x - 4 \)  
D. \( x^2 + 2x - 4 \)  
E. \( \frac{5}{x} + \frac{10}{x} - \frac{20}{x} \)

8 There were 90,000 people in Virginia who were still without power on September 22, 2003, after Hurricane Isabel hit the area. Power had been restored to 610,000 Virginia residents by that day. Which equation could be used to find \( x \), the original number of people without power? A.2

A. \( 90,000x = 610,000 \)  
B. \( x + 610,000 = 90,000 \)  
C. \( x + 90,000 = 610,000 \)  
D. \( x - 610,000 = 90,000 \)  
E. \( 610,000 - 90,000 = x \)

9 What is the solution of \( 3x - 7 = 2 \)? A.1

A. \( \frac{5}{3} \)  
B. 3  
C. \( \frac{14}{3} \)  
D. 6

10 Which is an equation of the line with slope \( -\frac{1}{3} \) that contains the point at (3, 6)? A.8

A. \( 3x + 6y = \frac{1}{3} \)  
B. \( \frac{1}{3}x + 6y = 0 \)  
C. \( x + 3y = 21 \)  
D. \( x + 3y = 27 \)  
E. \( 3x - 6y = -\frac{1}{3} \)
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

For Questions 11 and 12, adult’s tickets to a museum cost $10 while children’s tickets cost $6. Suppose that at the end of one day the museum had sold 5,000 tickets and had received $42,000 in admission fees.

11 Which system of equations could represent this situation if \( x \) is the number of adult’s tickets sold and \( y \) the number of children’s tickets sold?  
A. \[ x + y = 5,000 \]
   \[ 10x + 6y = 42,000 \]
B. \[ x + y = 42,000 \]
   \[ 10x + 6y = 5,000 \]
C. \[ x + y = 5,000 \]
   \[ 6x + 10y = 42,000 \]
D. \[ x + y = 42,000 \]
   \[ 6x + 10y = 5,000 \]

12 How many adult’s tickets did the museum sell that day?  
F. 2,000  
G. 2,500  
H. 3,000  
J. 4,000

13 The population of Virginia in 2003 was about \( 7 \times 10^6 \), with an area of about \( 4.1 \times 10^4 \) square miles. Which was the approximate population per square mile of the state in 2003?  
A. \( 1.7 \times 10^2 \)  
B. \( 2.9 \times 10^2 \)  
C. \( 2.87 \times 10^{10} \)  
D. \( 11.1 \times 10^{10} \)

14 Which is a function of \( x \)?  
F. \( x = |y| \)  
G. \( x = 3 \)  
H. \( x = y^2 - 1 \)  
J. \( y = 2x - 1 \)

15 Which is the graph of \( y \leq -2x + 4 \)?  
A.  
B.  
C.  
D.
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

For Questions 16 and 17, use this stem-and-leaf plot which shows the number of miles driven from home to work by 10 employees at two different companies.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
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<tbody>
<tr>
<td>3</td>
<td>0</td>
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<td>2</td>
<td>1</td>
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<td>2</td>
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<td>7</td>
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<td>4</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
</tr>
</tbody>
</table>

16 Which statement is true?  
F The mean, median, and mode for company A are each higher than the mean, median, and mode for company B.
G The mean for company A is the same as the mean for company B, but the median for A is greater than the median for B.
H The median for company A is the same as the median for company B, but the mean for A is less than the mean for B.
J The mean for company A is the same as the mean for company B, but the median for A is less than the median for B.

17 What is the range of distances driven to work for the employees of Company A?  
A 17 mi  
B 29 mi  
C 30 mi  
D 38 mi

18 Which ordered pair is the solution of the system of equations shown in this graph?  
F (1, 4)  
G (3, 2)  
H (2, 3)  
J (−1, 8)

19 Which is an equation of the line that contains the points at (8, −2) and (−4, 6)?  
A \[ y = \frac{-2}{3}x - 2 \]  
B \[ y = \frac{-3}{2}x + \frac{5}{2} \]  
C \[ y = \frac{-2}{3}x + \frac{10}{3} \]  
D \[ y = \frac{-3}{2}x + 12 \]
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

20 Rosilita paid $10.85 for 3 loaves of bread and 2 gallons of milk. A gallon of milk costs $0.91 more than twice the cost of a loaf of bread. Which equation could Rosilita use to find the cost $x$ of one loaf of bread?  

\[ \text{A.} \quad 2x + x = 10.85 \]
\[ \text{F.} \quad x + x = 10.85 \]
\[ \text{G.} \quad 3x + x + 0.91 = 10.85 \]
\[ \text{H.} \quad 3x + 2(0.91 + x) = 10.85 \]
\[ \text{J.} \quad 3x + 2(0.91 + 2x) = 10.85 \]

21 What is the range of the function $y = x^2 + 4$?  

\[ \text{A.} \quad y \geq 4 \]
\[ \text{B.} \quad x \neq -4 \]
\[ \text{C.} \quad \text{all real numbers} \]
\[ \text{D.} \quad -2 \leq y \leq 2 \]

22 What does $(2x + 3) + (6x - 10)$ equal?  

\[ \text{A.} \quad 11 \]
\[ \text{B.} \quad 8x + 13 \]
\[ \text{C.} \quad 8x - 7 \]

23 What is the complete factorization of $16x^2 - 25y^2$?  

\[ \text{A.} \quad (16x + 25y)(16x - 25y) \]
\[ \text{B.} \quad (4x + 5y)(4x - 5y) \]
\[ \text{C.} \quad (4x + 5y)^2 \]
\[ \text{D.} \quad (4x - 5y)^2 \]

24 The height of a tree is $\sqrt{92}$ meters. What is this number rounded to the nearest tenth?  

\[ \text{A.} \quad 46.0 \text{ m} \]
\[ \text{B.} \quad 23.0 \text{ m} \]
\[ \text{C.} \quad 9.6 \text{ m} \]
\[ \text{D.} \quad 8.9 \text{ m} \]

25 A toy rocket is shot into the air at an initial velocity of 10 meters per second from a height of 4 meters. The equation giving the height $h$ of the rocket above the ground at time $t$ is $h = -4.9t^2 + 10t + 4$. To the nearest tenth, what is the maximum height the rocket reaches?  

\[ \text{A.} \quad 9.1 \text{ m} \]
\[ \text{B.} \quad 10.7 \text{ m} \]
\[ \text{C.} \quad 12.3 \text{ m} \]
\[ \text{D.} \quad 13.1 \text{ m} \]

26 What is the simplified form of $-5\sqrt{72}$?  

\[ \text{A.} \quad -11\sqrt{2} \]
\[ \text{B.} \quad -30\sqrt{2} \]
\[ \text{C.} \quad -180\sqrt{2} \]

Go on
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

27 Which graph shows a direct variation function? A.18

[Images of four graphs labeled A, B, C, D]

28 Which is the equation of the line shown in this graph? A.6

F \( y = -x + 2 \)  
G \( y = x + 2 \)  
H \( y = -2x + 1 \)  
J \( y = 2x - 1 \)

29 What is the slope of the line containing the points at \((-3, 2)\) and \((5, 8)\)? A.7

A \( \frac{3}{4} \)  
B \( 3 \)  
C \( \frac{11}{3} \)  
D \( 5 \)

30 Which is the complete factorization of \(3x + 24xy\)? A.12

F \( y(3x + 24) \)  
G \( 3x(8y) \)  
H \( x(3 + 8xy) \)  
J \( 3x(1 + 8y) \)

31 If 3 pounds of flour cost $0.87, how much would 10 pounds of the same kind of flour cost? A.18

A $2.90  
B $3.45  
C $5.80  
D $8.70

Go on
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

32 The figure at the right shows a balanced scale. Which other scale would balance? **A.3**

F

G

H

J

33 What is the simplified form of \((4a^2b^3c)(-2a^4b^{-1}c^2)\)? **A.10**

A \(\frac{-2a^8c^2}{b^2}\)  
B \(-8a^6b^2c^3\)  
C \(\frac{-8a^8c^2}{b^3}\)  
D \(\frac{2a^8c^2}{b^3}\)

34 What property justifies that \((7 + 2) + 6 = (2 + 7) + 6\)? **A.3**

F Associative Property of Addition  
G Commutative Property of Addition  
H Addition Property of Equality  
J Distributive Property of Multiplication over Addition

35 Which matrix could represent this information: 2 states in the United States have dogwood and 2 have magnolia for their state flower while 3 states have dogwood and 1 has magnolia for their state tree? **A.4**

A

B

C

D

Go on
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

For Questions 36–38 use this table which gives the age \( x \) as of 2003 and the height \( y \) of five Virginia lighthouses.

<table>
<thead>
<tr>
<th>Lighthouse</th>
<th>Age (yr)</th>
<th>Height (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old Point Comfort</td>
<td>201</td>
<td>54</td>
</tr>
<tr>
<td>Assateague</td>
<td>170</td>
<td>145</td>
</tr>
<tr>
<td>New Point Comfort</td>
<td>199</td>
<td>63</td>
</tr>
<tr>
<td>Cape Henry</td>
<td>122</td>
<td>164</td>
</tr>
<tr>
<td>Old Cape Henry</td>
<td>211</td>
<td>90</td>
</tr>
</tbody>
</table>

36 Which is the equation of the best-fit line? Round numbers to one decimal place. Use your graphing calculator.  

\( F \ y = -1.2x + 315.8 \)  
\( G \ y = -1.1x + 293.5 \)  
\( H \ y = -0.7x + 254.4 \)  
\( J \ y = -2.9x + 636.9 \)  

37 Use your equation from Question 36 to predict the age in 2003 of a lighthouse if its height is 120 feet. Round your answer to the nearest year.  

\( A \ \text{158 yr} \)  
\( B \ \text{163 yr} \)  
\( C \ \text{178 yr} \)  
\( D \ \text{192 yr} \)

38 Use your equation from Question 36 to predict the height of a lighthouse if its age in 2003 is 100 years. Round your answer to the nearest whole number.  

\( F \ \text{184 ft} \)  
\( G \ \text{196 ft} \)  
\( H \ \text{212 ft} \)  
\( J \ \text{347 ft} \)

39 What is the slope of the line shown in this graph?  

\( A \ \frac{2}{5} \)  
\( B \ \frac{1}{2} \)  
\( C \ 2 \)  
\( D \ \frac{5}{2} \)

40 What is the simplified form of \( \sqrt{32} \)?  

\( F \ 2\sqrt{2} \)  
\( G \ 4\sqrt{2} \)  
\( H \ 8\sqrt{2} \)  
\( J \ 4 \)
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

41 What is the domain of the function that contains the ordered pairs given in this table? A.5

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

41 _________

A {1, 2, 3, 4, 5, 7, 9}
B {3, 5, 7, 9}
C {1, 2, 3, 4}
D All real numbers

42 What is the simplified form of \((-a^4b^{-7}c^2)^{-2}\)? A.10

F \(a^8b^{14}c^4\)
G \(\frac{b^{14}}{a^8c^4}\)
H \(\frac{-a^2}{b^9}\)
J \(\frac{b^9}{a^2c^4}\)

42 _________

43 If \(f(x) = 2x^2 - 7x\), what is \(f(-1)\)? A.15

A -9
B -5
C 5
D 9

43 _________

44 What are the solutions of \(2x^2 + 6x + 3 = 0\)? A.14

F \(-\frac{3 + \sqrt{3}}{2}\)
G \(-6 + \frac{\sqrt{3}}{2}\)
H \(-\frac{3}{2}, -6\)
J \(-\frac{1}{2}, -3\)

44 _________

45 What is the solution of \(5 - 7x < 26\)? A.1

A \(x < 3\)
B \(x > 3\)
C \(x < -3\)
D \(x > -3\)

45 _________

46 What are the zeros of the function whose graph is shown in the figure? A.15

F 2, -2
G -3
H 0
J -3, -2, 0

46 _________
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

47 Mount Rogers, the highest point in Virginia, has an elevation of 5,729 feet. What is this number in scientific notation?  
A. $5.729 \times 10^{-3}$  
B. $5.723 \times 10^{-2}$  
C. $5.729 \times 10^{2}$  
D. $5.729 \times 10^{3}$  

48 Mr. and Mrs. Rodriguez are taking their children to Colonial Williamsburg. A 1-day admission pass is $33 for an adult and $16.50 for a child. If they pay a total of $115.50 admission for themselves and their children, how many children do they have?  
F. 2  
G. 3  
H. 4  
J. 5  

49 Which is true about the graph of $5x - 3y = -30$?  
A. The $x$-intercept is 6, and the $y$-intercept is -10.  
B. The $x$-intercept is -6, and the $y$-intercept is 10.  
C. The $x$-intercept is 10, and the $y$-intercept is -6.  
D. The $x$-intercept is -10, and the $y$-intercept is 6.  

For Questions 50–51, use this box-and-whisker plot that shows student scores on an algebra quiz.

Algebra Quiz Grades

For Questions 50–51, use this box-and-whisker plot that shows student scores on an algebra quiz.

50 What was the median score on this quiz?  
F. 17  
G. 16  
H. 15  
J. 12  

51 If 40 students took this quiz, and none scored 12, how many scored higher than 12?  
A. 10  
B. 20  
C. 25  
D. 30  

52 What is the value of $2x^2 - 3x$ if $x = 7$?  
F. -7  
G. 7  
H. 77  
J. 175  

Go on
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

53 What are the solutions of \(x^2 - 4x = 5\)?  
A. 5, 9  
B. 0, 4  
C. -5, 1  
D. 5, -1  

54 What is the complete factorization of \(36a^2 + 12a + 1\)?  
F. \((a + 6)^2\)  
G. \((6a - 1)^2\)  
H. \((6a + 1)(6a - 1)\)  
J. \((6a + 1)^2\)  

55 Aubrey graphed the quadratic function \(y = x^2 - x - 6\) as shown in this figure. What are the solution(s) of the equation \(x^2 - x - 6 = 0\)?  
A. \(\frac{1}{2}, -\frac{1}{4}\)  
B. 1, -6  
C. -2, 3  
D. 2, -3  

56 Which diagram represents \((x + a)(y - b)\)?  
F  
G  
H  
J  

57 What is the slope of the line \(3x - 4y = 6\)?  
A. 3  
B. \(\frac{4}{3}\)  
C. \(\frac{3}{4}\)  
D. -4
58 Which is an equation of the line shown in this graph? A. $y = -3x + 2$  
B. $y = 3x - 1$  
C. $y = -\frac{1}{3}x + 2$  
D. $y = 2x - 3$

59 These matrices give the numbers of students from middle schools in Portsmouth and Norfolk who visited the art museum one day. Which matrix represents the sum of the two student groups at the museum? A. 

Portsmouth: Boys  
7th Grade: 22  
8th Grade: 31  
Girls  
7th Grade: 18  
8th Grade: 31

Norfolk: Boys  
7th Grade: 41  
8th Grade: 54  
Girls  
7th Grade: 48  
8th Grade: 59

A. $\begin{bmatrix} 63 & 62 \\ 56 & 90 \end{bmatrix}$  
B. $\begin{bmatrix} 63 & 62 \\ 66 & 90 \end{bmatrix}$  
C. $\begin{bmatrix} 63 & 85 \\ 66 & 90 \end{bmatrix}$  
D. $\begin{bmatrix} 44 & 62 \\ 36 & 90 \end{bmatrix}$

60 The figure shows the graph of $f(x)$. What is $f(2)$? A. $-3$  
B. $0$  
C. $1$  
D. $3$
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

**OBJECTIVE A.1** The student will solve multistep linear equations and inequalities in one variable, solve literal equations for a given variable, and apply these skills to solve practical problems. Graphing calculators will be used to confirm algebraic solutions.

1. Ngedi collects state quarters. She has 17 Virginia quarters. The number of these quarters minted in Denver is 2 more than 4 times the number of those minted in Philadelphia. How many were minted in Denver?
   - A 3
   - B 8
   - C 14
   - D 16

2. What is the solution of $-4x < -12$?
   - F $x < -3$
   - G $x > -3$
   - H $x > 3$
   - J $x < 3$

3. What is the solution of $5x - 17 = 2x - 11$?
   - A $\frac{-28}{3}$
   - B $-4$
   - C $\frac{6}{7}$
   - D 2

4. What is $y$ equal to if $2x - 3y = -12$ is solved for $y$?
   - F $y = -2x - 12$
   - G $y = \frac{2}{3}x - 12$
   - H $y = \frac{2}{3}x + 4$
   - J $y = -2x + 4$

5. Twenty more than five times the measure of an angle is 60 degrees. What is the measure of the angle?
   - A 8°
   - B 16°
   - C 24°
   - D 40°

6. What is the solution of $\frac{x - 3}{4} = \frac{2x + 6}{3}$?
   - F $\frac{-5}{3}$
   - G $\frac{-9}{5}$
   - H $\frac{-33}{5}$
   - J $-9$

7. Duane was solving the equation $\frac{2}{3}x + 1 = \frac{1}{2}x - \frac{1}{3}$. In order to make the problem easier, he multiplied the entire equation by 6 and obtained $4x + 1 = 3x - 2$. What was his mistake?
   - A He did not multiply the 1 by 6.
   - B Two-thirds times 6 is not 4.
   - C He should not have multiplied the $-\frac{1}{3}$ by 6.
   - D There was no mistake.
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.1 (continued)

8 What is \( y \) equal to if \( 4x + 6y = 2 \) is solved for \( y \)?

- **F** \[ y = \frac{2}{3}x + 2 \]
- **G** \[ y = \frac{3}{2}x + 2 \]
- **H** \[ y = \frac{-3}{2}x + \frac{1}{3} \]
- **J** \[ y = \frac{-2}{3}x + \frac{1}{3} \]

9 Max drove 132 miles from Lynchburg to Wytheville. If the trip took him 3 hours, what was his average speed?

- **A** 66 mph
- **B** 50 mph
- **C** 44 mph
- **D** 36 mph

10 Alberto works at a music store. If he works 15 hours each week at $6.00 per hour, how much does he make in a week?

- **F** $120
- **G** $90
- **H** $45
- **J** $2.50

11 What is the solution of \( 4x - 3(x + 2) = -5 \)?

- **A** \(-11\)
- **B** \(-7\)
- **C** \(-3\)
- **D** \(1\)

12 What is the solution of \( 4(2x - 1) < -x + 3 \)?

- **F** \(x < 1\)
- **G** \(x < \frac{7}{9}\)
- **H** \(x < \frac{4}{9}\)
- **J** \(x < -1\)

13 Parris has a piggy bank containing $7.60 in dimes and nickels. If there are 96 coins in the piggy bank, how many of these coins are dimes?

- **A** 40
- **B** 48
- **C** 56
- **D** 62

14 The sum of three consecutive odd integers is 117. What is the least of the three integers?

- **F** 43
- **G** 41
- **H** 39
- **J** 37

15 What is the value of \( x \) in the equation \( 3x + 2 = 20 \)?

- **A** 4
- **B** 6
- **C** \(\frac{22}{3}\)
- **D** 15
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.1 (continued)

16 Jim and Brad are driving in opposite directions from the same starting point on Skyline Drive, one at 30 miles per hour, the other at 20 miles per hour. How many hours will it take before they are 100 miles apart?
   F \( \frac{1}{2} \) h  
   G 2 h  
   H \( \frac{8}{3} \) h  
   J 10 h

17 Hector has 60 feet of fencing to enclose his vegetable garden. If he wants the garden to be 6 feet longer than it is wide, how many feet wide can the garden be?
   A 60 ft  
   B 12 ft  
   C 18 ft  
   D 27 ft

18 Jonah bought 3 equally priced sweatshirts. He gave the clerk a $100 bill and received $22.03 back in change. How much did each sweatshirt cost?
   F $25.99  
   G $27.97  
   H $29.82  
   J $33.33

19 Morgan is thinking of a number. She challenges her friend Melissa to find an inequality for the number from these clues. If 3 times the number is decreased by 7, the result is at least 17. Which of these inequalities represents the number \( n \)?
   A \( n \geq 8 \)  
   B \( n \leq 8 \)  
   C \( n \geq \frac{10}{3} \)  
   D \( n \leq \frac{10}{3} \)

20 A total of 70,000 soldiers died in the Petersburg Campaign of the Civil War. There were 14,000 fewer Confederate casualties than Union casualties. How many Confederate casualties were there in this campaign?
   F 28,000  
   G 35,000  
   H 42,000  
   J 48,000

21 The formula for the area of a triangle is \( A = \frac{1}{2}bh \). What is this formula solved for \( b \)?
   A \( b = \frac{1}{2}4h \)  
   B \( b = 2Ah \)  
   C \( b = 2A - h \)  
   D \( b = \frac{2A}{h} \)
OBJECTIVE A.2 The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables. Students will choose an appropriate computational technique, such as mental mathematics, calculator, or paper and pencil.

1. What is the value of $2\ell + 2w$ if $\ell = 6$ and $w = 5$?
   - A 15
   - B 18
   - C 22
   - D 28

2. The temperature in Duffield is $x$ degrees. If the temperature drops 22 degrees, it will be 54 degrees. Which equation represents this situation?
   - F $x - 22 = 54$
   - G $x + 22 = 54$
   - H $\frac{x}{22} = 54$
   - J $22x = 54$

3. Which expression represents the square of a number $n$, decreased by the number?
   - A $n^2 + n$
   - B $n^2 - n$
   - C $n^2 < n$
   - D $\sqrt{n} - n$

4. What is the approximate volume of air in the spherical balloon? The volume of a sphere with radius $r$ is $\frac{4\pi r^3}{3}$.
   - F 7,238 in$^3$
   - G 905 in$^3$
   - H 288 in$^3$
   - J 151 in$^3$

5. Antonia invested $10,000 at a bank, part at 2% and the rest at 2.5%. If she received $245 in interest after 1 year, how much did she invest at 2 percent? Which equation could be used to solve this problem, where $x$ represents the amount invested at 2%?
   - A $0.02x + 0.025(10,000 - x) = 245$
   - B $2x + 2.5(10,000 - x) = 245$
   - C $0.02x + 0.025(245 - x) = 10,000$
   - D $2x + 2.5(245 - x) = 10,000$
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.2 (continued)

6 Which expression represents 10 more than twice a number \( n \)?
   - F \( 10n + 2 \)
   - G \( 10 > 2n \)
   - H \( n + 10 \)
   - J \( 10 + 2n \)
   6 _________

7 The high temperature in Charlottesville one day was 20° Celsius. What is this temperature in degrees Fahrenheit? Use the formula \( F = \frac{9}{5}C + 32 \).
   - A 36°
   - B 43°
   - C 68°
   - D 212°
   7 _________

8 Luigi earns $8 per hour baby-sitting and $10 per hour working at a movie theater. If he baby-sits 50 hours in a year, how many hours would he need to work at the theater in order to earn $3,000 for a computer? Which equation represents this situation where \( x \) is the number of hours he would need to work at the theater?
   - F \( 400 + 10x = 3,000 \)
   - G \( 500 + 8x = 3,000 \)
   - H \( 8x + 10x = 3,000 \)
   - J \( 10x = 3,400 \)
   8 _________

9 Joanna spends 3 hours more each week practicing the piano than the clarinet. If \( n \) represents the number of hours she practices the clarinet, which expression represents the number of hours she practices the piano?
   - A \( \frac{n}{3} \)
   - B 3\( n \)
   - C \( n - 3 \)
   - D \( n + 3 \)
   9 _________

10 What is the approximate volume of this cone? The volume of a cone with radius \( r \) and height \( h \) is \( \frac{1}{3} \pi r^2 h \).
   - F 24 cm\(^3\)
   - G 72 cm\(^3\)
   - H 75 cm\(^3\)
   - J 226 cm\(^3\)
   10 _________
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

**OBJECTIVE A.3** The student will justify steps used in simplifying expressions and solving equations and inequalities. Justifications will include the use of concrete objects, pictorial representations, and the properties of real numbers, equality, and inequality.

1. The figure at the right shows a balanced scale. Which other scale would balance?
   - [Image of a balanced scale with a triangle at the bottom.]
   - **A**
   - **B**
   - **C**
   - **D**

2. Which statement is true if \( x \neq 0 \)?
   - \( F \) \( x \frac{1}{x} = 1 \)
   - \( G \) \( \frac{6x + 5}{3} = 2x + 5 \)
   - \( H \) \( -2^2 = 4 \)
   - \( J \) \( x + \frac{1}{x} = 1 \)

3. What is the simplified form of \( 4x - (3x + 8) \)?
   - **A** \( 12x^2 + 32x \)
   - **B** \( x - 4 \)
   - **C** \( x + 8 \)
   - **D** \( x - 8 \)

4. What is the simplified form of \( (3 - 5x)^2 \)?
   - **F** \( 9 + 25x^2 \)
   - **G** \( 6 - 10x \)
   - **H** \( 9 - 30x + 10x^2 \)
   - **J** \( 9 - 30x + 25x^2 \)

5. Laurene simplified the expression \( 2(3x + 4) \) to \( 6x + 8 \). Which property did she use?
   - **A** Additive Inverse Property
   - **B** Distributive Property of Multiplication over Addition
   - **C** Commutative Property of Addition
   - **D** Associative Property of Addition
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.3 (continued)

6 If \( \square = \star \) and \( \triangle = \diamond \), then which is true?

\[ \begin{align*}
F & \quad 4\square + 9\triangle = 2\star + 3\diamond \\
G & \quad 4\square + 9\triangle = 2\diamond + 2\star \\
H & \quad 4\square + 9\triangle = \star + 3\diamond \\
J & \quad 4\square + 9\triangle = 2(\diamond + \star) \\
\end{align*} \]

6 __________

7 What is the simplified form of \((8x + 1)(5x - 4)\)?

\[ \begin{align*}
A & \quad 40x^2 - 27x - 4 \\
B & \quad 40x^2 - 4 \\
C & \quad 13x - 3 \\
D & \quad 13x - 4 \\
\end{align*} \]

7 __________

For Questions 8 and 9, use this step-by-step solution of the equation \(8x + 2 = -6\).

\[
\begin{align*}
8x + 2 &= -6 \\
(1) \quad 8x + 2 + (-2) &= -6 + (-2) \\
& \quad 8x = -8 \\
(2) \quad \left(\frac{1}{8}\right)(8x) &= \left(\frac{1}{8}\right)(-8) \\
& \quad 1x = -1 \\
(3) \quad x = -1 \\
\end{align*}
\]

8 What property justifies step (1) in this solution?

\[ \begin{align*}
F & \quad \text{Identity Property of Addition} \\
G & \quad \text{Identity Property of Multiplication} \\
H & \quad \text{Addition Property of Equality} \\
J & \quad \text{Multiplication Property of Equality} \\
\end{align*} \]

8 __________

9 What property justifies step (2) in this solution?

\[ \begin{align*}
A & \quad \text{Identity Property of Addition} \\
B & \quad \text{Identity Property of Multiplication} \\
C & \quad \text{Addition Property of Equality} \\
D & \quad \text{Multiplication Property of Equality} \\
\end{align*} \]

9 __________

10 Of which property is this an example?

If \(2x = 3y \) and \(3y = 5z\), then \(2x = 5z\).

\[ \begin{align*}
F & \quad \text{Symmetric Property of Equality} \\
G & \quad \text{Transitive Property of Equality} \\
H & \quad \text{Associative Property of Equality} \\
J & \quad \text{Distributive Property} \\
\end{align*} \]

10 __________
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.4 The student will use matrices to organize and manipulate data, including matrix addition, subtraction, and scalar multiplication. Data will arise from business, industrial, and consumer situations.

1. The average life span of a sugar glider is 12 years, and its maximum mass is 130 grams. The average life span of a guinea pig is 5 years, and its maximum mass is 1,200 grams. Which matrix represents this information?

   A. \[
   \begin{bmatrix}
   130 & 12 \\
   1,200 & 5 
   \end{bmatrix}
   \]
   B. \[
   \begin{bmatrix}
   1,200 & 5 \\
   130 & 12 
   \end{bmatrix}
   \]
   C. \[
   \begin{bmatrix}
   130 & 1,200 \\
   12 & 5 
   \end{bmatrix}
   \]
   D. \[
   \begin{bmatrix}
   1,200 & 12 \\
   130 & 5 
   \end{bmatrix}
   \]

2. These matrices show the stock change on a Monday and Tuesday from the previous day during two different weeks. Which matrix gives the sum of these changes for the Mondays and Tuesdays?

   A. \[
   \begin{bmatrix}
   +3.5 \\
   +0.75 
   \end{bmatrix}
   \begin{bmatrix}
   -0.25 \\
   +2.0 
   \end{bmatrix}
   \]
   B. \[
   \begin{bmatrix}
   +1.5 \\
   +1.75 
   \end{bmatrix}
   \begin{bmatrix}
   -3.25 \\
   0.0 
   \end{bmatrix}
   \]
   C. \[
   \begin{bmatrix}
   +1.5 \\
   +2.0 
   \end{bmatrix}
   \begin{bmatrix}
   -2.25 \\
   0.0 
   \end{bmatrix}
   \]
   D. \[
   \begin{bmatrix}
   +3.5 \\
   +1.75 
   \end{bmatrix}
   \begin{bmatrix}
   -3.25 \\
   +2.0 
   \end{bmatrix}
   \]
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

**OBJECTIVE A.4 (continued)**

3 This matrix gives the price of a sweater and a jacket at a store. If the store increases its prices 10%, which matrix will represent the new prices?

\[
\begin{bmatrix}
\text{sweater} & \text{jacket} \\
$30 & $56 \\
\end{bmatrix}
\]

A \[\begin{bmatrix} \$3 & \$5.60 \end{bmatrix}\]  
B \[\begin{bmatrix} \$27 & \$50.40 \end{bmatrix}\]  
C \[\begin{bmatrix} \$40 & \$66 \end{bmatrix}\]  
D \[\begin{bmatrix} \$33 & \$61.60 \end{bmatrix}\]

4 This matrix gives the cost of two types of bottled water at a convenience store and a supermarket during a given week.

\[
\begin{bmatrix}
\text{Great Water} & \text{Convenience Store} & \text{Supermarket} \\
$1.19 & $0.99 \\
$1.25 & $1.04 \\
\end{bmatrix}
\]

This matrix gives the costs of the same types of water the following week.

\[
\begin{bmatrix}
\text{Great Water} & \text{Convenience Store} & \text{Supermarket} \\
$1.15 & $0.89 \\
$1.20 & $0.95 \\
\end{bmatrix}
\]

Which matrix represents the difference in price of the water between the two weeks?

F \[\begin{bmatrix} \$0.05 & \$0.10 \\
\$0.04 & \$0.09 \end{bmatrix}\]  
G \[\begin{bmatrix} \$0.04 & \$0.05 \\
\$0.05 & \$0.10 \end{bmatrix}\]  
H \[\begin{bmatrix} \$0.04 & \$0.10 \\
\$0.05 & \$0.11 \end{bmatrix}\]  
J \[\begin{bmatrix} \$0.04 & \$0.10 \\
\$0.05 & \$0.09 \end{bmatrix}\]

5 For Questions 5 and 6, use the matrices \[A = \begin{bmatrix} 7 & -2 \\ 5 & 4 \end{bmatrix}\] and \[B = \begin{bmatrix} 2 & -9 \\ 3 & -6 \end{bmatrix}\].

What does \[\begin{bmatrix} 9 & 7 \\ 8 & -2 \end{bmatrix}\] equal?

A \(A - B\)  
B \(B - A\)  
C \(A + B\)  
D \(-B - A\)

6 What does \[\begin{bmatrix} 6 & 27 \\ 9 & -18 \end{bmatrix}\] equal?

F \(A - B\)  
G \(A + B\)  
H \(3B\)  
J \(2A - 4B\)
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.5 The student will create and use tabular, symbolic, graphical, verbal, and physical representations to analyze a given set of data for the existence of a pattern, determine the domain and range of relations, and identify the relations that are functions.

1. Which is the graph of a function of $x$?
   - A
   - B
   - C
   - D

2. Which is a function?
   - F $(2, 1), (2, 2), (2, 3)$
   - G $(2, 1), (1, 2), (2, 7)$
   - H $(2, 1), (3, 5), (3, 8)$
   - J $(2, 1), (3, 1), (5, 7)$

3. Which equation is satisfied by all the ordered pairs in this table?
   - A $x - 2y = -11$
   - B $2x + y = 8$
   - C $x + 2y = 13$
   - D $2x - y = -4$

4. What is the domain of $y = \frac{1}{x + 3}$?
   - F All real numbers
   - G All real numbers except $-3$
   - H All real numbers except 0
   - J All real numbers greater than $-3$
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.5 (continued)

5 Which graph represents the data in this table?

<table>
<thead>
<tr>
<th>Investment ($)</th>
<th>Interest ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100</td>
<td>$4</td>
</tr>
<tr>
<td>$200</td>
<td>$8</td>
</tr>
<tr>
<td>$400</td>
<td>$16</td>
</tr>
</tbody>
</table>

A

B

C

D

5 _________

For Questions 6 and 7, use the relation shown in this graph.

6 What is the domain?

F \{-4, -3, -2, -1, 1, 2, 3, 4\}
G \{-3 \leq x \leq 4\}
H \{-3, -2, -1, 1, 4\}
J \{-4, -1, 1, 2, 3\}

6 _________

7 What is the range?

A \{-4, -3, -2, -1, 1, 2, 3, 4\}
B \{-3 \leq x \leq 4\}
C \{-3, -2, -1, 1, 4\}
D \{-4, -1, 1, 2, 3\}

7 _________

8 The data in this table represent a cubic pattern. What is the value of \(x\)?

\[
\begin{array}{cccc}
1 & 2 & 3 & 4 \\
1 & 8 & 27 & x
\end{array}
\]

F 16  
G 36  
H 48  
J 64

8 _________
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.5 (continued)

For Questions 9 and 10, use the function shown in this graph.

9 What is the range?
   A $-4 \leq x \leq 4$
   B $-3 \leq y \leq 3$
   C $-2, -1, 1$
   D $-3, -1, 1, 3$

10 What is the domain?
   F $-4 \leq x \leq 4$
   G $-3 \leq y \leq 3$
   H $-2, -1, 1$
   J $-3, -1, 1, 3$

For Questions 11 and 12, use the relation {(2, 6), (3, 11), (5, 19)}.

11 What is the domain?
   A $\{6, 11, 19\}$
   B $\{2, 3, 5\}$
   C $\{2, 3, 5, 6, 11, 19\}$
   D All real numbers

12 What is the range?
   F $\{6, 11, 19\}$
   G $\{2, 3, 5\}$
   H $\{2, 3, 5, 6, 11, 19\}$
   J All real numbers

13 Which relation is a function of $x$?
   A $y = x^2$
   B $x = y^2$
   C $x^2 + y^2 = 4$
   D $x = 6$

14 Which is true?
   F In the graph of a relation, no two points may lie on the same vertical line.
   G In the graph of a relation, no two points may lie on the same horizontal line.
   H In the graph of a function of $x$, no two points may lie on the same vertical line.
   J In the graph of a function of $x$, no two points may lie on the same horizontal line.

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Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.6 The student will select, justify, and apply an appropriate technique to graph linear functions and linear inequalities in two variables. Techniques will include slope-intercept, x- and y-intercepts, graphing by transformations, and the use of the graphing calculator.

1 Terrell jogs on the Chessie Nature Trail at a constant speed of 4 miles per hour. The equation relating his speed to distance traveled is \( y = 4 \). Which is the graph of this equation?

A

B

C

D

2 Which would be the easiest way to graph \( y = 3x - 4 \)?

F  Find the x-intercept and y-intercept for \( y = 3x \), graph them, draw the line, and then redraw the line 4 points down.

G  Make a table of 10 values for \( x \), find \( y \) for each, plot these points, and draw the line.

H  Graph the y-intercept, count off the slope to get a second point, and draw the line.

J  Solve the equation for \( x \), find the x-intercept, count off the slope to get a second point, and draw the line.

3 If the graph shown is translated 4 to the right, what will be the equation of the image?

A  \( y = -\frac{1}{2}x + 6 \)

B  \( y = -\frac{1}{2}x + 5 \)

C  \( y = -\frac{1}{2}x + 1 \)

D  \( y = -\frac{1}{2}x + 3 \)

4 Which is the equation of the image of \( y = x + 2 \) reflected over the x-axis?

F  \( y = x - 2 \)

G  \( y = -x + 2 \)

H  \( y = x + \frac{1}{2} \)

J  \( y = -x - 2 \)
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

**OBJECTIVE A.6 (continued)**

5 Which is the graph of $2x - 5y < 10$?

A

B

C

D

6 Which is the graph of $y = \frac{3}{4}x - 1$?

F

G

H

J

7 Which is the graph of $2x - 3y = 6$?

A

B

C

D

8 Which would you do in order to draw the graph of $y = -4x + 3$?

F Graph $-4$ on the $y$-axis and go up 3 and right 1 to get another point.

G Graph 3 on the $y$-axis and go down 4 and right 1 to get another point.

H Graph 3 on the $x$-axis and go right 4 and up 1 to get another point.

J Graph $-4$ on the $x$-axis and go right 3 and up 1 to get another point.
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

**OBJECTIVE A.7** The student will determine the slope of a line when given an equation of the line, the graph of the line, or two points on the line. Slope will be described as rate of change and will be positive, negative, zero, or undefined. The graphing calculator will be used to investigate the effect of changes in the slope on the graph of the line.

1. What is the slope of the line \( y = \frac{3}{5}x - 6 \)?
   - A: 1
   - B: \( \frac{3}{5} \)
   - C: \( -\frac{5}{3} \)
   - D: -6

2. What is the slope of the line \( 6x - 2y = 12 \)?
   - F: 6
   - G: 3
   - H: \( \frac{1}{3} \)
   - J: -6

3. Vince is doing an experiment breeding fruit flies for his biology class at Virginia Tech. At 1 P.M., he counts 100 fruit flies in a box. At 4 P.M., there are 370 flies in the box. What is the rate of change of fruit flies per hour?
   - A: 50
   - B: 67.5
   - C: 90
   - D: 270

4. What is the slope of the line \( x = -1 \)?
   - F: 1
   - G: 0
   - H: -1
   - J: undefined

5. What is the slope of a horizontal line?
   - A: positive
   - B: negative
   - C: undefined
   - D: zero

6. What is the slope of the line shown?
   - F: -1
   - G: \( -\frac{1}{2} \)
   - H: \( \frac{3}{2} \)
   - J: 2

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Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

**OBJECTIVE A.7 (continued)**

7. What is the slope of the line containing the points at \((-7, -6)\) and \((2, -3)\)?

A. \(\frac{1}{3}\)  
B. \(\frac{-3}{5}\)  
C. \(-1\)  
D. \(\frac{-9}{5}\)

8. How has the slope of line 1 changed to create line 2?

F. It has increased.  
G. It has decreased.  
H. It has changed from positive to negative.  
J. It has changed from negative to positive.

9. How has the slope of line 1 changed to create line 2?

A. It has changed from positive to negative.  
B. It has changed from positive to undefined.  
C. It has changed from negative to positive.  
D. It has increased.

10. What is the slope of the line \(x + 5y = 2\)?

F. 1  
G. \(\frac{2}{5}\)  
H. \(-\frac{1}{5}\)  
J. \(-5\)
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

**OBJECTIVE A.8** The student will write an equation of a line when given the graph of the line, two points on the line, or the slope and a point on the line.

1. Loretta’s salary was $42,000 in 1996, and it increased at a constant rate to $60,000 in 2004. Using $x = 0$ for 1996, which is an equation for her salary $y$ in terms of the number of years $x$ since 1996?

   A. $y = 18,000x + 42,000$
   B. $y = 42,000x + 60,000$
   C. $y = 2,250x + 42,000$
   D. $y = -8x + 60,000$

2. Which is an equation of the line shown in this graph?

   F. $y = 2x$
   H. $x = 2$
   G. $x + y = 2$
   J. $y = 2$

3. Which is an equation of the line containing the points at (2, 4) and (6, -8)?

   A. $y = -\frac{1}{3}x - 8$
   C. $x + 3y = 14$
   B. $y = -3x + 4$
   D. $3x + y = 10$

4. Which is an equation of the line with slope 5 and $y$-intercept $-2$?

   F. $y = -2$
   H. $5x - 2y = 0$
   G. $y = 5x + 2$
   J. $y = 5x - 2$

5. Which is an equation of the line with slope $\frac{2}{3}$ and $y$-intercept 4?

   A. $2x - 3y = -12$
   B. $3x - 2y = 8$
   C. $\frac{2}{3}x - 4y = 0$
   D. $-2x + 3y = 4$
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.8 (continued)

6 Which is an equation of the line with slope 2 that contains the point at \((-1, 4)\)?

\[ \text{F} \quad y = 2x + 4 \quad \text{G} \quad 2x + y = 4 \]
\[ \text{H} \quad y = 2x + 6 \quad \text{J} \quad 2x - y = -5 \]

7 An airplane began a constant descent toward the Lynchburg airport from an elevation of 10,000 feet. After 10 minutes, the plane was at an altitude of 3,000 feet. Which is an equation of the height of the plane \( h \) as a function of the minutes \( t \) it has been descending?

\[ \text{A} \quad h = -700t + 10,000 \]
\[ \text{B} \quad h = 700t - 10,000 \]
\[ \text{C} \quad h = 3,000t + 10,000 \]
\[ \text{D} \quad h = -700t + 3,000 \]

8 Which is an equation of the line that contains the points at \((8, 4)\) and \((8, -3)\)?

\[ \text{F} \quad x = 8 \quad \text{G} \quad x = 16 \]
\[ \text{H} \quad y = 1 \quad \text{J} \quad y = -3 \]

9 Elinor bought a boat for $13,000 to use on Smith Mountain Lake. If the value of the boat decreases $500 each year, which equation gives the value \( y \) of Elinor’s boat after \( x \) years?

\[ \text{A} \quad y = 500x + 13,000 \]
\[ \text{B} \quad y = -500x + 13,000 \]
\[ \text{C} \quad y = 13,000x + 500 \]
\[ \text{D} \quad y = -13,000x + 500 \]

10 Which is an equation of the line that contains the point at \((-6, 10)\) and has a slope of 0?

\[ \text{F} \quad x = -6 \quad \text{G} \quad y = 10 \]
\[ \text{H} \quad y = 0x - \frac{5}{3} \quad \text{J} \quad -6x + 10y = 0 \]
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.9 The student will solve systems of two linear equations in two variables both algebraically and graphically and apply these techniques to solve practical problems. Graphing calculators will be used both as a primary tool for solution and to confirm an algebraic solution.

For Questions 1 and 2, Helen and Althea went shopping for towels to take to college. Helen bought 4 bath towels and 3 hand towels for $72 while Althea bought 3 bath towels and 6 hand towels of the same kind for $84.

1 Which system of equations could you use to find the cost of 1 bath towel where \( x \) is the cost of 1 bath towel and \( y \) the cost of 1 hand towel?
   A \( 4x + 3y = 72 \)
   \( 3x + 6y = 84 \)
   B \( 3x + 4y = 72 \)
   \( 6x + 3y = 84 \)
   C \( x + y = 72 \)
   \( x + y = 84 \)
   D \( x + 4 + y + 3 = 72 \)
   \( x + 3 + y + 6 = 84 \)

2 How much did 1 bath towel cost?
   F $8
   G $10
   H $12
   J $15

3 Which graph shows the solution of \( x + y = 6 \) and \( y = \frac{1}{2}x + 2 \)?

4 Which system of equations is shown?
   F \( y = 3 \)
   \( y = 2x + 1 \)
   G \( y = 3 \)
   \( y = -2x + 1 \)
   H \( x = 3 \)
   \( y = 2x + 1 \)
   J \( x = 3 \)
   \( y = -2x + 1 \)
Objective A.9 (continued)

5 The sum of the ages of Gunston Hall Plantation $x$ and Arlington House $y$ in 2003 was 449 years. If Gunston Hall Plantation is 47 years older than Arlington House, which system of equations could be used to solve for the ages of these two buildings?

- A $x + y = 449$
- B $x + y = 449$
- C $x + y = 449$
- D $x + y = 449$

6 What is the solution of the system shown in this graph?

- F $(4, 0)$
- G $(0, 0)$
- H There is no solution.
- J There is an infinite number of solutions.

For Questions 7 and 8, the sum of the elevations of Front Royal and Hot Springs is 2,760 feet. The sum of the smaller elevation and 3 times the higher elevation is 7,150 feet.

7 What are the elevations?

- A Both are 1,380 ft.
- B 565 ft and 2,195 ft
- C 920 ft and 1,840 ft
- D 565 ft and 6,585 ft

8 Which system of equations represents this problem, where $x$ is the smaller elevation?

- F $x + y = 2,760$
- G $x + y = 2,760$
- H $x + y = 7,150$
- J $x + y = 7,150$

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Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.9 (continued)

For Questions 9 and 10, Amelia had a total of 1,260 marbles and table tennis balls. She had 40 fewer marbles than table tennis balls.

9 How many table tennis balls did she have?
   A 570  B 610  C 630  D 650

10 Which system of equations could be used to solve this problem, where \( x \) represents the number of marbles and \( y \) the number of table tennis balls?
   F \( xy = 1,260 \)
   \[ x = 40 - y \]
   \[ y = 1,260 + x \]  \( y < 40 \)
   G \( x + y = 1,260 \)
   \[ x = y - 40 \]
   \[ x + y = 1,260 \]  \( y = x - 40 \)
   H \[ y = 1,260 \]
   \[ x = 40 \]
   \[ y = 1,260 \]  \( x = x - 40 \)
   J \[ x = 1,260 \]

For Questions 11 and 12, Mark is doing a chemistry lab experiment in class at Virginia Military Institute. He needs to obtain 1 liter of a 30 percent acid solution by mixing a 20 percent solution with a 60 percent solution.

11 Which system of equations could be used to find the amount of each type of solution that Mark should use, where \( x \) represents the amount of 20 percent acid solution and \( y \) the amount of 60 percent acid solution?
   A \( 0.2x + 0.6y = 1 \)
   \[ 0.2x + 0.6y = 3 \]
   \[ x + y = 0.3 \]
   B \( x + y = 1 \)
   \[ 0.2x + 0.6y = 30 \]
   \[ 0.2x + 0.6y = 0.3 \]
   C \( 0.2x + 0.6y = 1 \)
   \[ x + y = 1 \]
   \[ 0.2x + 0.6y = 0.3 \]
   D \( x + y = 1 \)

12 How many liters of 20 percent acid solution should Mark use?
   F 0.2 L  G 0.25 L  H 0.5 L  J 0.75 L

13 Which is the solution of this system of equations?
   \[ 4(x + y) = 4 \]
   \[ y = \neg x + 1 \]
   A \((-7, 8)\)
   B \((-7, 6)\)
   C There is no solution.
   D There is an infinite number of solutions.
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.10 The student will apply the laws of exponents to perform operations on expressions with integral exponents, using scientific notation when appropriate.

1 Cumberland Gap National Historical Park has an area of $2.0 \times 10^4$ acres. How is this number written in decimal notation?
   A 2,000
   B 20,000
   C 200,000
   D 2,000,000

2 Which expression has a base of $k$, a coefficient of 5, and an exponent of 7?
   F $5k^7$
   G $7 \cdot 5^k$
   H $5 \cdot 7^k$
   J $7k^5$

3 What does $2^{-3}$ equal?
   A $-8$
   B $-6$
   C $-\frac{1}{8}$
   D $\frac{1}{8}$

4 The George Washington Masonic National Memorial is $3.33 \times 10^2$ feet tall. What is this number written in decimal notation?
   F 33
   G 333
   H 3,330
   J 33,300

5 What is the simplified form of $\frac{(-5x^2yz)^2}{10x^4yz^4}$?
   A $yz^2$
   B $\frac{5yz^2}{2}$
   C $\frac{-5}{2x^2z}$
   D $\frac{-y^2z}{2}$
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

**OBJECTIVE A.10** (continued)

6 What is the simplified form of \((5x^3)^2 + (2x^3)^2\)?

- F 9x^5
- G 7x^6
- H 14x^6
- J 29x^6

7 Wendy is multiplying \(c^3\) by \(c^4\). Which expression is equal to the product?

- A \(3 \cdot c \cdot 4 \cdot c\)
- B \(c \cdot c \cdot c + c \cdot c \cdot c \cdot c\)
- C \(c \cdot c \cdot c \cdot c \cdot c \cdot c\)
- D \((c + c + c)(c + c + c + c)\)

8 The population of Portsmouth was about \(1.0 \times 10^5\) in 2003 while the population of Onancock was about \(1.5 \times 10^3\). Approximately how many times greater in population was Portsmouth than Onancock? Round your answer to the nearest whole number.

- F 7
- G 15
- H 55
- J 67

9 What is the simplified form of \(\frac{(x^{-3}y^5z^2)^2}{x^{-4}z^4}\)?

- A \(\frac{xy^5}{z^2}\)
- B \(\frac{x^2y^7}{z^4}\)
- C \(\frac{y^{10}}{x^2z}\)
- D \(\frac{z^{10}}{x^3}\)

10 What is the simplified form of \((3.6 \times 10^2) \times (2.4 \times 10^4)\)?

- F \(8.64 \times 10^8\)
- G \(6.0 \times 10^8\)
- H \(8.64 \times 10^6\)
- J \(6.0 \times 10^6\)
Name __________________________ Date ________________

Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.10 (continued)

11 Which of these numbers is the least?
   A  $0.07 \times 10^{-5}$
   B  $4.6 \times 10^{-4}$
   C  $0.0000001$
   D  $9.8 \times 10^{-8}$

12 Marguerite is building a deck with a step of uniform width on three sides as shown in the figure. What expression gives the area of just her deck?

13 The area of Sandy Bottom Nature Park is 456 acres. What is this number written in scientific notation?
   A  $4.56 \times 10^{-2}$
   B  $4.56 \times 10^{2}$
   C  $4.56 \times 10^{3}$
   D  $0.456 \times 10^{4}$

14 Razonda was finding the volume of the box shown in the figure. She knew she had to multiply the length times the width times the height. Which expression represents the volume?

15 Marlon multiplied two numbers on his graphing calculator. The answer he got on the calculator was $7.476E5$. What was the product?
   A  747,600
   B  57,476
   C  38.38
   D  7.4765
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

**OBJECTIVE A.11** The student will add, subtract, and multiply polynomials and divide polynomials with monomial divisors, using concrete objects, pictorial and area representations, and algebraic manipulations.

1. Which expression represents the area of this triangle?
   - A: $2x^2 - 10x - 28$
   - B: $x^2 - 5x - 14$
   - C: $3x - 3$
   - D: $2x^2 - 28$

2. What does $(y - 3)(y + 7)$ equal?
   - F: $y^2 - 21$
   - G: $y^2 + 4y - 21$
   - H: $5y + 4$
   - J: $2y - 10$

3. What does $(2a + 4b)^2$ equal?
   - A: $4a^2 + 16b^2$
   - B: $4a + 8b$
   - C: $a^2 + 4ab + 4b^2$
   - D: $4a^2 + 16ab + 16b^2$

4. What expression represents the perimeter of this rectangle?
   - F: $8a - 2$
   - G: $15a^2 + 2a - 24$
   - H: $16a - 4$
   - J: $15a^2 - 24$

5. What does $(3x^2 + 2x - 7) + (4x^2 - 7x + 9)$ equal?
   - A: $7x^2 + 9x - 16$
   - B: $7x^2 - 5x + 2$
   - C: $12x^2 - 5x - 16$
   - D: $7x^4 - 14x^2 - 63$

6. What does $(4a^2 - 5a - 2) - (a^2 + 6a - 8)$ equal?
   - F: $3a^2 - 11a + 6$
   - G: $3a^2 + a - 10$
   - H: $4a^4 - 30a^2 + 16$
   - J: $-2a^3$
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.11 (continued)

7 This figure represents which product of binomials?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$2x^2$</td>
<td>$8xy$</td>
</tr>
<tr>
<td>$-3xy$</td>
<td>$-12y^2$</td>
</tr>
</tbody>
</table>

A $\left(2x - 4y\right)\left(x + 3y\right)$
B $\left(2x + 4y\right)\left(x - 3y\right)$
C $\left(2x - 3y\right)\left(x + 4y\right)$
D $\left(2x + 3y\right)\left(x - 4y\right)$

7 ________

8 What is the simplified form of $2x\left(3x + y\right) - 4\left(5x + 9y\right)$?

F $6x^2 + 10y - 20x$
G $-14x - 35y$
H $-14x + 2xy - 36y$
J $6x^2 + 2xy - 20x - 36y$

8 ________

9 What is the simplified form of $\frac{6x - 12x^4 + 36x^5}{6x}$?

A $1 - 2x^3 + 6x^4$
B $-2x^3 + 6x^4$
C $1 - 2x^4 + 6x^5$
D $-18x^3 + 30x^4$

9 ________

10 Betsy bought her friend a soccer ball as a birthday present. What expression gives the volume of the cubical box shown in the figure that Betsy found to wrap the soccer ball in?

F $6a^3$
G $8a^{27}$
H $8a^9$
J $4a^6$

10 ________

11 What expression represents the measure of the third angle of the triangle shown in the figure?

A $3a + 20$
B $-3a + 200$
C $200 + 3a$
D $160 - 3a$

11 ________
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.12 The student will factor completely first- and second-degree binomials and trinomials in one or two variables. The graphing calculator will be used as a tool for factoring and for confirming algebraic factorizations.

1 This figure shows a University of Virginia foam cold drink holder. The volume of the foam is $\pi b^2 h - \pi a^2 h$. Which is the complete factorization of $\pi b^2 h - \pi a^2 h$?

A $2\pi h(b - a)$  
B $\pi(b^2 h - a^2 h)$  
C $\pi h(b^2 - a^2)$  
D $\pi h(b + a)(b - a)$

2 What is the complete factorization of $3y^2 - 30y + 72$?

F $(3y - 18)(3y - 12)$  
G $(y - 18)(y - 12)$  
H $3(y - 12)(y + 2)$  
J $3(y - 6)(y - 4)$

3 What is the complete factorization of $4a^2 - 28a + 13b$?

A $(4a - 1)(a - 12)$  
B $4(a^2 - 7a + 3b)$  
C $(2a + 3)(2a + 4)$  
D Cannot be factored

4 The model shown in this figure illustrates which problem?

F $2x^2 + 5x + 2 = (2x + 1)(x + 2)$  
G $2x^2 + 5x + 2 = (2x + 2)(x + 1)$  
H $x^3 + 2x^2 + x + 2 = (x^2 + 1)(x + 2)$  
J $x^4 + 7 = (x^2 + 1)(x^2 + 7)$
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

**OBJECTIVE A.12 (continued)**

5 Raylene said that $9x^2 - 64$ factors into $(3x - 8)^2$, but Antonio disagreed with her. Which correct multiplication problem could Antonio use to show Raylene that her factorization is not correct?

- A $(3x - 8)(3x - 8) = 9x^2 - 24x + 64$
- B $(3x - 8)(3x - 8) = 9x^2 + 64$
- C $(3x - 8)(3x - 8) = 9x^2 - 16$
- D $(3x - 8)(3x - 8) = 9x^2 - 48x + 64$

6 What is the complete factorization of $x^2 + 8x - 20$?

- F $(x + 20)(x - 12)$
- G $(x + 10)(x - 2)$
- H $(x - 10)(x + 2)$
- J $(x - 5)(x - 4)$

7 After two years, an investment of $500 compounded annually at an interest rate of $r$ will yield an amount $500 + 1,000r + 500r^2$. Which is the complete factorization of this expression?

- A $500(1 + r)^2$
- B $500(1 + r + r^2)$
- C $r(1,000 + 500r)$
- D $500(2r + r^2)$

8 Which is the complete factorization of $6x^2y + 12xy^3$?

- F $x^2y(6 + 2y)$
- G $2y(3x^2 + 6xy^2)$
- H $6xy(x + 2y^2)$
- J $3x(2xy + 4y^3)$

9 Which is the complete factorization of $16a^2 - 24ab + 9b^2$?

- A $(4a + 3b)(4a - 3b)$
- B $(4a + 3b)^2$
- C $(4a - 3b)^2$
- D $(4a - 3)^2$

10 A square piece of cardboard 4 inches on a side has square corners of side $x$ inches cut out of it as shown in the figure. The area of the remaining cardboard is $16 - 4x^2$ square inches. What is the complete factorization of this expression?

- F $(4 - 2x)^2$
- G $4(2 - x)(2 + x)$
- H $(2x + 4)(2x - 4)$
- J $4(2 - x)^2$
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.13 The student will express the square root of a whole number in simplest radical form and approximate square roots to the nearest tenth.

1 The side of a square picture of Monticello is $2\sqrt{5}$ centimeters. The area of the square is $(2\sqrt{5})^2$ square centimeters. What is the simplified form of $(2\sqrt{5})^2$?
   A 7  B 10  C 20  D 50

2 What is the simplified form of $3\sqrt{8} + 5\sqrt{98}$?
   F $9\sqrt{2}$  G $41\sqrt{2}$  H $82\sqrt{2}$  J $8\sqrt{106}$

3 What is the simplified form of $\sqrt{12}$?
   A 9  B 6  C $2\sqrt{3}$  D $3\sqrt{2}$

4 The area of a square is 79 square centimeters. How long is each side of the square? Round your answer to the nearest tenth.
   F 8.9 cm  G 9.0 cm  H 19.8 cm  J 39.5 cm

5 What is the simplified form of $9\sqrt{54}$?
   A $3\sqrt{6}$  B $54\sqrt{3}$  C $27\sqrt{3}$  D $27\sqrt{6}$

6 What does $6\sqrt{2}$ equal? Round your answer to the nearest tenth.
   F 1.4  G 7.4  H 8.5  J 12.0
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.13 (continued)

7 The diameter of a round plate is \( \sqrt{18} \) inches. What is the simplified form of this expression?
   - A \( 9\sqrt{2} \) in.
   - B \( 3\sqrt{2} \) in.
   - C \( 2\sqrt{3} \) in.
   - D \( \sqrt{6} \) in.

8 Which square root simplifies to \( 19\sqrt{7} \)?
   - F \( \sqrt{2,527} \)
   - G \( \sqrt{368} \)
   - H \( \sqrt{266} \)
   - J \( \sqrt{133} \)

9 What is the perimeter of the triangle shown in the figure?
   - A \( 18\sqrt{2} \) m
   - B \( 11 + 7\sqrt{2} \) m
   - C \( 13 + 5\sqrt{2} \) m
   - D \( 11 + \sqrt{78} \) m

10 Which statement is true for all positive values of \( x \) and \( y \) where \( x \) is greater than \( y \)?
   - F \( \sqrt{x + y} = \sqrt{x} + \sqrt{y} \)
   - G \( \sqrt{x - y} = \sqrt{x} - \sqrt{y} \)
   - H \( \sqrt{4x} = 4\sqrt{x} \)
   - J \( \sqrt{xy} = \sqrt{x}\sqrt{y} \)

11 Giuseppe was standing 100 feet away from a point directly underneath the Natural Bridge of Virginia. If the distance between his feet and the bridge was 237 feet, how high above the ground is the bridge? Round your answer to the nearest foot.
   - A 137 ft
   - B 165 ft
   - C 200 ft
   - D 215 ft
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.14 The student will solve quadratic equations in one variable both algebraically and graphically. Graphing calculators will be used both as a primary tool in solving problems and to verify algebraic solutions.

1. Use your calculator to graph \( y = 5x^2 - 6x - 1 \). What is the greater solution of \( 5x^2 - 6x - 1 = 0 \)? Round your answer to the nearest tenth.
   - A. \(-0.1\)
   - B. \(-1.0\)
   - C. \(1.3\)
   - D. \(-2.8\)

2. What is/are the solution(s) of \( x^2 + 4x - 12 = 0 \)? Use the given graph of \( y = x^2 + 4x - 12 \).
   - F. \(-12, -6, 2\)
   - G. \(-12\)
   - H. \(-6, 2\)
   - J. \(-2, -16\)

3. What are the solutions of \( x^2 + 4x + 1 = 0 \)?
   - A. \(-4 \pm \sqrt{3}\)
   - B. \(-2 \pm \sqrt{3}\)
   - C. \(-4 \pm \sqrt{5}\)
   - D. \(-2 \pm \sqrt{5}\)

4. The length of the rectangular yard shown in the figure is 50 less than 4 times the width. One side of the yard is bordered by the Potomac River. If the area of the yard is 16,100 square feet, how many feet of the yard is alongside the river?
   - F. 70 ft
   - G. 230 ft
   - H. 330 ft
   - J. 425 ft

5. Which is/are the solution(s) of \( (4 - x)^2 = 9 \)?
   - A. \(1\)
   - B. \(-7\)
   - C. \(1, 7\)
   - D. \(-1, -7\)
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

**OBJECTIVE A.14 (continued)**

6 Between which two consecutive integers does one solution of \( x^2 + 8x + 2 = 0 \) lie?
- \( \text{F} \) 0 and 1
- \( \text{G} \) −5 and −4
- \( \text{H} \) −8 and −7
- \( \text{J} \) −12 and −11

7 A group of high school students were going to Arlington, Virginia, and Washington, D.C. The trip cost the group $7,200. When two of the students could not go on the trip, the cost per person increased by $120. Which equation could be used to find the number of students who went on the trip?
- \( \text{A} \) \( x^2 − 2x − 120 = 0 \)
- \( \text{B} \) \( x^2 + 2x + 7,200 = 0 \)
- \( \text{C} \) \( (x − 2)(x + 120) = 7,200 \)
- \( \text{D} \) \( \frac{7,200}{x − 2} = 120 \)

For Questions 8 and 9, Miranda has a swimming pool in her back yard that is 20 feet wide and 30 feet long. She wants to put a deck of uniform width \( x \) around the pool so that the combined area of the pool and the deck will be 1,344 square feet.

8 Which equation could she use to find the width for the deck?
- \( \text{F} \) \( (30 + 2x)(20 + 2x) = 1,344 \)
- \( \text{G} \) \( (30 + x)(20 + x) = 1,344 \)
- \( \text{H} \) \( (30 + 2x)(20 + 2x) = 744 \)
- \( \text{J} \) \( (30 + x)(20 + x) = 744 \)

9 What is the width of the deck?
- \( \text{A} \) 4 ft
- \( \text{B} \) 6 ft
- \( \text{C} \) 8 ft
- \( \text{D} \) 12 ft

10 What are the solutions of \( x^2 + 6x = 27 \)?
- \( \text{F} \) 0, −6
- \( \text{G} \) 21, 27
- \( \text{H} \) 9, −3
- \( \text{J} \) −9, 3
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.14 (continued)

11 Use your graphing calculator to estimate the greater solution of \(3x^2 - 4x - 8 = 0\). What is this solution, rounded to the nearest hundredth?
   A \(-9.33\)  B \(-1.10\)  C \(0.67\)  D \(2.43\)

12 What is/are the solution(s) of \(9x^2 - 36 = 0\)?
   F \(4\)  G \(0, 4\)  H \(2, -2\)  J \(6, -6\)

13 For what value of \(k\) will the equation \(x^2 + kx + 16 = 0\) have exactly one real solution which is negative?
   A \(8\)  B \(4\)  C \(-4\)  D \(-8\)

14 Which quadratic equation has solutions \(-4\) and 0?
   F \(x(x + 4) = 0\)  G \((x - 4)(x + 4) = 0\)  H \(x(x - 4) = 0\)  J \(4(x + 4) = 0\)

15 Which is the graph of a quadratic function which has a related quadratic equation with two real solutions?
   A  
   B  
   C  
   D  

Virginia SOL, Algebra I  45
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

**OBJECTIVE A.15** The student will, given a rule, find the values of a function for elements in its domain and locate the zeros of the function both algebraically and with a graphing calculator. The value of \( f(x) \) will be related to the ordinate on the graph.

For Questions 1 and 2, the area \( A(x) \) in square feet of the window shown in the figure is given by \( A(x) = 2x^2 + \frac{1}{8}\pi x^2 \).

1. What does \( A(5) \) represent?
   - A) the height of the window when the width is 5 ft
   - B) the width of the window when the height is 5 ft
   - C) the area of the window when the height is 5 ft
   - D) the area of the window when the width is 5 ft

2. What is the area of the window if the width is 4 feet?
   - F) \( 32 + \frac{1}{2}\pi \) ft\(^2\)
   - G) \( 32 + 2\pi \) ft\(^2\)
   - H) \( 8 + \frac{1}{2}\pi \) ft\(^2\)
   - J) \( 8 + 2\pi \) ft\(^2\)

3. What is the zero of \( f(x) = 2x - 10 \)?
   - A) 5
   - B) 2
   - C) \(-8\)
   - D) \(-10\)

4. How do you use the graph of a function \( f(x) \) to find \( f(3) \)?
   - F) Find the ordinate when \( x = 3 \).
   - G) Find the \( x \)-intercept nearest \( x = 3 \).
   - H) Find the slope when \( x = 3 \).
   - J) Find the \( x \)-value when \( y = 3 \).
5 Wilson purchased a computer for $1,600. It will depreciate $200 per year. Which equation gives the value $f(x)$ of Wilson’s computer after $x$ years?

A $f(x) = 200x + 1,600$  
B $f(x) = -200x + 1,600$  
C $f(x) = -1,600x + 200$  
D $f(x) = 1,600x + 200$

6 The function $f(k) = 2.2k$ gives the number of pounds $f(k)$ equivalent to $k$ kilograms. Which table gives ordered pairs of this function?

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<tr>
<th>$k$</th>
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<td>3.2</td>
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<tr>
<td>2</td>
<td>4.4</td>
</tr>
<tr>
<td>6</td>
<td>13.2</td>
</tr>
</tbody>
</table>

7 If $g(x) = x^2 + 6x - 2$, what is $g(-1)$?

A $-3$  
B $-6$  
C $-7$  
D $-9$

8 The figure shows the graph of $f(x)$. Which is true?

F $f(-2) > f(0)$  
H $f(2) > f(1)$  
G $f(-2) < f(4)$  
J $f(0) = f(6)$

9 If $h(x) = 5$, what is $h(2)$?

A 0  
B 2  
C 5  
D 10
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

**OBJECTIVE A.16** The student will, given a set of data points, write an equation for a line of best fit and use the equation to make predictions.

For Questions 1–3, suppose this table shows the total number of points scored and yards gained by the football team of each given university on a Saturday in October.

<table>
<thead>
<tr>
<th>School</th>
<th>Points Scored x</th>
<th>Yards Gained y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virginia Tech</td>
<td>47</td>
<td>468</td>
</tr>
<tr>
<td>Univ. of Virginia</td>
<td>27</td>
<td>377</td>
</tr>
<tr>
<td>Wake Forest</td>
<td>24</td>
<td>392</td>
</tr>
<tr>
<td>Maryland</td>
<td>37</td>
<td>407</td>
</tr>
<tr>
<td>Duke</td>
<td>7</td>
<td>275</td>
</tr>
</tbody>
</table>

1. Which is an equation for the line of best fit? Round your numbers to the nearest tenth. Use your graphing calculator.
   - A \( y = 3.6x + 262.5 \)
   - B \( y = 0.2x - 51.3 \)
   - C \( y = 4.6x + 256.5 \)
   - D \( y = 4.5x + 255.3 \)

2. Using the equation for the line of best fit, how many points would you expect a team to have scored if they gained 500 yards? Round your answer to the nearest whole number.
   - F 49  
   - G 54  
   - H 151 
   - J 2,505

3. Using the equation for the line of best fit, how many yards would you expect a team to have gained if they scored 14 points? Round your answer to the nearest whole number.
   - A 272  
   - B 300  
   - C 318  
   - D 336

4. Which appears to be an equation for the best-fit line for the data shown in this graph?
   - F \( y = -x + 6 \)
   - G \( y = 4x + 2 \)
   - H \( y = x + 3 \)
   - J \( y = -2x + 1 \)
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.16 (continued)

For Questions 5 and 6, use this table giving the number of stories and number of rooms in five hotels in Virginia. The equation of the best-fit line relating this data is $y = 33.6x – 29.4$.

| Stories x | 19 | 15 | 7 | 3 | 2 |
| Rooms y   | 685| 395| 153| 95| 72|

5 Using the equation for the best-fit line, how many rooms would you expect to find in a hotel of 10 stories? Round your answer to the nearest whole number.

A 102  
B 196  
C 307  
D 521

6 How many stories would you expect a hotel to have if it has 130 rooms? Round your answer to the nearest whole number.

F 1  
G 5  
H 9  
J 12

For Questions 7–9, use this table which gives the grade point average and number of hours spent doing homework per week for 6 high school students.

| Hours per week doing homework x | 18 | 16 | 15 | 12 | 7 | 8 |
| GPA y                           | 4.0 | 3.8 | 3.4 | 3.0 | 2.3 | 2.1 |

7 What is an equation for the line of best fit for this data? Round your numbers to two decimal places. Use your graphing calculator.

A $y = 0.17x + 0.92$  
B $y = 0.05x + 2.6$  
C $y = 0.12x + 1.43$  
D $y = 0.36x + 0.34$

8 If a student spends 10 hours per week doing homework, what GPA would he or she be expected to have? Round your answer to two decimal places.

F 2.62  
G 2.86  
H 3.20  
J 17.92

9 If a student has a GPA of 1.60, how many hours per week would you expect him or her to spend doing homework? Round your answer to the nearest whole number.

A 6  
B 4  
C 2  
D 1
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.17 The student will compare and contrast multiple one-variable data sets, using statistical techniques that include measures of central tendency, range, and box-and-whisker graphs.

1 Lupe has test grades of 92, 87, 99, and 84 in algebra. What must she get on the fifth test to have a mean of 90?
   A 94
   B 90
   C 89.5
   D 88

2 Which is true about the class medians?
   F Mrs. Abbott’s is 60 and Mr. Chang’s is 65.
   G Mrs. Abbott’s is 80 and Mr. Chang’s is 75.
   H Mrs. Abbott’s is 40 and Mr. Chang’s is 50.
   J Mrs. Abbott’s is 50 and Mr. Chang’s is 90.

3 What percent of the scores in Mrs. Abbott’s class are between 60 and 80?
   A 25%
   B 40%
   C 50%
   D 75%

4 Which is true about the class ranges?
   F Mrs. Abbott’s is 50 and Mr. Chang’s is 25.
   G Mrs. Abbott’s is 50 and Mr. Chang’s is 90.
   H Mrs. Abbott’s is 40 and Mr. Chang’s is 25.
   J Mrs. Abbott’s is 40 and Mr. Chang’s is 90.

5 What percent of the scores in Mr. Chang’s class are greater than 50?
   A 25%
   B 50%
   C 75%
   D 100%
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.17 (continued)

For Questions 6–10, Olivia had to conduct a survey for her statistics class. She recorded the weight and height of all the pet dogs on her block. This table shows the data she collected.

<table>
<thead>
<tr>
<th>Breed of Dog</th>
<th>Weight (pounds)</th>
<th>Height (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shih Tzu</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Fox Terrier</td>
<td>19</td>
<td>14</td>
</tr>
<tr>
<td>Keeshond</td>
<td>31</td>
<td>18</td>
</tr>
<tr>
<td>Golden Retriever</td>
<td>66</td>
<td>23</td>
</tr>
<tr>
<td>Newfoundland</td>
<td>110</td>
<td>27</td>
</tr>
<tr>
<td>Afghan Hound</td>
<td>55</td>
<td>25</td>
</tr>
<tr>
<td>Shetland Sheepdog</td>
<td>24</td>
<td>19</td>
</tr>
</tbody>
</table>

6. What is the range of the weights?
   F 31 lb
   H 66 lb

7. What is the mean weight?
   A 31 lb
   B 45 lb
   C 66 lb
   D 100 lb

8. What is the median weight?
   F 31 lb
   H 66 lb
   G 45 lb
   J 100 lb

9. What is the range of the heights?
   A 27 in.
   B 23 in.
   C 19 in.
   D 17 in.

10. Which is the box-and-whisker graph for the heights?
    F
    G
    H
    J
For Questions 11–14, use this table which shows average high and low temperatures in Norfolk for five months.

<table>
<thead>
<tr>
<th>Month</th>
<th>Average High (°F)</th>
<th>Average Low (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>50</td>
<td>32</td>
</tr>
<tr>
<td>March</td>
<td>57</td>
<td>39</td>
</tr>
<tr>
<td>June</td>
<td>85</td>
<td>67</td>
</tr>
<tr>
<td>August</td>
<td>86</td>
<td>69</td>
</tr>
<tr>
<td>November</td>
<td>62</td>
<td>43</td>
</tr>
</tbody>
</table>

11 What is the mean of the average high temperatures?
   A 68°F  B 62°F  C 50°F  D 36°F

12 What is the mean of the average low temperatures?
   F 68°F  G 62°F  H 50°F  J 36°F

13 Which is true?
   A The range of the average high temperatures is less than the range of the average low temperatures.
   B The range of the average high temperatures is greater than the range of the average low temperatures.
   C The range of the average high temperatures is the same as the range of the average low temperatures.
   D The range of the average high temperatures is 10 more than the range of the average low temperatures.

14 Which box-and-whisker graph shows the average low temperatures?
   F  
   G  
   H  
   J  
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

OBJECTIVE A.18 The student will analyze a relation to determine whether a direct variation exists and represent it algebraically and graphically, if possible.

1. The Friends of the Library Club is having a used paperback book sale. Koslo bought 5 books for $2.50 while Cody bought 8 books for $4.00. Which statement is true for Koslo and Cody?
   - A. The cost of the books varies directly with the number of books purchased.
   - B. The cost of the books varies inversely with the number of books purchased.
   - C. The cost of the books varies directly with the square of the number of books purchased.
   - D. The cost of the books varies inversely with the square of the number of books purchased.

2. Which is the graph of a direct variation function?

   - F
   - G
   - H
   - J

3. Which is a direct variation situation?
   - A. When the price of t-shirts is lowered, the number sold increases.
   - B. The time it takes to mow the grass decreases as the number of people working increases.
   - C. The cost to fill a 10-gallon automobile gas tank increases as the cost per gallon of gas increases.
   - D. The number of potatoes that will fit in a box decreases as the size of the potatoes increases.

4. Which is the equation of the direct variation function that contains the ordered pairs in this table?

<table>
<thead>
<tr>
<th>x</th>
<th>2</th>
<th>6</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>1</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

   - F. \( y = \frac{1}{2}x \)
   - G. \( y = 2x \)
   - H. \( y = x - 3 \)
   - J. \( y = x - 1 \)
Standards Practice

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

**OBJECTIVE A.18** (continued)

5. Anthony can iron 6 shirts in 1 hour. Which proportion could you use to find how many shirts \(x\) he can iron in 2.5 hours at this rate?

   - A \(\frac{6}{1} = \frac{x}{2.5}\)
   - B \(\frac{6}{1} = \frac{2.5}{x}\)
   - C \(\frac{6}{60} = \frac{x}{2.5}\)
   - D \(\frac{6}{2.5} = \frac{1}{x}\)

6. Which is a direct variation function?

   - F \(y = 4x + 2\)
   - G \(y = \frac{4}{x}\)
   - H \(y = 4x^2\)
   - J \(y = 4x\)

7. The distance traveled in a given time on the Blue Ridge Parkway varies directly with the speed. Joe travels 120 miles at 30 miles per hour. How many miles would he travel in the same time period if he increased his speed to 40 miles per hour?

   - A 90 mi
   - B 100 mi
   - C 135 mi
   - D 160 mi

8. In which table of ordered pairs does \(y\) vary directly as \(x\)?

   - F
     | \(x\) | 1 | 2 | 3  |
     | \(y\) | 4 | 8 | 12 |
   - G
     | \(x\) | 1 | 2 | 3  |
     | \(y\) | 2 | 5 | 8  |
   - H
     | \(x\) | 1 | 2 | 3  |
     | \(y\) | 1 | 4 | 9  |
   - J
     | \(x\) | 1 | 2 | 3  |
     | \(y\) | 2 | 8 | 16 |

9. Jillian is reading a book about rabbits to her daughter Louise. If Jillian can read 6 pages in 10 minutes, how many minutes will it take her to read 21 pages at the same rate?

   - A 50 min
   - B 35 min
   - C 25 min
   - D 12.6 min

10. If \(x\) varies directly as \(y\) and \(x = 6\) when \(y = 8\), what is \(x\) when \(y = 18\)?

    - F \(2.6\)
    - G \(13.5\)
    - H \(16\)
    - J \(24\)
Sample Test

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1. Beaula is canoeing on the Shenandoah River. She goes 20 miles downstream in 3 hours, and she returns the same distance upstream in 4$\frac{1}{2}$ hours. What is the speed of the current in miles per hour?

A. $\frac{5}{9}$ mi/h  
B. $\frac{2}{3}$ mi/h  
C. $\frac{2}{3}$ mi/h  
D. $1\frac{1}{9}$ mi/h

2. The area of the figure shown is given by the formula $A = \frac{1}{2}h(b_1 + b_2)$. If you solve this equation for $h$, what is $h$ equal to?

F. $h = 2A - (b_1 + b_2)$  
G. $h = \frac{1}{2}A(b_1 + b_2)$  
H. $h = 2(A - b_1 - b_2)$  
J. $h = \frac{2A}{b_1 + b_2}$

3. Which is the complete factorization of $20x^2 - 15x + 10xy^2$?

A. $10x(2x - 5 - y^2)$  
B. $5x(4x - 3 + 2y^2)$  
C. $5x^2(4 - 3 + 2y^2)$  
D. $15(5x^2 - x + 5y^2)$

4. The length of each side of a square room is $\sqrt{272}$ feet. What is this number rounded to the nearest tenth?

F. 4.1 ft  
G. 10.4 ft  
H. 16.5 ft  
J. 33.0 ft

5. Which is the equation of the line shown in this graph?

A. $5x - 2y = 10$  
B. $-2x + 5y = -10$  
C. $y = \frac{5}{2}x - 2$  
D. $x + 5y = -10$
Sample Test

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

6 Which is the graph of a direct variation function?

6 ________

7 If \( g(x) = -x^3 + 2 \), what is \( g(3) \)?

A -27  
B -25  
C -7  
D 29

7 ________

8 What is the range of the function that contains the ordered pairs given in this table?

8 ________

9 Which is an example of the Commutative Property of Addition?

9 ________

10 What is the simplified form of \((x^2 + 6x - 2) - (3x^2 + 4x + 9)\)?

10 ________

11 What is the solution of \(2x - 11 = 5x + 19\)?

11 ________

Go on
Sample Test

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

12 What is the simplified form of $-4\sqrt{20}$?
   F $-80$  G $-2\sqrt{5}$  H $-8\sqrt{5}$  J $-16\sqrt{5}$

13 Which is an equation for the model shown in the figure?
   A $x + 3 = 8$  B $x - 3 = 8$  C $x = 11$  D $3x = 8$

14 What is the simplified form of $(3x + 5)(2x - 7)$?
   F $5x^2 - 11x - 2$  G $5x - 2$  H $6x^2 - 35$  J $6x^2 - 11x - 35$

15 Which is the inequality shown in this graph?
   A $y < \frac{2}{3}x - 2$  B $y \leq \frac{2}{3}x - 2$  C $y > \frac{2}{3}x - 2$  D $y \geq \frac{2}{3}x - 2$

16 Amanda is preparing a box of 24 toys. Bags of marbles cost $2.50 each, rubber balls cost $2.00 each, and she wants the box to cost $55.50. Which equation could she use to find how many bags of marbles $x$ she should put in the box?
   F $x + 24 - x = 55.50$  G $2.50x + 2.00(24 - x) = 55.50$  H $2.50x + 2.00(24 - x) = 55.50(24)$
**Sample Test**

*Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.*

**For Questions 17 and 18, the length of a rectangular field is 20 feet more than three times its width, and its area is 672 square feet.**

17 Which equation could be used to find the width x?
- A) $3x^2 + 20x - 672 = 0$
- B) $20x^2 + 3x - 672 = 0$
- C) $x^2 + 20x = 672$
- D) $8x + 40 = 672$

18 What is the length of the field?
- F) 79 ft
- G) 56 ft
- H) 32 ft
- J) 12 ft

19 The following matrix gives the prices of 2 types of gasoline at 3 different gasoline stations.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>98% octane</td>
<td>$1.90</td>
<td>$1.85</td>
<td>$1.79</td>
</tr>
<tr>
<td>87% octane</td>
<td>$1.75</td>
<td>$1.69</td>
<td>$1.50</td>
</tr>
</tbody>
</table>

The matrix below gives the prices one week later.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>98% octane</td>
<td>$1.86</td>
<td>$1.78</td>
<td>$1.75</td>
</tr>
<tr>
<td>87% octane</td>
<td>$1.70</td>
<td>$1.65</td>
<td>$1.50</td>
</tr>
</tbody>
</table>

Which matrix shows the difference of the gasoline prices from the first week to the second?
- A) $\begin{bmatrix} 3.76 & 3.63 & 3.54 \\ 3.45 & 3.34 & 3.00 \end{bmatrix}$
- B) $\begin{bmatrix} 0.04 & 0.07 & 0.04 \\ 0.05 & 0.04 & 0.00 \end{bmatrix}$
- C) $\begin{bmatrix} 3.45 & 3.34 & 3.00 \\ 3.76 & 3.63 & 3.54 \end{bmatrix}$
- D) $\begin{bmatrix} 0.05 & 0.04 & 0.00 \\ 0.04 & 0.07 & 0.04 \end{bmatrix}$
Sample Test

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

For Questions 20 and 21, use this table that shows the number of United States presidents born in the given states.

<table>
<thead>
<tr>
<th>State</th>
<th>Number of Presidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois</td>
<td>1</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>4</td>
</tr>
<tr>
<td>New York</td>
<td>4</td>
</tr>
<tr>
<td>Ohio</td>
<td>7</td>
</tr>
<tr>
<td>Texas</td>
<td>2</td>
</tr>
<tr>
<td>Virginia</td>
<td>8</td>
</tr>
</tbody>
</table>

20 What is the median number of presidents born in these states?  
F 4  
G 4.3  
H 7  
J 8

21 What is the mean number of presidents born in these states?  
A 4  
B 4.3  
C 7  
J 8

22 What is the complete factorization of $2x^2 - 9x - 18$?  
F $(2x + 3)(x - 6)$  
G $(2x - 6)(x + 3)$  
H $(x - 12)(x + 3)$  
J $(x + 12)(x - 3)$

23 The graph of $y = \frac{1}{2}x - 3$ is shown in the figure. Which would you do to graph $y < \frac{1}{2}x - 3$?  
A Shade above the line.  
B Shade below the line.  
C Change the line to dashed and shade above it.  
D Change the line to dashed and shade below it.

24 What are the zeros of the function $f(x) = x^2 - 6x + 8$?  
F 5, 7  
G 2, 4  
H -2, -4  
J -1, -8
Sample Test

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

25 Rondell collects baseball cards. He bought a package of 70 cards containing players for the New York Yankees and Atlanta Braves. If the number of Braves cards was 10 more than twice the number of Yankees cards, how many cards were there for players of each team?
   A 20 Braves and 50 Yankees   B 30 Braves and 40 Yankees
   C 40 Braves and 30 Yankees   D 50 Braves and 20 Yankees

26 Samuel and Emerson were hiking in Jefferson National Forest. They saw a total of 24 squirrels and deer during their hike. They saw twice as many squirrels as deer. Which system of equations could be used to find how many squirrels $s$ and deer $d$ they saw?
   F $s + d = 24$
   $s = 2d$
   H $s + d = 2$
   $24s = d$
   G $s + d = 24$
   $d = 2s$
   J $s + 2d = 24$
   $24d = s$

27 What does $(4xy^2)^3(-2x^2y)$ equal?
   A $-8x^5y^7$
   C $-128x^6y^6$
   B $-8x^6y^6$
   D $-128x^5y^7$

28 If $y = 3x - 1$ and the domain is {0, 1, 2}, what is the range?
   F {1, 4, 7}
   H {0, 3, 6}
   G $\left\{ \frac{1}{3}, \frac{2}{3}, 1 \right\}$
   J $\{-1, 2, 5\}$

29 What is the slope of the line $y = 12$?
   A 12   B 1
   C 0   D undefined

30 Which could be the zeros of the function shown in this graph?
   F $-4, 4$
   H $-4, 3, 4$
   G 0, 3
   J $-4 \leq x \leq 4$
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

31 Which table shows ordered pairs that satisfy the equation \( y = x^3 \)?

A
\[
\begin{array}{c|c|c|c}
 x & 1 & 2 & 3 \\
 y & 3 & 6 & 9 \\
\end{array}
\]

B
\[
\begin{array}{c|c|c|c}
 x & 1 & 2 & 3 \\
 y & 3 & 8 & 27 \\
\end{array}
\]

C
\[
\begin{array}{c|c|c|c}
 x & 1 & 2 & 3 \\
 y & 1 & 4 & 9 \\
\end{array}
\]

D
\[
\begin{array}{c|c|c|c}
 x & 1 & 2 & 3 \\
 y & 1 & 8 & 27 \\
\end{array}
\]

32 What is the value of \( 5xy + 2x - y \) if \( x = 2 \) and \( y = -1 \)?

F 15
G 12
H -5
J -7

33 Which could be an equation of the line shown in this graph?

A \(-3x - 4y = 0\)
B \(4x + 3y = -12\)
C \(3x + 4y = -12\)
D \(y = -3x - 4\)

34 The area of Great Dismal Swamp is about 223,000 acres. How is this number written in scientific notation?

F \(2.23 \times 10^5\)
G \(2.23 \times 10^4\)
H \(223 \times 10^4\)
J \(22.3 \times 10^6\)

35 What is the simplified form of \( \frac{20a^4b^{-7}c^6}{-5ab^6c^2} \)?

A \(\frac{-4a^4c^4}{b^6}\)
B \(\frac{15a^3}{b^7c^4}\)
C \(\frac{15a^4}{b^6c^3}\)
D \(\frac{-4a^{3/4}}{b^7}\)

Go on
Sample Test

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

36 What is the slope of the line containing the points at \((-1, -2)\) and \((-4, 6)\)?

F \(\frac{-8}{3}\)  
G \(\frac{-4}{5}\)  
H \(\frac{-8}{5}\)  
J \(\frac{-7}{2}\)  

37 Which could be the solution of the system of equations graphed in this figure?

A \((-4, -3)\)  
B \((3, -4)\)  
C \((-4, 3)\)  
D \((-3, 4)\)

38 Richmond’s Landmark Theater has 3,300 seats. The theater is filled, and there are 150 more men than women in the theater. Which equation could you use to find how many men there are if \(x\) is the number of women?

F \(2x - 150 = 3,300\)  
G \(x + 150 = 3,300\)  
H \(150x = 3,300\)  
J \(x + x + 150 = 3,300\)

39 Which is a direct variation function?

A \(y = 3x - 7\)  
B \(y = 3x^2 - 7\)  
C \(y = 3x\)  
D \(y = \frac{3}{x}\)

40 What is the height of this book in simplified form?

\(\sqrt{75} \text{ in.}\)  
F \(25\sqrt{3} \text{ in.}\)  
G \(15\sqrt{3} \text{ in.}\)  
H \(5\sqrt{3} \text{ in.}\)  
J \(2\sqrt{3} \text{ in.}\)
Sample Test

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

41 A ski resort made a total profit of $100,000 during the months of December and January. If the profit in December was 50% more than the profit in January, what was the profit in December?
   A $40,000  B $60,000  C $66,666.67  D $33,333.33

42 Suppose this matrix gives the rental costs of typical apartments in two parts of the United States.

<table>
<thead>
<tr>
<th>studio 1 bedroom 2 bedroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>East coast</td>
</tr>
<tr>
<td>Midwest</td>
</tr>
</tbody>
</table>

If the rent for these apartments is raised $25, which matrix represents the new rents?

F \[
\begin{bmatrix}
$625 & $750 & $925 \\
$525 & $675 & $850 \\
\end{bmatrix}
\]

G \[
\begin{bmatrix}
$625 & $775 & $950 \\
$525 & $700 & $875 \\
\end{bmatrix}
\]

H \[
\begin{bmatrix}
$575 & $725 & $900 \\
$475 & $650 & $825 \\
\end{bmatrix}
\]

J \[
\begin{bmatrix}
$750 & $938 & $1,156 \\
$625 & $844 & $1,063 \\
\end{bmatrix}
\]

43 Which is an equation of the line that contains the points at (−1, −3) and (−5, 4)?
   A \( y = \frac{-7}{4}x - 3 \)  B \( y = \frac{-7}{4}x - \frac{19}{4} \)
   C \( y = \frac{-4}{7}x - \frac{25}{7} \)  D \( y = \frac{-4}{7}x + 4 \)

44 Which is a possible slope for the line shown in this graph?

F 1  G 0  H −1  J undefined

45 What property justifies the statement \((7 + 2) + 6 = 7 + (2 + 6)\)?
   A Associative Property of Addition
   B Commutative Property of Addition
   C Addition Property of Equality
   D Distributive Property of Multiplication over Addition
Sample Test

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

46 Which expression gives the perimeter of the triangle shown in this figure?

- F \(3a + 8\)
- G \(5a + 6\)
- H \(5a + 7\)
- J \(5a + 8\)

47 What is the solution of \(-3x + 6 < 9\)?

- A \(x < -1\)
- B \(x < 1\)
- C \(x > -1\)
- D \(x > 1\)

48 Which is an equation of the line that contains the point at \((-6, 10)\) and has undefined slope?

- F \(x = -6\)
- G \(y = 10\)
- H \(y = 0x - \frac{5}{3}\)
- J \(-6x + 10y = 0\)

49 The area of Prince William Forest is 18,726 acres, the area of Lake Fairfax Park is 479 acres, and the area of Lake Anna is 2,058 acres. What is the sum of these areas in scientific notation?

- A \(2.55726 \times 10^3\)
- B \(8.721 \times 10^3\)
- C \(2.1263 \times 10^4\)
- D \(4.4096 \times 10^4\)

50 The number of miles Marcus can ride his bike varies directly with the length of time he rides. If he can ride 18 miles in 1.6 hours, which could be the constant of variation?

- F \(1.6\)
- G \(11.25\)
- H \(19.6\)
- J \(28.8\)

51 What is the complete factorization of \(64a^2 - 48a + 9\)?

- A \((8a + 3)(8a - 3)\)
- B \((64a - 9)^2\)
- C \((8a - 3)^2\)
- D \((8a + 3)^2\)

52 What are the solutions of \(6x^2 + 7x - 5 = 0\)?

- F \(-\frac{1}{3}, \frac{5}{2}\)
- G \(-\frac{5}{3}, \frac{1}{2}\)
- H \(10, -3\)
- J \(-10, 3\)
53 The round-trip airfares shown in this matrix were available in October. If airlines raise their fares 20%, which matrix shows the new fares? Round your answers to the nearest whole numbers.

\[
\begin{bmatrix}
\text{Norfolk} & \text{Richmond} & \text{Roanoke} \\
\text{Chicago} & $421 & $710 & $619 \\
\text{New York City} & $561 & $635 & $768
\end{bmatrix}
\]

A \[
\begin{bmatrix}
$441 & $730 & $639 \\
$581 & $655 & $788
\end{bmatrix}
\]
B \[
\begin{bmatrix}
$84 & $142 & $124 \\
$112 & $127 & $154
\end{bmatrix}
\]
C \[
\begin{bmatrix}
$505 & $852 & $743 \\
$673 & $762 & $922
\end{bmatrix}
\]
D \[
\begin{bmatrix}
$337 & $568 & $495 \\
$449 & $508 & $614
\end{bmatrix}
\]

For Questions 54 and 55, use this box-and-whisker plot showing the prices of convertibles and sedans.

54 Which is true?
- F The range and the median price are greater for the convertibles.
- G The median is greater for convertibles, but the range is smaller.
- H The range is greater for convertibles, but the median is smaller.
- J The range and the median price are smaller for the convertibles.

55 What percent of the convertibles cost more than $32,000?
- A 25%
- B 50%
- C 75%
- D 100%

56 What is the domain of \( y = x^2 + 4 \)?
- F \(-2 \leq x \leq 2\)
- G \(x \neq -4\)
- H All real numbers
- J \(y \geq 4\)
Sample Test

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

57 Which is an equation for the function that contains the ordered pairs given in this table?

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>13</td>
</tr>
</tbody>
</table>

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

58 For Questions 58–60, suppose this table gives the length $x$ and weight $y$ of five tunas caught off the Barrier Islands.

<table>
<thead>
<tr>
<th>Length (inches)</th>
<th>Weight (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>35</td>
<td>56</td>
</tr>
<tr>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>70</td>
<td>400</td>
</tr>
<tr>
<td>25</td>
<td>28</td>
</tr>
</tbody>
</table>

For Questions 58–60, suppose this table gives the length $x$ and weight $y$ of five tunas caught off the Barrier Islands.

58 Which is an equation of the best-fit line? Round the numbers in your equation to two decimal places. Use your graphing calculator.

F  $y = 0.12x + 23.66$
G  $y = -0.4x + 38$
H  $y = 2.79x - 56.79$
J  $y = 7.39x - 162.96$

59 If a tuna is 40 inches long, what would you expect its weight to be? Use the equation you wrote for Question 58. Round your answer to the nearest whole number of pounds.

A  133 lb
B  96 lb
C  55 lb
D  28 lb

60 If a tuna weighs 300 pounds, how many inches long would you expect it to be? Use the equation you wrote for Question 58. Round your answer to the nearest whole number of inches.

F  45 in.
G  54 in.
H  63 in.
J  128 in.