Correlations of Lesson-specific references in
PreNTICE HALL ALGEBRA and
PreNTICE HALL GEOMETRY

- TAKS Sample Test
- Practice Sets aligned to TAKS/TEKS objective-by-objective
- Mixed Practice Test Items
# TAKS Practice Workbook

## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAKS Correlation to Prentice Hall Algebra and Prentice Hall Geometry</td>
<td>v</td>
</tr>
<tr>
<td>Formula Chart</td>
<td>37</td>
</tr>
<tr>
<td><strong>TAKS Practice Items</strong></td>
<td></td>
</tr>
<tr>
<td>Objective 1: The student will describe functional relationships in a variety of ways.</td>
<td>1</td>
</tr>
<tr>
<td>Objective 2: The student will demonstrate an understanding of the properties and attributes of functions.</td>
<td>4</td>
</tr>
<tr>
<td>Objective 3: The student will demonstrate an understanding of linear functions.</td>
<td>8</td>
</tr>
<tr>
<td>Objective 4: The student will formulate and use linear equations and inequalities.</td>
<td>14</td>
</tr>
<tr>
<td>Objective 5: The student will demonstrate an understanding of quadratic and other nonlinear functions.</td>
<td>19</td>
</tr>
<tr>
<td>Objective 6: The student will demonstrate an understanding of geometric relationships and spatial reasoning.</td>
<td>23</td>
</tr>
<tr>
<td>Objective 7: The student will demonstrate an understanding of two- and three-dimensional representations of geometric relationships and shapes.</td>
<td>25</td>
</tr>
<tr>
<td>Objective 8: The student will demonstrate an understanding of the concepts and uses of measurement and similarity.</td>
<td>28</td>
</tr>
<tr>
<td>Objective 9: The student will demonstrate an understanding of percents, proportional relationships, probability, and statistics in application problems.</td>
<td>32</td>
</tr>
<tr>
<td>Objective 10: The student will demonstrate an understanding of the mathematical processes and tools used in problem solving.</td>
<td>36</td>
</tr>
<tr>
<td><strong>TAKS Mixed Practice Items</strong></td>
<td>40</td>
</tr>
<tr>
<td><strong>TAKS Sample Test</strong></td>
<td>48</td>
</tr>
<tr>
<td><strong>Answer Sheet</strong></td>
<td>60</td>
</tr>
<tr>
<td><strong>Answers</strong></td>
<td>61</td>
</tr>
</tbody>
</table>
### Objective 1

The student will describe functional relationships in a variety of ways.

**A (b)(1) Foundations for functions.** The student understands that a function represents a dependence of one quantity on another and can be described in a variety of ways.

- **(A) The student describes independent and dependent quantities in functional relationships.**
  - Practice: Items 1, 2, 3
  - Mixed Review: Items 1
  - Sample Test: Items 1
  - Prentice Hall Algebra Chapter Lesson: 2-4, 2-7
  - Prentice Hall Geometry Chapter Lesson: 2-4, 2-7

- **(B) The student [gathers and records data, or] uses data sets, to determine functional (systematic) relationships between quantities.**
  - Practice: Items 4, 5, 7, 8, 11, 12
  - Mixed Review: Items 2, 9, 58
  - Sample Test: Items 2-4, 2-7

- **(C) The student describes functional relationships for given problem situations and writes equations or inequalities to answer questions arising from the situations.**
  - Practice: Items 8, 9, 13, 25, 7, 10
  - Mixed Review: Items 3, 4, 5, 12, 16, 18, 58
  - Sample Test: Items 2-4, 2-7

- **(D) The student represents relationships among quantities using [concrete] models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities.**
  - Practice: Items 4, 5, 6, 8, 10, 11, 12, 17
  - Mixed Review: Items 2, 5, 10, 12
  - Sample Test: Items 2, 4, 8, 9, 11, 12, 16, 18, 58
  - Prentice Hall Algebra Chapter Lesson: 2-2, 2-3
  - Prentice Hall Geometry Chapter Lesson: 2-4, 2-7

- **(E) The student interprets and makes inferences from functional relationships.**
  - Practice: Items 7, 8, 10, 13
  - Mixed Review: Items 3, 7, 12
  - Sample Test: Items 3, 5, 12
  - Prentice Hall Algebra Chapter Lesson: 2-4, 2-7
  - Prentice Hall Geometry Chapter Lesson: 2-4, 2-7

### Objective 2

The student will demonstrate an understanding of the properties and attributes of functions.

**A (b)(2) Foundation for functions.** The student uses the properties and attributes of other functions.

- **(A) The student identifies [and sketches] the general forms of linear \((y = x)\) and quadratic \((y = x^2)\) parent functions.**
  - Practice: Items 1, 2, 3
  - Mixed Review: Items 6, 17, 21, 22
  - Sample Test: Items 2-4, 2-5, 7-1, 7-2
  - Prentice Hall Algebra Chapter Lesson: MT (58, 89)

- **(B) For a variety of situations, the student identifies the mathematical domains and ranges and determines reasonable domain and range values for given situations.**
  - Practice: Items 4, 5, 18
  - Mixed Review: Items 4
  - Sample Test: Items 2-4

- **(C) The student interprets situations in terms of given graphs [or creates situations that fit given graphs].**
  - Practice: Items 6, 12, 13
  - Mixed Review: Items 7
  - Sample Test: Items 2-2
**Objective 3**
The student will demonstrate an understanding of linear functions.

**A (c)(1) Linear functions**. The student understands that linear functions can be represented in different ways and translates among their various representations.

<table>
<thead>
<tr>
<th>Practice Set Items</th>
<th>Mixed Review Items</th>
<th>Sample Test Items</th>
<th>Prentice Hall Algebra Chapter Lesson</th>
<th>Prentice Hall Geometry Chapter Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3</td>
<td>7</td>
<td>2, 4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**A (c)(2) Linear functions**. The student understands the meaning of the slope and intercepts of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations.

<table>
<thead>
<tr>
<th>Practice Set Items</th>
<th>Mixed Review Items</th>
<th>Sample Test Items</th>
<th>Prentice Hall Algebra Chapter Lesson</th>
<th>Prentice Hall Geometry Chapter Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>4, 5, 13</td>
<td>8, 24, 25</td>
<td>14</td>
<td>5-1, 5-2</td>
<td></td>
</tr>
<tr>
<td>Objectives and Instructional Targets</td>
<td>Practice Set Items</td>
<td>Mixed Review Items</td>
<td>Sample Test Items</td>
<td>Prentice Hall Algebra Chapter Lesson</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>--------------------</td>
<td>--------------------</td>
<td>-------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>(B) The student interprets the meaning of slope and intercepts in situations using data, symbolic representations, or graphs.</td>
<td>11, 13, 16, 17, 18</td>
<td>9, 24</td>
<td>12, 15</td>
<td>5-1, 5-4, 5-9</td>
</tr>
<tr>
<td>(C) The student investigates, describes, and predicts the effects of changes in m and b on the graph of ( y = mx + b ).</td>
<td>6, 8, 16, 17, 18</td>
<td>13</td>
<td></td>
<td>5-4</td>
</tr>
<tr>
<td>(D) The student graphs and writes equations of lines given characteristics such as two points, a point and a slope, or a slope and a y-intercept.</td>
<td>7, 9, 10</td>
<td>14</td>
<td></td>
<td>5-5, 5-6, 5-7</td>
</tr>
<tr>
<td>(E) The student determines the intercepts of linear functions from graphs, tables, and algebraic representations.</td>
<td>11, 14, 15</td>
<td>9</td>
<td>15</td>
<td>5-9</td>
</tr>
<tr>
<td>(F) The student interprets and predicts the effects of changing slope and y-intercept in applied situations.</td>
<td>8, 16, 17, 18</td>
<td>15</td>
<td></td>
<td>5-4</td>
</tr>
<tr>
<td>(G) The student relates direct variation to linear functions and solves problems involving proportional change.</td>
<td>14, 20, 21</td>
<td>5</td>
<td></td>
<td>5-3</td>
</tr>
</tbody>
</table>

**Objective 4**
The student will formulate and use linear equations and inequalities.

A (c)(3) Linear functions. The student formulates equations and inequalities based on linear functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation.

<table>
<thead>
<tr>
<th>Objective 4</th>
<th>Practice Set Items</th>
<th>Mixed Review Items</th>
<th>Sample Test Items</th>
<th>Prentice Hall Algebra Chapter Lesson</th>
<th>Prentice Hall Geometry Chapter Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) The student analyzes situations involving linear functions and formulates linear equations or inequalities to solve problems.</td>
<td>1, 2, 3, 9, 13, 17</td>
<td>10</td>
<td>4, 16, 18, 58</td>
<td>3-1, 3-2, 3-3, 4-2, 4-5, 4-6, 4-7, 4-8, 5-5, 6-5</td>
<td></td>
</tr>
<tr>
<td>(B) The student investigates methods for solving linear equations and inequalities using [concrete] models, graphs, and the properties of equality, selects a method, and solves the equations and inequalities.</td>
<td>4, 5, 7</td>
<td>17</td>
<td></td>
<td>3-1, 3-2, 3-3, 4-2, 4-5, 4-6, 4-7, 4-8, 6-5, M T (201)</td>
<td></td>
</tr>
<tr>
<td>(C) For given contexts, the student interprets and determines the reasonableness of solutions to linear equations and inequalities.</td>
<td>8, 10</td>
<td>11</td>
<td></td>
<td>4-9</td>
<td></td>
</tr>
</tbody>
</table>

A (c)(4) Linear functions. The student formulates systems of linear equations from problem situations, uses a variety of methods to solve them, and analyzes the situations in terms of the situation.
<table>
<thead>
<tr>
<th>Objectives and Instructional Targets</th>
<th>Practice Set Items</th>
<th>Mixed Review Items</th>
<th>Sample Test Items</th>
<th>Prentice Hall Algebra Chapter Lesson</th>
<th>Prentice Hall Geometry Chapter Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) The student analyzes situations and formulates systems of linear equations to solve problems.</td>
<td>9, 11, 13</td>
<td>18, 20</td>
<td>6-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(B) The student solves systems of linear equations using [concrete] models, graphs, tables, and algebraic methods.</td>
<td>12, 14, 15</td>
<td>19</td>
<td>6-1, 6-2, 6-3, MT (169)</td>
<td>MT (348)</td>
<td></td>
</tr>
<tr>
<td>(C) For given contexts, the student interprets and determines the reasonableness of solutions to systems of linear equations.</td>
<td>6, 16, 18</td>
<td>12</td>
<td>6-1, 6-2, 6-3, 6-4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Objective 5**
The student will demonstrate an understanding of quadratic and other nonlinear functions.

**A (d)(1) Quadratic and other nonlinear functions.** The student understands that the graphs of quadratic functions are affected by the parameters of the function and can interpret and describe the effects of changes in the parameters of quadratic functions.

(B) The student investigates, describes, and predicts the effects of changes in a on the graph of $y = ax^2$.  
1, 2, 3  
21  
7-1, 7-2, 7-3  

(C) The student investigates, describes, and predicts the effects of changes in c on the graph of $y = x^2 + c$.  
4, 5, 6  
13  
22  
7-1, 7-2, 7-3  

(D) For problem situations, the student analyzes graphs of quadratic functions and draws conclusions.  
7, 8, 9  
22  
7-2, 7-3  

**A (d)(2) Quadratic and other nonlinear functions.** The student understands there is more than one way to solve a quadratic equation and solves them using appropriate methods.

(A) The student solves quadratic equations using [concrete] models, tables, graphs, and algebraic methods.  
7, 10, 11, 12, 13, 14, 18, 19  
14  
23  
7-5  

(B) The student relates the solutions of quadratic equations to the roots of their functions.  
13, 14, 15, 18, 19  
24  
MT (342)  

**A (d)(3) Quadratic and other nonlinear functions.** The student understands there are situations modeled by functions that are neither linear nor quadratic and models the situations.

(A) The problem uses [patterns to generate] the laws of exponents and applies them in problem-solving situations.  
15, 16, 17  
15  
25  
8-1, 8-2, 8-3, 8-6, 8-7, 8-8  

**Objective 6**
The student will demonstrate an understanding of geometric relationships and spatial reasoning.

**G (b)(4) Geometric reasoning.** The student uses a variety of representations to describe geometric relationships and solve problems.
(A) The student selects an appropriate representation ([concrete], pictorial, graphical, verbal, or symbolic) in order to solve problems.

G(c)(1) Geometric reasoning. The student identifies, analyzes, and describes patterns that emerge from two- and three-dimensional geometric figures.

(A) The student uses numeric and geometric patterns to make generalizations about geometric properties, including properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles.

(B) The student uses the properties of transformations and their compositions to make connections between mathematics and the real world in applications such as tesselations or fractals.

(C) The student identifies and applies patterns from right triangles to solve problems, including special right triangles (45-45-90 and 30-60-90) and triangles whose sides are Pythagorean triples.

G(e)(3) Congruence and the geometry of size. The student applies the concept of congruence to justify properties of figures and solve problems.

(A) The student uses congruence transformations to make conjectures and justify properties of geometric figures.

Objective 7
The student will demonstrate an understanding of two- and three-dimensional representations of geometric relationships and shapes.

G(d)(1) Dimensionality and the geometry of location. The student analyzes the relationship between three-dimensional objects and related two-dimensional representations and uses these representations to solve problems.

(B) The student uses nets to represent [and construct] three-dimensional objects.

(C) The student uses top, front, side, and corner views of three-dimensional objects to create accurate and complete representations and solve problems.
### Objective 8
The student will demonstrate an understanding of the concepts and uses of measurement and similarity.

**G(e)(1) Congruence and the geometry of size.** The student extends measurement concepts to find area, perimeter, and volume in problem situations.

<table>
<thead>
<tr>
<th>A) The student finds the area of polygons and composite figures.</th>
<th>1, 2, 3, 4, 20</th>
<th>28, 29</th>
<th>25, 40, 42</th>
<th>MT (58)</th>
<th>5-2, 5-5, 5-6, 6-7</th>
</tr>
</thead>
<tbody>
<tr>
<td>B) The student finds areas of sectors and arc lengths of circles using proportional reasoning.</td>
<td>4, 5, 6</td>
<td>29, 38</td>
<td>41</td>
<td>5-8</td>
<td></td>
</tr>
<tr>
<td>C) The student [develops, extends and] uses the Pythagorean Theorem.</td>
<td>7, 8, 9</td>
<td>30</td>
<td>29, 30, 42</td>
<td>9-1</td>
<td>5-3</td>
</tr>
<tr>
<td>D) The student finds surface area and volumes of prisms, pyramids, spheres, cones, and cylinders in problem situations.</td>
<td>10, 11, 12</td>
<td>31, 33</td>
<td>43, 46</td>
<td>6-2, 6-3, 6-4, 6-5, 6-6, 10-6</td>
<td></td>
</tr>
</tbody>
</table>

**G(f)(1) Similarity and the geometry of shape.** The student applies the concepts of similarity to justify properties of figures and solve problems.

| A) The student uses similarity properties and transformations to [explore and] justify conjectures about geometric figures and solve problems. | 13, 14, 15, 17, 23 | 32 | 44, 45 | 2-6, 3-1, 3-2, 3-3 |
The student uses ratios to solve problems involving similar figures.

In a variety of ways, the student applies, and justifies triangle similarity relationships, such as right triangle ratios, [trigonometric ratios], and Pythagorean triples.

The student describes the effect on the perimeter, area, and volume when length, width, or height of a three-dimensional solid is changed and applies this idea in solving problems.

**Objective 9**
The student will demonstrate an understanding of percents, proportional relationships, probability, and statistics in application problems.

<table>
<thead>
<tr>
<th>Objective 9</th>
<th>The student will demonstrate an understanding of percents, proportional relationships, probability, and statistics in application problems.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(8.3)</strong> Patterns, relationships, and algebraic thinking.**</td>
<td>The student identifies proportional relationships in problem situations and solves problems. The student is expected to:</td>
</tr>
<tr>
<td>(B) estimate and find solutions to application problems involving percents and proportional relationships such as similarity and rates.</td>
<td>1, 2, 3 34 50, 57 3-7, 3-8, 4-1 10-1</td>
</tr>
<tr>
<td><strong>(8.11)</strong> Probability and statistics.**</td>
<td>The student applies the concepts of theoretical and experimental probability to make predictions. The student is expected to:</td>
</tr>
<tr>
<td>(A) find the probabilities of compound events (dependent and independent); and</td>
<td>3, 4, 5, 6, 7, 8 35 46, 47 2-8, 3-6, 11-6, 11-7 6-8, M T (11)</td>
</tr>
<tr>
<td>(B) use theoretical probabilities and experimental results to make predictions and decisions.</td>
<td>6, 7, 8, 9 35 47 1-7</td>
</tr>
<tr>
<td><strong>(8.12)</strong> Probability and statistics.**</td>
<td>The student uses statistical procedures to describe data. The student is expected to:</td>
</tr>
<tr>
<td>(A) select the appropriate measure of central tendency to describe a set of data for a particular purpose; and</td>
<td>9, 10, 11, 12, 36, 37 49, 50, 53</td>
</tr>
<tr>
<td>(C) construct circle graphs, bar graphs, and histograms, with and without technology.</td>
<td>12, 13, 14, 15, 17 58</td>
</tr>
<tr>
<td><strong>(8.13)</strong> Probability and statistics.**</td>
<td>The student evaluates predictions and conclusions based in statistical data. The student is expected to:</td>
</tr>
<tr>
<td>(B) recognize misuses of graphical or numerical information and evaluate predictions and conclusions based in data analysis.</td>
<td>14, 15, 16, 17, 37 48</td>
</tr>
</tbody>
</table>
**Objective 10**
The student will demonstrate an understanding of the mathematical processes and tools used in problem solving.

(8.14) **Underlying processes and mathematical tools.** The student applies Grade 8 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to:

| (A) identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics; | 1-12, 16, 17 | 12, 34, 35 38-40, 44 | 9,16, 47, 49, 51-54, 60 |
| (B) use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness; and | 1-4, 6, 8-12, 16, 17 | 12, 34, 35 38-40, 44 | 16, 47, 49-52, 59, 60 |
| (C) select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwoods to solve a problem. | 1-4, 6-12, 16, 17 | 34, 35, 38-40, 44 | 9, 47, 49, 51, 52, 54, 59, 60 |

(8.15) **Underlying processes and mathematical tools.** The student communicates about Grade 8 mathematics through informal and mathematical language, representations, and models. The student is expected to:

| (A) communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, or algebraic mathematical tools. | 5, 6, 8-12 | 12, 37, 38-40 | 16, 49, 54 |

(8.16) **Underlying processes and mathematical tools.** The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to:

| (A) make conjectures from patterns or sets of examples and nonexamples; and | 11, 12, 17 | 41, 43 | 9, 54 |
| (B) validate his/her conclusions using mathematical properties and relationships | 11, 13-15 | 37, 42 | 55 |
# Grades 9, 10, and 11 Exit Level Mathematics Chart

## LENGTH

<table>
<thead>
<tr>
<th>Metric</th>
<th>Customary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kilometer = 1,000 meters</td>
<td>1 mile = 1,760 yards</td>
</tr>
<tr>
<td>1 meter = 100 centimeters</td>
<td>1 mile = 5,280 feet</td>
</tr>
<tr>
<td>1 centimeter = 10 millimeters</td>
<td>1 yard = 3 feet</td>
</tr>
<tr>
<td></td>
<td>1 foot = 12 inches</td>
</tr>
</tbody>
</table>

## CAPACITY AND VOLUME

<table>
<thead>
<tr>
<th>Metric</th>
<th>Customary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 liter = 1,000 milliliters</td>
<td>1 gallon = 4 quarts</td>
</tr>
<tr>
<td></td>
<td>1 gallon = 128 ounces</td>
</tr>
<tr>
<td></td>
<td>1 quart = 2 pints</td>
</tr>
<tr>
<td></td>
<td>1 pint = 2 cups</td>
</tr>
<tr>
<td></td>
<td>1 cup = 8 ounces</td>
</tr>
</tbody>
</table>

## MASS AND WEIGHT

<table>
<thead>
<tr>
<th>Metric</th>
<th>Customary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kilogram = 1,000 grams</td>
<td>1 ton = 2,000 pounds</td>
</tr>
<tr>
<td>1 gram = 1,000 milligrams</td>
<td>1 pound = 16 ounces</td>
</tr>
</tbody>
</table>

## TIME

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year = 365 days</td>
</tr>
<tr>
<td>1 year = 12 months</td>
</tr>
<tr>
<td>1 year = 52 weeks</td>
</tr>
<tr>
<td>1 week = 7 days</td>
</tr>
<tr>
<td>1 day = 24 hours</td>
</tr>
<tr>
<td>1 hour = 60 minutes</td>
</tr>
<tr>
<td>1 minute = 60 seconds</td>
</tr>
</tbody>
</table>

Continued on other side
Grades 9, 10, and 11 Exit Level Mathematics Chart *(continued)*

<table>
<thead>
<tr>
<th>Perimeter</th>
<th>rectangle</th>
<th>( P = 2l + 2w ) or ( P = 2(l + w) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circumference</td>
<td>circle</td>
<td>( C = 2\pi r ) or ( C = \pi d )</td>
</tr>
<tr>
<td>Area</td>
<td>rectangle</td>
<td>( A = lw ) or ( A = bh )</td>
</tr>
<tr>
<td></td>
<td>triangle</td>
<td>( A = \frac{1}{2}bh ) or ( A = \frac{bh}{2} )</td>
</tr>
<tr>
<td></td>
<td>trapezoid</td>
<td>( A = \frac{1}{2}(b_1 + b_2)h ) or ( A = \frac{(b_1 + b_2)h}{2} )</td>
</tr>
<tr>
<td></td>
<td>circle</td>
<td>( A = \pi r^2 )</td>
</tr>
<tr>
<td>Surface Area</td>
<td>cube</td>
<td>( S = 6s^2 )</td>
</tr>
<tr>
<td></td>
<td>cylinder (lateral)</td>
<td>( S = 2\pi rh )</td>
</tr>
<tr>
<td></td>
<td>cylinder (total)</td>
<td>( S = 2\pi rh + 2\pi r^2 ) or ( S = 2\pi (r + h) )</td>
</tr>
<tr>
<td></td>
<td>cone (lateral)</td>
<td>( S = \pi rl )</td>
</tr>
<tr>
<td></td>
<td>cone (total)</td>
<td>( S = \pi rl + \pi r^2 ) or ( S = \pi (l + r) )</td>
</tr>
<tr>
<td></td>
<td>sphere</td>
<td>( S = 4\pi r^2 )</td>
</tr>
<tr>
<td>Volume</td>
<td>prism</td>
<td>( V = Bh^* )</td>
</tr>
<tr>
<td></td>
<td>cylinder</td>
<td>( V = Bh^* )</td>
</tr>
<tr>
<td></td>
<td>pyramid</td>
<td>( V = \frac{1}{3}Bh^* )</td>
</tr>
<tr>
<td></td>
<td>cone</td>
<td>( V = \frac{1}{3}Bh^* )</td>
</tr>
<tr>
<td></td>
<td>sphere</td>
<td>( V = \frac{4}{3}\pi r^3 )</td>
</tr>
</tbody>
</table>

*B* represents the area of the Base of a solid figure.

### Pi

\( \pi \)  
\( \pi = 3.14 \) or \( \pi = \frac{22}{7} \)

### Pythagorean Theorem

\( a^2 + b^2 = c^2 \)

### Distance Formula

\( d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \)

### Slope of a Line

\( m = \frac{y_2 - y_1}{x_2 - x_1} \)

### Midpoint Formula

\( M = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \)

### Quadratic Formula

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

### Slope-Intercept Form of an Equation

\( y = mx + b \)

### Point-Slope Form of an Equation

\( y - y_1 = m(x - x_1) \)

### Standard Form of an Equation

\( Ax + By = C \)

### Simple Interest Formula

\( I = prt \)
1. In which of the given situations is the independent event underlined?
   - A: number of bricks; height of the wall
   - B: gallons of fuel consumed; length of an airplane flight
   - C: total cost to hire an electrician; electrician’s hourly cost
   - D: speed of a car; distance traveled in 3 hours

2. Which is the dependent variable in the function \( d = f(k) = 3k + 4 \)?
   - F: \( f \)
   - G: \( d \)
   - H: \( k \)
   - J: 3

3. Which is the independent variable in the function \( f(k) = 3(k^2 + 4) \)?
   - A: \( f \)
   - B: \( h \)
   - C: \( k \)
   - D: 4

4. Which of the following represents the graph of the pattern in the table?

<table>
<thead>
<tr>
<th>( x )</th>
<th>( f(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-3</td>
</tr>
<tr>
<td>1</td>
<td>-1</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
</tr>
</tbody>
</table>

- F
- G
- H
- J

GO ON
5 Write an equation for the relationship between the values in the table.

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>-4</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>16</td>
</tr>
</tbody>
</table>

A \( y = -2x + 4 \)
B \( y = 2x + 4 \)
C \( y = -2x - 4 \)
D \( y = 2x - 4 \)

6 This is the graph of which equation?

F \( y = x^2 - 10 \)
G \( y = x^2 \)
H \( y = -x^2 \)
J \( y = -x^2 \)

7 Let \( f(x) = 3x + 2 \) and \( g(x) = x - 3 \). What is \( f(g(2)) \)?

A -1
B 0
C 1
D 2

8 The cost \( C(m) \) of a call from Houston to San Antonio is a function of the cost of the first minute of the call, $0.40, and the cost of each additional minute \( m \). Which function models the rule for a 10-minute call?

F \( C(m) = 0.40m \)
G \( C(m) = 0.40 + 9m \)
H \( C(m) = 0.40 + 10m \)
J \( C(m) = 0.40m + 10 \)

9 The total cost \( c \) of hiring an architect to design a building is $2,000 plus $3.00 per square foot \( s \) of the final building. Which equation shows that function?

A \( f(s) = 2000 + 3c \)
B \( f(c) = 3(2000 + s) \)
C \( c = f(s) = 2000 + 3s \)
D \( f(s) = 3(2000 - c) \)

10 In the equation \( y = f(x) = 2x^2 - 3x^2 \), as \( x \) increases,

F \( y \) increases.
G \( y \) decreases.
H \( y \) does not change.
J \( y \) decreases then increases.
11 Which table below represents the increase in population for each state?

1950 Population 
(rounded to the nearest hundred thousand)

<table>
<thead>
<tr>
<th>State</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>1,900,000</td>
</tr>
<tr>
<td>Indiana</td>
<td>3,900,000</td>
</tr>
<tr>
<td>Michigan</td>
<td>6,400,000</td>
</tr>
</tbody>
</table>

Source: Bureau of the Census, U.S. Dept. of Commerce

1990 Population 
(rounded to the nearest hundred thousand)

<table>
<thead>
<tr>
<th>State</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>2,400,000</td>
</tr>
<tr>
<td>Indiana</td>
<td>5,500,000</td>
</tr>
<tr>
<td>Michigan</td>
<td>9,300,000</td>
</tr>
</tbody>
</table>

Source: Bureau of the Census, U.S. Dept. of Commerce

A Population Increase of States

<table>
<thead>
<tr>
<th>State</th>
<th>Population Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>43,000,000</td>
</tr>
<tr>
<td>Indiana</td>
<td>94,000,000</td>
</tr>
<tr>
<td>Michigan</td>
<td>157,000,000</td>
</tr>
</tbody>
</table>

B Population Increase of States

<table>
<thead>
<tr>
<th>State</th>
<th>Population Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>50,000</td>
</tr>
<tr>
<td>Indiana</td>
<td>160,000</td>
</tr>
<tr>
<td>Michigan</td>
<td>290,000</td>
</tr>
</tbody>
</table>

C Population Increase of States

<table>
<thead>
<tr>
<th>State</th>
<th>Population Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>1,500,000</td>
</tr>
<tr>
<td>Indiana</td>
<td>1,600,000</td>
</tr>
<tr>
<td>Michigan</td>
<td>2,900,000</td>
</tr>
</tbody>
</table>

D Population Increase of States

<table>
<thead>
<tr>
<th>State</th>
<th>Population Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>500,000</td>
</tr>
<tr>
<td>Indiana</td>
<td>1,600,000</td>
</tr>
<tr>
<td>Michigan</td>
<td>2,900,000</td>
</tr>
</tbody>
</table>

Questions 12 and 13 are open-ended griddable items.

12 The length (in feet) of a panpipe is inversely proportional to its pitch (in hertz). The inverse variation is modeled by the equation \( p = \frac{495}{l} \).

Find the length in feet required to produce a pitch of 220 hertz.

13 A certain medication for dogs recommends that a dog be given 3 milliliters per 10 pounds of body weight. What is the recommended dosage for a dog that weighs 45 pounds?
1. Which of the following is the graph of a linear function?

   A
   ![Linear Function Graph A]

   B
   ![Linear Function Graph B]

   C
   ![Linear Function Graph C]

   D
   ![Linear Function Graph D]

2. Which of the following is the graph of a quadratic function?

   F
   ![Quadratic Function Graph F]

   G
   ![Quadratic Function Graph G]

   H
   ![Quadratic Function Graph H]

   J
   ![Quadratic Function Graph J]
3. To which of the following families does this graph belong?

![Graph]

A. linear function family  
B. quadratic function family  
C. absolute value function family  
D. Not enough information is given.

4. Find the range of the function \( y = 3x - 2 \) when the domain is \( \{ -3, 1, 4 \} \).

F. \( \{-\frac{1}{3}, 1, 2\} \)  
G. \( \{-11, 1, 10\} \)  
H. \( \{-9, 3, 12\} \)  
J. \( \{9, 3, 12\} \)

5. Find the domain when the range of the function \( y = 2x^2 + 1 \) is \( \{9, 3, 99\} \).

A. \( \{-7, -1, 99\} \)  
B. \( \{-3, -1, 15\} \)  
C. \( \{5, 2, 50\} \)  
D. \( \{-2, -1, 7\} \)

6. Which interpretation most closely matches the graph?

![Graph]

F. The puppy chases a ball, sits and chews on a bone, takes a nap, and runs around.  
G. The puppy runs around, sits and chews on a bone, chases a ball, and takes a nap.  
H. The puppy sits and chews on a bone, runs around, chases a ball, and takes a nap.  
J. The puppy runs around, takes a nap, sits and chews on a bone, and chases a ball.

7. What correlation is shown by the scatterplot?

![Scatterplot]

A. positive correlation  
B. negative correlation  
C. no correlation  
D. Not enough information is given.
8 The square of an unknown quantity is multiplied by 4 and subtracted from 32. The result of this operation is equal to the same unknown quantity divided by 3. Which is the correct algebraic representation of this situation?

- **F** \[4x^2 - 32 = \frac{x}{3}\]
- **G** \[32 - 4x^2 = \frac{x}{3}\]
- **H** \[32 - 4x^2 = -\frac{3}{x}\]
- **J** \[4x^2 - 32 = -\frac{3}{x}\]

9 Cubes of cement are used to build a wall 7 blocks high, 3 blocks wide, and 20 blocks long. Which algebraic expression correctly represents the volume of the wall?

- **A** \[V = 7 \times 3 \times 20\]
- **B** \[V = 7 \times 3 \times 20 \times x^2\]
- **C** \[V = \frac{7 \times 3 \times 20}{x^3}\]
- **D** \[V = 420x^3\]

10 This table shows the number of sides of some geometric figures and their number of diagonals.

<table>
<thead>
<tr>
<th>Number of Sides</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Diagonals</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>9</td>
<td>14</td>
<td>20</td>
<td>?</td>
</tr>
</tbody>
</table>

Which expression can be used to determine the number of diagonals of the nth figure?

- **F** \[n \cdot (n - 3) \div 2\]
- **G** \[n \cdot (n - 3)\]
- **H** \[n \cdot (n - 2) \div 3\]
- **J** \[2(n^2 - 3n)\]

11 The pattern of dots shown below continues infinitely, with more dots being added at each step.

```
  .
  .
```

Which expression can be used to determine the number of dots in the nth step?

- **A** \[n^2 - 1\]
- **B** \[2^2 + 5 + 7 + 9 + 11 + 13 + \ldots + n\]
- **C** \[n - 1^2\]
- **D** \[(n + 1)^2\]

12 Which interpretation most closely matches the graph?

- **F** The stock market opened well, but soon experienced losses. Investors rallied about mid-day on good news and brought the market to a positive close.
- **G** The stock market opened on a downward trend, but good news finally resulted in a small gain for the day.
- **H** The stock market opened poorly but rebounded before ending on a slight loss for the day.
- **J** Early investors drove the stock market slightly up in the early morning, but bad news sent stocks lower. The afternoon session brought little change.
13 Suppose you survey each of your classmates to find the number of hours they sleep each day and watch TV each day. Then you draw a scatter plot of the data where the x-coordinate is hours of TV and the y-coordinate is hours of sleep. You conclude that as the hours of TV increase, the hours of sleep decrease. Which scatter plot shows this relationship?

A  

B  

C  

D  

14 Simplify: \((x^4 - 5x^2 + 3x - 8) - (x^3 + 2x^2 - x + 4)\)

F  \(x^4 + x^3 - 3x^2 + 4x - 4\)

G  \(x^4 - x^3 - 3x^2 + 2x - 12\)

H  \(x^4 - x^3 - 7x^2 + 4x - 12\)

J  \(x^4 - x^3 - 8x^2 + 2x - 4\)

15 Simplify: \(6(4x - 2) + 2(3x^2 - x) - 3x^2\)

A  \(3x^2 + 24x + 10\)

B  \(3x^2 + 22x - 12\)

C  \(24x - 12 + 6x^2 - 2x - 3x^2\)

D  \(3x^2 + 23x - 2\)

16 Simplify: \(4x(x - 3) + 2x(2x + 1)\)

F  \(8x^2 - 10\)

G  \(8x^2 - 10x\)

H  \(-2x\)

J  \(18x^2 - 12x\)

Questions 17 and 18 are open-ended griddable items.

17 Given: \(f(x) = 2x^2 + 5x - 8\)
\(g(x) = 3x^2 - 2x + 4\)

What is the value of \(g(5) - f(-4)\)?

18 The function \(c = f(m) = 0.15m + 0.50\) describes the cost \(c\) of a phone call from a pay phone when it costs \$0.50 for the first minute and \$0.15 for every minute after that. Sandy has \$2.46 in change. What is the longest call in minutes she can make?
1. Which table contains data that can be represented by a linear function?

A

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>-4</td>
</tr>
<tr>
<td>0</td>
<td>-3</td>
</tr>
<tr>
<td>4</td>
<td>-2</td>
</tr>
<tr>
<td>6</td>
<td>-1.5</td>
</tr>
</tbody>
</table>

B

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>12</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>19</td>
</tr>
</tbody>
</table>

C

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

D

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>46</td>
</tr>
<tr>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>-2</td>
</tr>
<tr>
<td>6</td>
<td>68</td>
</tr>
</tbody>
</table>

2. Which of these describes a linear relationship?

F. the size of one’s hands and the cost of gloves

G. the cost of food and the number of calories it contains

H. the number of pages in a book and its place on the Best-Seller List

J. the speed of a train and the distance traveled

3. Which table shows the same data as the graph?

A

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>-11</td>
</tr>
<tr>
<td>-1</td>
<td>-5</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

B

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>13</td>
</tr>
<tr>
<td>-2</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>-1</td>
</tr>
<tr>
<td>4</td>
<td>-5</td>
</tr>
</tbody>
</table>

C

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>5</td>
</tr>
<tr>
<td>-1</td>
<td>-1</td>
</tr>
<tr>
<td>1</td>
<td>-5</td>
</tr>
<tr>
<td>5</td>
<td>-13</td>
</tr>
</tbody>
</table>

D

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-3</td>
</tr>
<tr>
<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
</tr>
</tbody>
</table>
4 What is the slope of the linear function \(2x + 3y = 12\)?

- **F** \(-\frac{2}{3}\)
- **G** \(\frac{2}{3}\)
- **H** \(\frac{3}{4}\)
- **J** \(4\)

5 Determine the slope of the line.

6 In the linear equation \(y = 2x - 3\), the \(y\)-intercept is changed to \(\frac{1}{2}\). How will this change affect the graph of the line?

- **F** The line will now go down from left to right.
- **G** The line will move \(3\frac{1}{2}\) units up.
- **H** The line will now go up from left to right.
- **J** The line will move \(\frac{1}{2}\) unit up.

7 What is the standard-form equation of the graph?

- **A** \(-7x + 9y = -34\)
- **B** \(7x + 9y = 20\)
- **C** \(-7x - 9y = 20\)
- **D** \(y = -\frac{7}{9}x + \frac{20}{9}\)
8. The line of a graph will be moved $4\frac{1}{2}$ units down. How will this change be reflected in the new equation of the line?

F. The slope will change by $-4\frac{1}{2}$.
G. The $y$-intercept will change by $+4\frac{1}{2}$.
H. The slope will change by $+4\frac{1}{2}$.
J. The $y$-intercept will change by $-4\frac{1}{2}$.

9. Determine the equation of the line that passes through the points (6, 2) and (4, 3).

A. $y = -\frac{1}{2}x + 5$
B. $y = -\frac{1}{2}x - 5$
C. $y = \frac{1}{2}x + 5$
D. $y = -\frac{1}{2}x - 5$

10. Determine the equation of the line with slope $\frac{2}{3}$ that passes through the point (5, 3).

F. $y = \frac{2}{3}x + \frac{1}{3}$
G. $y = \frac{2}{3}x - 3$
H. $y = \frac{2}{3}x - \frac{1}{3}$
J. $y = \frac{2}{3}x + 3$

11. Which graph shows the linear equation with slope $-\frac{1}{4}$ and $y$-intercept $-2$?

A
B
C
D
12 A dentist charges a flat fee for an office visit and an additional fee for filling each cavity. In the equation \( y = 32x + 70 \), what does 32x represent?

F the office visit fee  
G the cost of filling one cavity  
H the cost of x-rays  
J the cost of filling all cavities

13 The cost of a tip at a restaurant is a function of the cost of the meal. The cost of 4 meals is shown in the table.

<table>
<thead>
<tr>
<th>Cost of Meal</th>
<th>Tip</th>
</tr>
</thead>
<tbody>
<tr>
<td>$12.00</td>
<td>$2.40</td>
</tr>
<tr>
<td>$16.00</td>
<td>$3.20</td>
</tr>
<tr>
<td>$22.00</td>
<td>$4.40</td>
</tr>
<tr>
<td>$25.00</td>
<td>$5.00</td>
</tr>
</tbody>
</table>

If the data are graphed with the cost of the meal on the horizontal axis and the tip on the vertical axis, what does the slope represent?

A a rate of 20%  
B the total cost per meal  
C an average cost of the meals  
D the rating of the service

14 Determine the x- and y-intercepts of the line \( 3x - 4y = 11 \).

F \( x\)-intercept = \( \frac{11}{4} \); \( y\)-intercept = \( -\frac{11}{3} \)  
G \( x\)-intercept = \( -\frac{11}{4} \); \( y\)-intercept = \( \frac{11}{3} \)  
H \( x\)-intercept = \( -\frac{11}{3} \); \( y\)-intercept = \( -\frac{11}{4} \)  
J \( x\)-intercept = \( \frac{11}{3} \); \( y\)-intercept = \( -\frac{11}{4} \)

15 Determine the x- and y-intercepts of the linear equation shown by the values in the table.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>-11</td>
</tr>
<tr>
<td>-2</td>
<td>-6</td>
</tr>
<tr>
<td>1</td>
<td>-1</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>

A \( x\)-intercept = \( \frac{8}{3} \); \( y\)-intercept = \( -\frac{8}{3} \)  
B \( x\)-intercept = \( \frac{5}{3} \); \( y\)-intercept = \( -\frac{3}{8} \)  
C \( x\)-intercept = \( -\frac{8}{3} \); \( y\)-intercept = \( \frac{8}{3} \)  
D \( x\)-intercept = \( -\frac{8}{3} \); \( y\)-intercept = \( \frac{8}{3} \)

16 A n auto rental agency charges a flat fee for renting a car, plus a fee for each mile driven. The agency has decided to increase the mileage fee. How would this change affect the graph of this linear function?

F The \( y\)-intercept would increase.  
G The \( y\)-intercept would decrease.  
H The slope would increase.  
J The slope would decrease.
17 A computer company sells its computers for a fixed price, plus an additional charge for every 100 Mb of memory it installs. To increase sales, the company lowered the base price of the computer. How would this change affect the line of the linear function?

A The slope would increase.
B The slope would decrease.
C The y-intercept would decrease.
D The y-intercept would increase.

18 A cement block manufacturer sells blocks for $1.25 each and charges a $200 delivery fee. The graph below shows this relationship. If the line of this graph is moved down but retains the same slope, what is the significance of this change?

F The company has lowered its delivery fee.
G The company has raised its delivery fee.
H The company has raised the price of the block.
J The company has lowered the price of the block.

19 Which graph shows a direct variation?
Questions 20 and 21 are open-ended griddable items.

20 A school nutritionist estimates that 3 pounds of peanut butter will serve 25 students. How many pounds of peanut butter would be needed to serve 238 students?

21 The distance needed to stop a car (d) varies directly with the square of the speed of the car (s). If a car traveling 25 mph requires 60 feet to stop, how many feet will be required to stop a car that is traveling at 60 mph?
1 It is your turn to bring donuts to the club meeting. Plain donuts (p) are $7.99 per dozen, and filled donuts (f) are $8.99 per dozen. You have $35 in your wallet. Which inequality could you use to determine how many of both kinds of donuts you could buy?

A $8p + 9f < 35$
B $7.99p + 8.99f < 35.00$
C $7.99p + 8.99f \leq 35$
D $8.99f + 7.99p \geq 35.00$

2 A ferry operator estimates the weight of each female passenger (f) as 150 pounds and each male passenger (m) as 200 pounds. The ferry has a weight limit of 22.5 tons. Which inequality could you use to determine the possible combinations of male and female passengers that would not endanger the ferry?

F $f + m < 22.5$
G $150f + 200m \leq 45,000$
H $22.5 - 200m = 150f$
J $150(m + f) = 45,000$

3 One floor of an office building has 8,000 square feet of available space. The builders can put in offices (s) at 300 square feet each or conference rooms (c) at 500 square feet each. Which equation could you use to determine the number of offices and conference rooms possible?

A $8,000 + 500c = 300s$
B $8,000 = 500c - 300s$
C $800 + 300s = 500c$
D $300s + 500c = 8,000$

4 Which graph shows the solution of $10y - 18x \geq 25$?
5 This graph shows the solution set of which inequality?

![Graph of an inequality]

A $2y - x > 3$
B $10x + 3y < -6$
C $3y - x \geq 4$
D $y - 10x \leq -3$

6 A theory holds that if you measure the distance ($d$) from ankle to elbow of a 1-year-old horse, double it, and add 3 inches, you will have the height ($h$) that horse will be as an adult. One study measured the following horses at 1 year of age and again at 5 years of age. The study used the equation $h = 2d + 3$ as a criterion.

<table>
<thead>
<tr>
<th>Horse</th>
<th>$d$</th>
<th>$h$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chance</td>
<td>29&quot;</td>
<td>68&quot;</td>
</tr>
<tr>
<td>Pride</td>
<td>31&quot;</td>
<td>59&quot;</td>
</tr>
<tr>
<td>Trigger</td>
<td>29.8&quot;</td>
<td>63&quot;</td>
</tr>
<tr>
<td>Spots</td>
<td>31.5&quot;</td>
<td>58&quot;</td>
</tr>
</tbody>
</table>

Which is a valid statement about the accuracy of the equation for this set of data?

F It gives a reasonable and accurate measure for all subjects.
G It gives an exact measure for two of the subjects.
H It gives a reasonable and accurate measure for Trigger only.
J It gives a reasonable and accurate measure for all but Pride.
A scientist theorized that a person’s arm-span \((s)\) is \(\frac{1}{8}\) of 7 times their height \((h)\). He used the equation \(s = \frac{7h}{8}\) as a criterion, then made and recorded the following results:

<table>
<thead>
<tr>
<th>Name</th>
<th>s</th>
<th>h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amanda</td>
<td>40&quot;</td>
<td>62&quot;</td>
</tr>
<tr>
<td>Bob</td>
<td>45&quot;</td>
<td>67&quot;</td>
</tr>
<tr>
<td>Carol</td>
<td>44&quot;</td>
<td>65&quot;</td>
</tr>
<tr>
<td>DeWayne</td>
<td>50&quot;</td>
<td>74&quot;</td>
</tr>
<tr>
<td>Everett</td>
<td>39&quot;</td>
<td>63&quot;</td>
</tr>
</tbody>
</table>

If a variation of an inch or more is considered inaccurate, which is a valid statement about the accuracy of the equation for this set of data?

F It gives a reasonable and accurate measure for three of the subjects.
G It gives an exact measure for Carol only.
H It gives a reasonable and accurate measure for DeWayne and Everett only.
J It gives a reasonable and accurate measure for none of the subjects.

The Music Mart rents trumpets for a $20 fee plus $7 per week. Music Warehouse rents trumpets for a $40 fee plus $5 per week. Which system of equations would you use to determine the length of the rental period when the stores’ total charges are equal?

A \(y = 20x + 7\)
   \(y = 40x + 5\)
B \(y = 7(20 + x)\)
   \(y = 5(40 + x)\)
C \(y = x + 27\)
   \(y = x + 45\)
D \(y = 7x + 20\)
   \(y = 5x + 40\)

Forensics experts believe they have determined a relationship between the width of a person’s hand \((h)\) and the circumference of that person’s skull \((s)\). They used the inequality \(6h - 2 \geq s\) to test this theory, then made and recorded the measurements.

If a deviation of \(\frac{1}{2}\) inch is considered inaccurate, which is a valid statement about the accuracy of the inequality for this set of data?

F It gives a reasonable and accurate measure for only two subjects.
G It gives an exact measure for subjects D and F.
H It gives a reasonable and accurate measure for all but one subject.
J It gives a reasonable and accurate measure for half the subjects.

Alain is selecting a local phone company. Company A charges a $7.95 monthly fee and 7¢ per minute of usage. Company B charges a $4.95 monthly fee and 8.5¢ per minute of usage. Alain estimates that he talks on the phone for 300 minutes per month. Which system of equations will help him decide which company would be the better bargain?

A \(y = 795x + 7\)
   \(y = 495 + 8.5\)
B \(y = 7x + 795\)
   \(y = 8.5x + 495\)
C \(y = 7x + 4.95\)
   \(y = 8.5x + 7.95\)
D \(y = 7x - 795\)
   \(y = 8.5x - 495\)
12. Complete the tables to find the solution to the system below.

\[ y = 2x - 5 \]
\[ 3y + 4x = 5 \]

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td></td>
<td>-3</td>
<td></td>
</tr>
<tr>
<td>-2</td>
<td></td>
<td>-2</td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td></td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

F (2, -1)
G (-2, 1)
H (1, -2)
J (-1, 2)

13. Alpha Car Rental rents a mid-size sedan for $45 per day plus 40¢ per mile. Beta Car Rental rents the same car for $39 per day and 50¢ per mile. Which system of equations would you use to determine at what mileage the two agencies would charge the same amount?

A. \[ y = 40x + 45 \]
   \[ y = 50x + 39 \]

B. \[ y = 40(x + 45) \]
   \[ y = 50(x + 39) \]

C. \[ y = 45x + 40 \]
   \[ y = 39x + 50 \]

D. \[ y = x + 85 \]
   \[ y = x + 89 \]

14. Which graph shows the solution to the system below?

\[ y = -2x + 4 \]
\[ -3y + 8x = -12 \]
15 Solve.
\[ y = -2x - 2 \]
\[ 2x + 3y = 6 \]
A (3, -4)
B (4, -3)
C (-3, 4)
D Not here

16 Ashley came across the following problem in her math book:

A bank contains 24 coins, all nickels and quarters. The total value of the coins is $4.40.
What are the coins?
A shley wrote and solved a system of equations and determined the solution to be (8, 16).
Which statement is the most reasonable interpretation of A shley’s solution?

F There is an equal number of one kind of coin as there are of the other kind.
G There are 8 nickels and 16 quarters in the bank.
H A shley’s solution is incorrect.
J There are 16 nickels and 8 quarters in the bank.

Questions 17 and 18 are open-ended griddable items.

17 The number of people involved in recycling in a community is modeled by the function
\[ n = 90 \sqrt{3t} + 398 \], where \( t \) is the number of months the recycling plant has been open. Estimate the number of people recycling when the plant has been open for 6 months.

18 Mr. Sandford took 8 shirts and 3 ties to the dry cleaners and was charged $34.50 for the cleaning. The following week he took in 5 shirts and 4 ties, and was charged $24.75. If Mr. Sandford wants 7 more shirts cleaned, and buys two buttons for 50¢ each, how much more must he pay?
1 In the equation \( y = -3x \), as \( x \) increases,
A y increases.
B y decreases.
C y does not change.
D y increases then decreases.

2 What is the effect on the graph of \( y = 9x^2 \) when the equation is changed to \( y = 4x^2 \)?
F The \( x \) values for any given \( y \) are farther from the \( y \)-axis.
G The graph of \( y = 4x^2 \) is 5 units lower than the graph of \( y = 9x^2 \).
H The graph of \( y = 9x^2 \) is 5 units lower than the graph of \( y = 4x^2 \).
J The \( x \) values for any given \( y \) are closer to the \( y \)-axis.

3 What is the effect on the graph of \( y = 3x^2 \) when the equation is changed to \( y = -3x^2 \)?
A The graph is rotated 90° to the right.
B The graph is reflected across the \( x \)-axis.
C The graph is rotated 90° to the left.
D The graph is reflected across the \( y \)-axis.

4 What is the effect on the graph of \( y = x^2 - 2 \) when the equation is changed to \( y = x^2 + 2 \)?
F The graph moves up 2 units.
G The graph moves to the right 4 units.
H The graph is reflected across the \( y \)-axis.
J The graph moves up 4 units.

5 Charlie was supposed to graph the equation \( y = 2x^2 - 5 \), but he copied the equation incorrectly. Instead, he graphed \( y = 2x^2 + 5 \). How does his graph differ from the correct graph?
A Charlie’s graph is 10 units lower than it should have been.
B Charlie’s graph is 5 units lower than it should have been.
C Charlie’s graph is 10 units higher than it should have been.
D Charlie’s graph is 5 units higher than it should have been.
6. Which graph shows \( y = 3x^2 - 3 \) and \( y = 3x^2 + 37 \)?

7. Which statement about the equation given by this graph when \( y = 0 \) is correct?

A. The equation has two real solutions.
B. The equation has no real solution.
C. The equation has one real solution.
D. You cannot determine the number of real solutions.

8. Determine the equation for the graph.

F. \( y = (x - 5)^2 + 3 \)
G. \( y = (x - 3)^2 - 5 \)
H. \( y = (x + 5)^2 + 3 \)
J. \( y = (x + 5)^2 - 3 \)
9. An arrow was shot into the air with an initial velocity of 45 feet per second from an initial height of 4 feet. The graph shows the path of the arrow, using the vertical motion formula \( h = -16t^2 + vt + s \), where \( t \) is the time in seconds, \( v \) is the initial velocity, and \( s \) is the initial height.

Which is the best conclusion about the arrow's action?

A. The arrow fell to Earth in 5 seconds.
B. The arrow reached its maximum height of 35 feet in less than a second.
C. After 1 second the arrow was 33 feet above ground level.
D. The arrow traveled more than 100 feet in its flight.

10. Solve this quadratic equation by any method. Round your solutions to the nearest tenth.

\[ 4x^2 - 12x - 91 = 0 \]

- F. 6.5, -3.5
- G. -6.5, -3.5
- H. 6.5, 3.5
- J. -6.5, 3.5

11. Solve. \( \frac{2}{x} + \frac{6}{x-1} = \frac{6}{x^2 - x} \)

- A. 0
- B. \( \frac{1}{5} \)
- C. \( \frac{3}{2} \)
- D. No solution

12. Use the quadratic formula to find the solutions of \( -3x^2 + 10x - 8 = 0 \).

- F. \( \frac{-3}{2}, 2 \)
- G. \( \frac{4}{3}, -2 \)
- H. \( \frac{4}{3}, 2 \)
- J. 4, \( \frac{2}{3} \)

13. The graph below shows the equation \( x^2 + 5x - 6 = 0 \). What are the roots of the equation?

- A. -6, 1
- B. -6, -2.5, 1
- C. \( \sqrt{6}, 1 \)
- D. -12.25, -6, -2.5, 1
14 Find all real roots of $x^4 - 9x^2 + 14 = 0$.
   F $x = (2, 7)$
   G $x = (2, -2, 7, -7)$
   H $x = (\sqrt{2}, -\sqrt{2}, 7, -7)$
   J $x = (-\sqrt{2}, \sqrt{2}, -\sqrt{7}, \sqrt{7})$

15 Simplify $\left( \frac{a^4b^3c^7}{a^2b^4c^3} \right)^5$.
   A $\frac{a^{10}c^{20}}{b^5}$
   B $\frac{a^{30}c^{20}}{b^5}$
   C $\frac{a^{30}c^{20}}{b^5}$
   D $\frac{a^{10}c^{20}}{b^5}$

16 The base of a triangle has a length of $4ab^2$. The height of the triangle is $12a^3b^4$. Find the area of the triangle.
   F $48a^{15}b^8$
   G $24a^{15}b^8$
   H $48a^8b^6$
   J $24a^8b^6$

17 The area of a rectangle is $8x^8y^{12}$ square units. The width of the rectangle is $2x^4y^3$ units. What is the length of the rectangle?
   A $4x^2y^4$
   B $6x^3y^4$
   C $4x^4y^9$
   D $6x^4y^9$
1. What space figures can you use to approximate the shape of the ice cream cone?

A. half sphere, cone
B. half circle, cone
C. sphere, cylinder
D. half sphere, half cylinder

2. Some figures that are piggles are shown below, as are some nonpiggles.

Piggles

Nonpiggles

Which one of the following is not a piggle?

F. F
G. G
H. H
J. J

3. Which word makes the statement true? All _____ are similar.

A. polygons
B. rectangles
C. triangles
D. circles

4. RSTV is a rectangle

Which triangle is congruent to \( \triangle VRS\)?

F. \( \triangle VTX\)
G. \( \triangle STX\)
H. \( \triangle RSX\)
J. \( \triangle TSR\)

5. What is the approximate diameter of a dinner plate?

A. 25 centimeters
B. 25 inches
C. 25 ounces
D. 25 grams
6 Of the letters P, E, S, and W, which one has rotational symmetry but not reflectional symmetry?

F  P  
G  E  
H  S  
J  W

7 A triangle has vertices A (2, 6), B (−5, 1), and C (−2, 8). What are the vertices of the reflection image of ∆ABC in the line y = 1?

A (2, 5), (−5, 0), (−2, 7)  
B (2, 7), (−5, 2), (−2, 9)  
C (0, 6), (7, 1), (4, 8)  
D (2, −4), (−5, 1), (−2, −6)

8 Mrs. Andrews drives 9 blocks west and 6 blocks north from her home to her workplace. After work, she drives 3 blocks east and 4 blocks north to pick up groceries. Which of the following describes the route that will take her home from the grocery store?

F  6 blocks east, 10 blocks south  
G  6 blocks west, 10 blocks south  
H  6 blocks east, 10 blocks north  
J  6 blocks west, 10 blocks north

9 Which of the following rotations would map a regular octagon onto itself?

A  160°  
B  135°  
C  75°  
D  60°

10 Which of the following figures does not have a vertical line of symmetry?

F  
G  
H  
J

Questions 11 and 12 are open-ended griddable items.

11 What is the length of the diagonal of the rectangle?

12 The length of the diagonal of a square is \( \sqrt{18} \) centimeters. What is the length of one side of the square?
1. The net below could be folded to make which of the following figures?
   A. regular square pyramid
   B. triangular prism
   C. triangular pyramid
   D. cube

2. The net below could be folded to make which of the following figures?
   F. right cone
   G. square pyramid
   H. triangular prism
   J. triangular pyramid

3. Which net will fold to make a cube?
   I. 
   II. 
   III. 
   IV. 
   A. I and II only
   B. II only
   C. II and III only
   D. II, III, and IV only

4. The top and front views of an object built with 8 cubes are shown below.
   Top View
   Front View
   Which of the following represents a side view of the object?
   F. 
   G. 
   H. 
   J. 

GO ON
5 The isometric drawing of a solid structure is shown below.

Which of the following shows the right-side view of the structure?

A  

B  

C  

D  

6 Which of the lines is parallel to the line 
y = 6x – 5?

F  x = 6y + 5 
G  y = –6x + 5 
H  5y – 30x = 24 
J  3y + 18x = 35 

7 \( \overline{RS} \) contains the points R (9, –2) and S (–7, 4). What is the slope of a line perpendicular to \( \overline{RS} \)?

A  \(-\frac{8}{3}\) 
B  \(-\frac{3}{8}\) 
C  \frac{3}{8} 
D  \frac{8}{3} 

8 Rectangle \( WXYZ \) contains the consecutive vertices \( W(4, 7) \) and \( X(13, 12) \). Which of the following could be the coordinates of vertex \( Y \)?

F  (4, 12) 
G  (9, 16) 
H  (13, 7) 
J  (18, 3) 

9 What are the coordinates of the midpoint of \( EF \) with endpoints \( E(–21, 9) \) and \( F(–7, –15) \)?

A  (14, –24) 
B  (–6, –11) 
C  (–14, –3) 
D  (–28, –6)
10  What is the shortest distance from point B to point Z?

F  $\sqrt{24}$
G  $\sqrt{74}$
H  9
J  12

11  The vertices of $\triangle ABC$ are $A(-2, 1)$, $B(1, 5)$, and $C(6, 5)$. Which of the following describes $\triangle ABC$?

A  isosceles triangle
B  right triangle
C  equilateral triangle
D  Not here

Questions 12 and 13 are open-ended griddable items.

12  The top, side, and front views of an object built with cubes are shown below.

How many cubes are needed to construct this object?

13  Find the measure of $\overline{TR}$ in $\odot P$.
1. The area of a square is 324 square feet. The length of one side of the square is _____.
   A  18 ft  
   B  32.4 ft  
   C  81 ft  
   D  162 ft

2. The area of a right triangle with sides that measure 9 meters, 12 meters, and 15 meters is _____.
   F  18 m²  
   G  36 m²  
   H  54 m²  
   J  108 m²

3. What is the area of figure WXYZ?
   A  34 units²  
   B  44 units²  
   C  64 units²  
   D  80 units²

4. What is the area of a circle with a diameter of 22 centimeters?
   F  11π cm²  
   G  22π cm²  
   H  121π cm²  
   J  484π cm²

5. A pizza with a diameter of 14 inches is divided into 8 equal slices. Find the area of one slice of the pizza to the nearest square inch. (Use 3.14 for π.)
   A  19 in.²  
   B  24 in.²  
   C  77 in.²  
   D  154 in.²

6. The area of the shaded sector of the circle is _____.
   F  45π cm²  
   G  225π cm²  
   H  450π cm²  
   J  900π cm²
7 A right triangle has legs that measure 8 inches and 15 inches. The length of the hypotenuse of the triangle is ______.

A 17 in.
B 23 in.
C \sqrt{23} in.
D \sqrt{161} in.

8 The length of the hypotenuse of a right triangle is 57 centimeters and one leg of the triangle measures 32 centimeters. Find the length of the other leg of the triangle. Round your answer to the nearest centimeter.

F 11 cm
G 25 cm
H 47 cm
J 65 cm

9 What is the value of x?

A \frac{3 \sqrt{3}}{2}
B \frac{5 \sqrt{3}}{2}
C 9
D 12

10 A rectangular prism is 12 centimeters long, 8 centimeters wide, and 6 centimeters high. Find the surface area of the prism.

F 26 cm²
G 52 cm²
H 432 cm²
J 576 cm²

11 Find the total surface area of the cylinder to the nearest square meter. (Use 3.14 for π.)

A 26 m²
B 42 m²
C 133 m²
D 266 m²

12 Find the volume of a cone that has a diameter of 6 feet and a height of 5 feet. Use 3.14 for π. Round your answer to the nearest cubic foot.

F 47 ft³
G 94 ft³
H 141 ft³
J 188 ft³
13. Which two figures are not similar?

A. \[
\begin{array}{ccc}
4 & 4 \\
5 & 5 \\
\end{array}
\]

B. \[
\begin{array}{ccc}
7.5 & \\
5 & \\
\end{array}
\]

C. \[
\begin{array}{ccc}
6 & 6 \\
4 & 10.5 \\
\end{array}
\]

D. \[
\begin{array}{ccc}
5 & 4 \\
6 & 5 \\
\end{array}
\]

14. Rectangle \( A\ B\ C\ D \) is 18 centimeters by 12 centimeters. Which of the rectangles shown are similar to rectangle \( A\ B\ C\ D \)?

I. \[
\begin{array}{ccc}
15 & 10 \\
25 & 15 \\
\end{array}
\]

II. \[
\begin{array}{ccc}
20 & \\
30 & \\
\end{array}
\]

III. \[
\begin{array}{ccc}
25 & \\
15 & \\
\end{array}
\]

F. I and II only

G. I and III only

H. II and III only

J. I, II, and III

15. \( \triangle ABC \) is an isosceles right triangle. \( \triangle CDE \) contains two 45° angles. \( \triangle FGH \) is a triangle with side lengths of 7 centimeters, 7 centimeters, and \( 7\sqrt{2} \) centimeters. Which of these triangles are similar?

A. \( \triangle ABC \) and \( \triangle CDE \) only

B. \( \triangle ABC \) and \( \triangle FGH \) only

C. \( \triangle CDE \) and \( \triangle FGH \) only

D. All three triangles are similar.

16. The two rectangles are similar.

What is the ratio of the area of the first rectangle to the area of the second?

F. 0.625:1

G. 1.26:1

H. 1.60:1

J. 2.56:1

17. The two triangles are similar.

What is the value of \( y \)?

A. 15

B. \( 15\sqrt{2} \)

C. \( 24\sqrt{2} \)

D. 36
18 Which of the following is not a Pythagorean triple?

- F  5, 12, 13
- G  14, 48, 50
- H  13, 84, 85
- J  16, 63, 66

19 A cube made of lead weighs 40 pounds. How much does a cube of lead weigh if each dimension is one-half as large?

- A  5 lb
- B  15 lb
- C  20 lb
- D  80 lb

20 If a walkway around a rectangular swimming pool is 4 meters wide, then the formula \( A = 8(\ell + w) + 64 \) gives the area \( A \) of the walkway for a pool with length \( \ell \) and width \( w \).

What is the area of a walkway for a pool with length 25 meters and width 15 meters?

- F  375 m²
- G  384 m²
- H  759 m²
- J  832 m²

21 A factory is preparing to manufacture several thousand aluminum barrels with the dimensions shown below. The barrels will be painted with an expensive corrosion-resistant paint.

So that they can order the correct amount of paint without ordering any more than they need, the factory needs to know the surface area of each barrel to the nearest square foot. Miscalculating the surface area by a square foot per barrel could result in ordering too much or too little paint, and end up costing a lot of money.

Find the surface area of the barrel.

22 At the same time of day, a person who is 5 feet tall casts a 3-foot-long shadow and a building casts a 12-foot-long shadow. What is the height of the building in feet?

23 The polygons shown are similar.

What is the value of \( x \)?
1. A car salesperson uses 6% to estimate sales tax, while the actual sales tax is 6.25%. How much is the difference in tax for a customer buying a $38,000 car?

A $25.00  
B $95.00  
C $228.00  
D $237.50

2. A mortar mix calls for 3.8 pounds of sand for every 2 pounds of Portland cement. How much cement should be mixed with 70 pounds of sand?

F 36.84 lb  
G 108.57 lb  
H 133.00 lb  
J 140.00 lb

3. A farmer has 10 hens that lay eggs. On an average day, 60% of the hens lay eggs. Which expression represents the probability that on one day, 9 of the 10 hens lay eggs?

A \((.6)^9 \cdot (.4)^1\)  
B \(10 \cdot (.6)^9\)  
C \(10 \cdot (.6)^9 \cdot (.4)^1\)  
D \(100 \cdot (.6)^9 \cdot (.4)^1\)

4. If \(A\) and \(B\) are two independent events and \(P(A) = \frac{1}{5}\) and \(P(B) = \frac{3}{10}\), what is \(P(A \text{ and } B)\)?

F \(\frac{3}{50}\)  
G \(\frac{1}{10}\)  
H \(\frac{1}{2}\)  
J \(\frac{4}{15}\)

5. To win a prize at a grand opening of a store, each shopper chooses two numbers. The first number is from 1 to 6, and the second number is from 7 to 12. Then the shopper tries to match the numbers by rolling two number cubes, one with numbers 1 to 6 on its faces, and the second with numbers 7 to 12 on its faces. What is the probability of winning a prize, rounded to the nearest percent?

A 3%  
B 4%  
C 5%  
D 6%
A biology class raised 36 pea plants as part of an experiment. When the plants flowered, some had white flowers, some had pink flowers, and some had blue flowers. The table below shows how many plants had each color of flowers.

<table>
<thead>
<tr>
<th>Flower color</th>
<th>White</th>
<th>Pink</th>
<th>Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of plants</td>
<td>22</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

Next year’s class will raise 60 pea plants. Based on this year’s data, predict how many of those plants are likely to have blue flowers.

F 6
G 8
H 10
J 18

An integer from 1 to 10 is randomly selected by a computer. At the same time, you choose an integer from 1 to 10. What is the probability that the two numbers will be the same?

A \( \frac{1}{10} \)
B \( \frac{1}{100} \)
C \( \frac{1}{20} \)
D \( \frac{1}{5} \)

A computer randomly generates two numbers from 1 to 5. The probability distribution for the sum of the numbers is given. Find \( P(\text{sum is prime}) \).

A 38%
B 40%
C 44%
D 50%

A healthcare organization wants to determine the average length of stay in the hospital for patients with broken legs. Which would be the most appropriate measure of central tendency to use for this study?

A mean
B median
C mode
D Not here

The accountant for a small business firm wants to determine the middle-most salary for the 20 employees. Which would be the most appropriate measure of central tendency to use in making this determination?

A mean
B median
C mode
D Not here
11 An athletic shoe manufacturer wants to determine the most common size of shoe worn by football players. What is the most appropriate measure of central tendency for the manufacturer to use?

A mean  
B median  
C mode  
D Not here  

12 Under which circumstances would you use a histogram to display your data?

F You want to show the highest temperature in your town over a period of a month.  
G You want to show how your rent and other expenses relate to your total budget.  
H You want to compare the averages heights for males and females at several different ages.  
J You want to show the number of students in your class who were born in each month of the year.

13 You want to construct a double bar graph showing the difference between the spending habits of men and women in different areas of the country. What would the two different bars represent?

A east coast and west coast of the country  
B men and women  
C northern and southern areas of the country  
D men and women spending over $50 and those spending less than $50  

14 The bar graph below shows the number of votes four students received in a student council election. Which of the following is NOT true?

F Gillian received about 100 more votes than Nelson.  
G Tina received the least votes.  
H About 730 votes were cast.  
J Jamal received about 200 votes.

15 Which is a valid statement concerning this graph?

SURVEY OF FAVORITE SPORTS

<table>
<thead>
<tr>
<th></th>
<th>Baseball</th>
<th>Soccer</th>
<th>Basketball</th>
<th>Football</th>
<th>Hockey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key: 1 symbol</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

A Football is the most popular sport among those surveyed.  
B The information should have been displayed in a circle graph.  
C The graph is misleading because the size of the symbols differ.  
D The information should have been displayed in a line graph.
Questions 16 and 17 are open-ended griddable items.

16 A chair normally sells for $795, but has been discounted 25%. The store holds a sale that offers a discount of 15% off the sale price of the chair. What is the price of the chair now?

17 Margo is making a circle graph to show the population of her city in terms of different age groups. The number of children under the age of 5 years is 8% of the total population. How many degrees of the circle should represent this portion of the population?
1. The band at your school is selling T-shirts to help pay for a trip to Washington, D.C. A local printer will print the T-shirts for a setup charge of $200 plus $6 per shirt. The band will charge $10 per shirt. How many shirts does the band need to sell to make a profit of $600?

A. 100  
B. 150  
C. 200  
D. 250

2. The diameter of Jupiter is 88,000 miles. This is about 11.1 times the diameter of Earth. What is the diameter of Earth? Round your answer to the nearest integer.

F. 7,928 miles  
G. 14,006 miles  
H. 87,989 miles  
J. 88,011 miles

3. Jennifer has 10 fewer quarters than dimes and 5 fewer nickels than quarters. The total value of the coins is $4.75. How many quarters, dimes, and nickels does she have?

A. 10 quarters, 20 dimes, 5 nickels  
B. 10 quarters, 20 dimes, 15 nickels  
C. 12 quarters, 22 dimes, 7 nickels  
D. 15 quarters, 25 dimes, 0 nickels

4. Raul, Nadine, and Sam are employed by company X. This week Raul worked 37 hours, Nadine worked 28.5 hours, and Sam worked 32.5 hours. Each employee earns $7.25 per hour. Which is the most reasonable estimate for the total pay of the three employees for this week?

F. $600  
G. $700  
H. $800  
J. $900

5. An architect is designing a right triangle-shaped wall for an art museum. The hypotenuse of the wall will be 12 meters long, one of the other sides will be 6 meters long, and the angle between these two sides will be 60°. What is the best estimate for the length of the remaining side?

A. 10.4 m  
B. 10.8 m  
C. 12.0 m  
D. 15.5 m
6 Clare’s monthly bank statement for her savings account shows the following changes:
- $40.00  electronic withdrawal
- $85.00  deposit
- $1.04   interest
- $139.65 new balance

Which of the following is the appropriate strategy for figuring out the balance in Clare’s account before these transactions were made?

F   looking for a pattern
G   making a table
H   working a simpler problem
J   working backwards

7 A rectangular pen is to be constructed alongside a barn using 120 feet of fencing. The barn will be used for one side of the pen. What should the dimensions of the pen be to maximize its area?

A 30 ft × 60 ft
B 40 ft × 40 ft
C 40 ft × 80 ft
D 50 ft × 70 ft

8 The attendance at a ball game was 400 people. Student tickets cost $2 and adult tickets cost $3. Total ticket sales were $1,050. Write a system of two equations to model this situation in terms of the number of students (s) and the number of adults (a).

F 3a – 2s = 400
   1,050a + 1,050s = 400
G 2s + 3a = 1,050
   s + a = 400
H 3s = 2a
   1,050(s + a) = 400
J 2s = 3a
   400(s + a) = 1,050

9 Geraldo and his family went snowmobiling at Yellowstone Park. Adventures Unlimited charges $20 per day plus $0.25 per mile to rent a snowmobile, while Snow Paradise charges $30 per day plus $0.15 per mile. Write an equation that represents the snowmobile rental cost (y) for a given number of miles (x) for each business.

A y = .25x + 30; y = .15x + 20
B y = .30x + 15; y = .20x + 25
C y = .30x + 25; y = .15x + 20
D y = .25x + 20; y = .15x + 30

10 Scientists discovered that salamanders in an area river were on the decline. Write an exponential function to model a population of 175 salamanders decreasing at an annual rate of 12%.

F y = 175(1.12)x
G y = 175(.88)x
H y = 175(.12)x
J y = 175(.12)
11. The Fibonacci Sequence consists of the pattern 1, 1, 2, 3, 5, 8, 13, ....
What is the ninth term in the pattern?

A 14  
B 18  
C 19  
D 34

12. The table gives information about the number of sides and diagonals of convex polygons.

<table>
<thead>
<tr>
<th>Number of sides (n)</th>
<th>Number of diagonals (a) from one vertex</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

Determine the number of diagonals for a 10-sided regular polygon.

F 35  
G 37  
H 39  
J 41

13. Which property allows us to conclude that 
\(7m^2(3m^2 - 4) = 21m^4 - 28m^2?\)

A associative property  
B law of exponents  
C commutative property  
D distributive property

14. Which property allows us to conclude that 
\((5a^7b^4)^3 = 125a^{21}b^{12}\)?

F distributive property  
G zero property of exponents  
H raising a power to a power  
J raising a quotient to a power

15. Given that A is parallel to B, which of the following allows us to conclude that \(\angle 3 \equiv \angle 6\)?

A corresponding angles postulate  
B alternate interior angles theorem  
C same-side interior angles theorem  
D Eratosthenes' law
Questions 16 and 17 are open-ended griddable items.

16 When Merced’s gas tank is empty, it costs about $35 to fill it with gas. If gas costs $1.59 per gallon and her tank is $\frac{1}{4}$ full, how many dollars will it cost to fill Merced’s gas tank?

17 Use the data to find the percent increase in estimated deaths from 1950 to 1985. Round to the nearest percent.

**Estimated Number of Deaths in the U.S.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Deaths (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>1.45</td>
</tr>
<tr>
<td>1960</td>
<td>1.71</td>
</tr>
<tr>
<td>1970</td>
<td>1.92</td>
</tr>
<tr>
<td>1980</td>
<td>2.00</td>
</tr>
<tr>
<td>1985</td>
<td>2.09</td>
</tr>
<tr>
<td>1990</td>
<td>2.16</td>
</tr>
<tr>
<td>1993</td>
<td>2.27</td>
</tr>
</tbody>
</table>

Source: Universal Almanac
1. Which is the dependent variable in the function \( y = f(x) = 4x - 34? \)
   
   A. \( f \)  
   B. \( x \)  
   C. \( y \)  
   D. \( 4 \)

2. A homeowner’s monthly bill \( B(k) \) for electricity is a function of the basic service charge, \$7.83, and 8.5¢ for each kilowatt-hour used. Which function models the rule for a homeowner who uses \( k \) kw-h?
   
   F. \( B(k) = 7.83 + \frac{0.085}{k} \)
   
   G. \( B(k) = 7.83k \)
   
   H. \( B(k) = 7.83k + 0.085 \)
   
   J. \( B(k) = 7.83 + 0.085k \)

3. In the equation \( y = -6x^2 \), as \( x \) increases,
   
   A. \( y \) increases.  
   B. \( y \) decreases.  
   C. \( y \) increases then decreases.  
   D. \( y \) decreases then increases.

4. Find the range of the function \( y = 4x + 1 \) when the domain is \( \{-2, 0, 3\} \).
   
   F. \( \{-9, 0, 11\} \)
   
   G. \( \{-7, 1, 13\} \)
   
   H. \( \{7, 3, -13\} \)
   
   J. \( \{9, 5, 12\} \)

5. The square of an unknown quantity is multiplied by 5 and added to 20. The result of this operation is equal to 400 divided by the same unknown quantity. Which is the correct algebraic representation of this situation?
   
   A. \( 20 + 5x^2 = \frac{400}{x} \)
   
   B. \( 5x^2 - 20 = \frac{x}{400} \)
   
   C. \( 5x^2 - 20 = \frac{400}{y} \)
   
   D. \( 20 - 5x^2 = 400x \)

6. Simplify: \( 5x(2x + 2) + x(3x - 7) \)
   
   F. \( 13x^2 + 3 \)
   
   G. \( 7x^2 - 3x \)
   
   H. \( 16x^2 \)
   
   J. \( 13x^2 + 3x \)
7 Which of these describes a linear relationship?

A the speed of a rocket and the distance traveled
B the circumference of a bike tire and the speed of a bicycle
C the length of a film and the price of admission
D the number of words on a page and the length of a book

8 What is the slope of the linear function 4y − 3x = 16?

F $\frac{-3}{4}$
G $-3$
H $\frac{3}{4}$
J $\frac{3}{16}$

9 Determine the x- and y-intercepts of the line 5x + 3y = 15.

A x-intercept = $\frac{-3}{5}$; y-intercept = $\frac{15}{3}$
B x-intercept = 3; y-intercept = $\frac{3}{15}$
C x-intercept = 5; y-intercept = 3
D x-intercept = 3; y-intercept = 5

10 A commuter airline that runs from San Antonio to Corpus Christi has strict weight limits for passengers and their luggage. The planes are able to carry passengers up to a total weight of 1 ton. The planes can also carry 1.5 tons of cargo or luggage. The airline estimates the weight of each female passenger (f) as 140 pounds and each male passenger (m) as 190 pounds. Which inequality could you use to determine the possible combinations of male and female passengers that would not endanger the planes?

F $f + m < 2,000$
G $140f + 190m \leq 2,000$
H $2.5(140 + 190) \leq f + m$
J $190(f + m) < 2,000$

11 Which line would be a reasonable line of best fit for the data graphed in the scatter plot?

A line a: $y = 2x - 4$
B line b: $y = 2x - 6$
C line c: $y = 0.73x + 0.6$
D line d: $y = 0.73x - 0.4$

TAKS Mixed Practice Items
12. Shelly’s Unshelled Nut Shop sells a variety of nuts at different prices. Wally bought 2 pounds of cashews and 2.5 pounds of pecans and paid $17.75. Several weeks later, Wally bought 2.5 pounds of cashews and 1.5 pounds of pecans and paid $15.20. Wally reasoned that the nut shop charged $3.30 and $4.50 per pound for the different kinds of nuts. Which statement is the most reasonable interpretation of Wally’s solution?

F Wally likes cashews and pecans, but not other kinds of nuts.

G The nut shop charges $3.50 per pound for pecans and $4.30 a pound for cashews.

H Wally’s solution is correct.

J The nut shop charges $3.50 per pound for cashews and $4.30 a pound for pecans.

13. What is the effect on the graph of the equation \( y = x^2 + 3 \) when the equation is changed to \( y = x^2 - 3 \)?

A The graph moves down 3 units.

B The graph moves up 6 units.

C The graph is reflected across the x-axis.

D The graph moves down 6 units.

14. Solve \( x^2 - 6x + 8 = 0 \).

F 2, 4

G -2, -4

H -2, 4

J 2, -4

15. The area of a parallelogram is \( 9x^{10}y^{12} \) square units. The height of the parallelogram is \( 3x^5y^4 \) units. What is the base of the parallelogram?

A \( 6x^2y^3 \) units

B \( 3x^2y^3 \) units

C \( 3x^5y^9 \) units

D \( 6x^5y^9 \) units

16. A quadrilateral with exactly one pair of parallel sides is a _____.

F parallelogram

G rectangle

H trapezoid

J kite

17. Greta has 30 feet of fencing to use for a small dog kennel. Which shape will result in the greatest area?

A a square

B a right isosceles triangle

C an equilateral triangle

D a circle

18. \( \triangle ABC \) is a rhombus. The measure of \( \angle B \) is 59°. The measure of \( \angle D \) is _____.

F 31°

G 59°

H 118°

J 121°
19. Which two letters show a rotation?
   A. b d  
   B. b p  
   C. d p  
   D. d q

20. The length of the diagonal of the rectangle is 35 centimeters.
   \[ y \]
   \[ 28 \text{ cm} \]

   What is the value of \( y \)?
   F. \( 7\sqrt{2} \) cm
   G. \( 14\sqrt{2} \) cm
   H. 21 cm
   J. 28 cm

21. Which of the following rotations would not map a regular hexagon onto itself?
   A. 60°
   B. 90°
   C. 120°
   D. 240°

22. The net below will fold to make a ______.
   \[ \]
   F. rectangular prism
   G. trapezoidal prism
   H. rectangular pyramid
   J. cube

23. The top, side, and front views of an object built with cubes are shown below.
   \[ \]
   Top view  Side view  Front view

   How many cubes are needed to construct this object?
   A. 6
   B. 7
   C. 8
   D. 11

24. Line \( MN \) contains the points \( M (11, 6) \) and \( N (-3, 2) \). Which of these lines is parallel to line \( MN \) ?
   F. \( x = \frac{7}{2} y - 10 \)
   G. \( y = -\frac{2}{7} x + 3 \)
   H. \( 14x + 4y = 27 \)
   J. \( 21x - 6y = 5 \)
25 Which of the lines is perpendicular to the line \( y = -1.2x + 8.5 \)?

A \( y = 1.2x - 3.8 \)

B \( y = \frac{5}{6}x + 2 \)

C \( y = -0.8x - 6.1 \)

D \( y = -\frac{6}{5}x + 9 \)

26 A diameter of a circle has endpoints \( X (-21, 4) \) and \( Y (11, -8) \). The coordinates of the center of the circle are _____.

F \((-17, 3)\)

G \((-16, -6)\)

H \((-10, -4)\)

J \((-5, -2)\)

27 What is the length of the segment with endpoints \( C (14, -5) \) and \( D (9, 3) \)?

A \( \sqrt{13} \)

B \( 8 \)

C \( \sqrt{89} \)

D \( 13 \)

28 Find the area of the isosceles trapezoid.

F \( 54 \text{ cm}^2 \)

G \( 63 \text{ cm}^2 \)

H \( 72 \text{ cm}^2 \)

J \( 108 \text{ cm}^2 \)

29 The circumference of a circle is \( 10\pi \) inches. The area of the circle is _____.

A \( 10 \text{ in.}^2 \)

B \( 10\pi \text{ in.}^2 \)

C \( 20\pi \text{ in.}^2 \)

D \( 25\pi \text{ in.}^2 \)

30 What is the value of \( x \)?

F \( 21\sqrt{2} \)

G \( \sqrt{585} \)

H \( 12\sqrt{3} \)

J \( \sqrt{297} \)
31. A pyramid has a rectangular base that is 15 meters by 13 meters. The height of the pyramid is 11 meters. What is the volume of the pyramid?

A 715 m³
B 1,072.5 m³
C 2,145 m³
D 4,290 m³

32. What is the value of \( n \)?

\[
\begin{array}{c}
6 \\
\hline
7 & n & 5
\end{array}
\]

F 2.5
G 3.0
H 4.0
J 4.3

33. The volume of a large sphere is 27 times greater than the volume of a small sphere. The surface area of the small sphere is \( 64\pi \) cm². The surface area of the large sphere is ______.

A \( 192\pi \) cm²
B \( 192\pi \sqrt{3} \) cm²
C 576\pi \) cm²
D 1,728\pi \) cm²

34. The Computer Connection is having a year-end sale. All computers are being sold at a 20% discount. Computer Connection employees get an additional 7.5% discount. If the regular price of a computer is $1,120.00, how much would a computer cost an employee during the year-end sale?

F $291.20
G $828.80
H $896.00
J $1,052.80

35. At the fall carnival, there is a game where you choose a 4-digit number. Each digit must be from 1 to 6. You try to match your number by rolling a number cube 4 times. How many different 4-digit numbers are possible?

A 24
B 96
C 1,296
D 4,096

36. A newspaper is doing a story on executive salaries. The reporter wants to determine the middle-most salary for the top executives of the Fortune 500 companies. Which would be the most appropriate measure of central tendency to use in making this determination?

F mean
G median
H mode
J range
37 For a given year, the average daily temperature for Austin in January was 49.1°F, and the average daily temperature in July was 84.7°F. Which statement is true?

A The daily temperature in Austin ranges from 49.1°F to 84.7°F.
B Austin’s average daily temperatures for January and July are the same as the entire state of Texas.
C If you add all the average daily temperatures in Austin for the given year in January and in July, then divide each sum by 31, you will get 49.1°F and 84.7°F.
D If you randomly select a day in January, the temperature will always be lower than a randomly selected day in July.

38 Nikita’s band recorded a CD of its newest songs. The recording studio charged $350 per hour for 5 hours of studio time. Each CD costs $3.12 to manufacture, and the band ordered 500 CDs. What is the least number of CDs Nikita’s band will have to sell to break even if the band charges $13.50 for each CD?

F 130
G 142
H 246
J 255

39 Keesha has two fewer nickels than dimes and seven fewer dimes than quarters. The total value of coins is $6.85. How many quarters, dimes, and nickels does Keesha have?

A 9 quarters, 2 dimes, 0 nickels
B 13 quarters, 11 dimes, 20 nickels
C 20 quarters, 13 dimes, 11 nickels
D 25 quarters, 18 dimes, 16 nickels

40 Tammy, Tomas, and April all work at a restaurant. Each earns $5.00 per hour plus tips. During an average shift, each of them earns about $45.00 in tips. Tammy works 14 hours a week, Gail works 21 hours a week, and April works 30 hours a week. What piece of information is needed to calculate their total earnings for a week?

F the length of a shift
G which days of the week each person works
H how much withholding tax is taken out of their paychecks
J how many shifts each person works

41 Suppose you deposit $1,500 in an account paying 6% interest, compounded quarterly. Which expression represents the interest earned at the end of n years?

A $1,500 \cdot 1.06^n$
B $1,500 \cdot 1.015^{(4n)}$
C $1,500(1.06^n - 1)$
D $1,500(1.015^{(4n)} - 1)$

42 Which property of mathematics allows us to conclude that $6r^3(3r^2 + 21) = 18r^5 + 126r^2$?

F associative property
G law of exponents
H commutative property
J distributive property
43 You need to paint a large circle for your school's logo in the school's parking lot. The circle has a diameter of 12 feet. If a gallon of paint covers 200 square feet, how many quarts of paint will you need?

44 Theo was reconciling his checking account. His monthly bank statement for June showed that he had a beginning balance of $432.78 and an ending balance of $389.50. He made one deposit of $68.20 on June 10 and another deposit on June 24 for $47.96. How much did Theo withdraw from his checking account during the month?
1. In which of the given situations is the dependent event underlined?
   A. number of board feet of lumber; size of the deck
   B. gallons of paint used; square feet of wall painted
   C. total cost to rent a canoe; the canoe’s hourly rental rate
   D. speed of an airplane; distance traveled in 2.5 hours

2. Write an equation for the relationship between the values in the table.

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-14</td>
</tr>
<tr>
<td>0</td>
<td>-2</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>18</td>
</tr>
</tbody>
</table>

   F. y = -4x + 2
   G. y = 4x - 2
   H. y = 4x + 2
   J. y = -4x - 2

3. Which of the following represents a periodic function?
   A. the distance of the Earth from the sun
   B. car sales in a year
   C. the path of a bouncing ball
   D. earnings on a certificate of deposit at 4% compounded quarterly

4. Which of the following is a graph of a linear function?

   F
   
   G
   
   H
   
   J
5 The total cost \( c \) of renting a car for a week is $375 plus $0.15 per mile traveled \( m \). Which equation shows that function?

A \( f(m) = 375 + 0.15c \)

B \( f(c) = 0.15(375 + m) \)

C \( c = 375 + 0.15m \)

D \( f(m) = 0.15(375 - m) \)

6 The cook at Barbecue Bonnie’s Rib Joint uses 12 ounces of sauce per 10 pounds of ribs. How many ounces of sauce would the cook use for 55 pounds of ribs?

F 55 oz

G 66 oz

H 120 oz

J 660 oz

7 Which situation most closely matches the graph?

A A runner warms up and then runs several laps.

B A rocket is shot straight up into the air and falls back to earth.

C A spinning top is quickly released, spins, gradually slows down, and then stops.

D A football is thrown for a 30-yard pass.

8 Five times a number cubed less two times that number plus 12 equals that number times 19. Which is the correct algebraic representation of this situation?

F \( (5y)^3 + 2y + 12 = 19y \)

G \( 5y^3 - 2y + 12 = 19y \)

H \( 5y^3 + 2y - 12 = 19y \)

J \( 5y^2 - 2y + 12 = 19y \)

9 The Fibonacci sequence is 1, 1, 2, 3, 5, 8, 13, 21, . . . Which of the following shows how the sequence is constructed for \( n \geq 3 \)?

A \( a_n = a_{n-2} + a_{n+1} \)

B \( a_n = a_{n-1} - a_{n-2} \)

C \( a_n = a_{n-1} + a_{n-2} \)

D \( a_{n-3} = a_{n-2} + a_{n-1} \)

10 Simplify: \( 5(4y - 1) + 4(6y^2 - y) - 4y^2 \)

F \( 20y^2 - 16y + 5 \)

G \( 28y^2 + 24y - 5 \)

H \( 24y^8 - 4y^2 + 16y - 5 \)

J \( 20y^2 + 16y - 5 \)

11 In the equation \( y = -2x^2 \), as \( x \) increases,

A \( y \) increases.

B \( y \) decreases.

C \( y \) increases then decreases.

D \( y \) decreases then increases.
12 Which table best shows the same data as the graphed line?

![Graph of a straight line with x and y axes ranging from -20 to 20 and values ranging from -20 to 20.]

<table>
<thead>
<tr>
<th>F</th>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-2</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>G</th>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-10</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>H</th>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-14</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>J</th>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-10</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

13 A boat rental charges a basic fee of $15 to rent a sailboat for 1 hour, and an additional fee $x$ for each 15 minutes beyond the first hour. In the equation $y = 14x + 15$, what does $14x$ represent?

A the basic fee for 1 hour plus 14 minutes extra

B the cost for dock fees

C the cost to rent a sailboat for 2 weeks

D the cost for $3\frac{1}{2}$ hours of additional time

14 In the linear equation $y = -3x + 4$, the slope of the line is changed to $\frac{3}{4}$. How will this change affect the graph of the line?

F There will be no change in the slope.

G The line will move $\frac{3}{4}$ unit up.

H The line will now go down from left to right.

J The line will now go up from left to right.

15 Find the solution of the system.

$-2x + y = 6$

$y = x + 2$

A $(4, 2)$

B $(-4, -2)$

C $(-4, 2)$

D $(4, -2)$
16. Which graph shows the linear equation with slope of $-\frac{1}{2}$ and y-intercept of $-5$?

F  
\[ y \]
\[ -20 -15 -10 -5 5 10 15 20 x \]

G  
\[ y \]
\[ -20 -15 -10 -5 5 10 15 20 x \]

H  
\[ y \]
\[ -20 -15 -10 -5 5 10 15 20 x \]

J  
\[ y \]
\[ -20 -15 -10 -5 5 10 15 20 x \]

17. A company that provides carpet cleaning services to an office building charges a fixed price for 5,000 square yards of carpeting, plus an additional charge for each 500 square yards cleaned. To increase sales, the company lowered the base price for 5,000 square yards. How would this change affect the line of the linear function that gives the total charge as a function of square yards to be cleaned?

A. The y-intercept would increase.
B. The slope would increase.
C. The y-intercept would decrease.
D. The slope would decrease.

18. A building contractor needs to purchase door and cabinet hinges for an office building she is constructing. Door hinges (d) sell for $7.25 a pair and cabinet hinges (c) sell for $3.45 a pair. The contractor has a check made out for $427.50 to the hardware supply store. Which inequality could the contractor use to determine how many pairs of both kinds of hinges she could buy?

F. $7d + 3c < 42$
G. $7.25d + 3.45c \leq 427.5$
H. $7.25d + 3.45c < 427.5$
J. $3.45c + 7.25d \geq 427.5$

19. Find the roots of the equation $-x^2 - 2x = -8$.

A. $x = \{-2, 4\}$
B. $x = \{2, 4\}$
C. $x = \{-2, -4\}$
D. $x = \{2, -4\}$
20  Which graph shows the solution of $6x - 5y = 15$?

21  Kim is trying to figure out which cellular phone company gives him the best deal for his typical calling patterns. Company V charges $35 a month for 200 minutes of phone time, plus $0.35 for each additional minute. Company S charges $40 a month for 250 minutes of phone time, plus $0.38 for each additional minute. Kim estimates that he will use approximately 300 minutes per month. Which system of equations will help him decide which cellular service provider offers the better bargain?

A  $y = 35 + 0.38x$
   $y = 0.35x + 40$

B  $y = 35 - 0.35x$
   $y = 40 - 0.38x$

C  $y = 35.35 \cdot 200x$
   $y = 40.38 \cdot 250x$

D  $y = 35 + 0.35x$
   $y = 0.38x + 40$

22  Sandro’s class got their midterm test results. The teacher said on the 50-question test that the range of scores between the highest and the lowest was 30. In addition she said that the highest score was three times the lowest minus four. Sandro wrote a system of equations and figured out that the highest score was 47 and the lowest score was 17. Which statement is the most reasonable conclusion based on Sandro’s solution?

F  Sandro’s solution was incorrect.

G  Most of the people in the class got passing grades on the test because they studied.

H  Most of the people in the class got a failing grade on the test because they didn’t study enough.

J  The person with the highest score probably got an A, and the person with the lowest score failed the test.
23. Determine the equation for this graph.

\[ y = (x - 7)^2 + 2 \]

24. Use the quadratic formula to find the solutions of \(5x^2 - 8x + 3 = 0\).

\[ \begin{align*}
F & \quad \frac{5}{3}, 1 \\
G & \quad 5, 3 \\
H & \quad \frac{3}{5}, 1 \\
J & \quad \frac{1}{3}, 3
\end{align*} \]

25. The area of a rectangle is \(12x^3y^5\) square units. The length of the rectangle is \(6x^3y^5\) units. What is the width of the rectangle?

\[ \begin{align*}
A & \quad 2x^6y^{10} \\
B & \quad 6x^6y^{10} \\
C & \quad 2x^2y^3 \\
D & \quad 6x^2y^3
\end{align*} \]

26. Which figure must have congruent diagonals?

- F parallelogram
- G rectangle
- H rhombus
- J trapezoid

27. Figure \(PQRS\) is an isosceles trapezoid. \(PS\) is congruent to \(QR\). The measure of \(\angle P\) is 112°. The measure of \(\angle S\) is ______.

\[ \begin{align*}
A & \quad 56° \\
B & \quad 68° \\
C & \quad 112° \\
D & \quad \text{Not here}
\end{align*} \]

28. Which of the tiles below can be used with tiles congruent to it to create a tessellation?

\[ \begin{align*}
F & \quad \text{Circle} \\
G & \quad \text{Octagon} \\
H & \quad \text{Pentagon} \\
J & \quad \text{Trapezoid}
\end{align*} \]
29 The perimeter of a square is 56 feet. The length of the diagonal of the square is _____.

A 14 \sqrt{2} \text{ ft}
B 28 \text{ ft}
C 28 \sqrt{2} \text{ ft}
D 56 \sqrt{2} \text{ ft}

30 What is the value of \(x\)?

\[
\begin{align*}
x & = 60^\circ \quad 38 \\
x & = \sqrt{38}
\end{align*}
\]

F \(\sqrt{38}\)
G 19
H 19 \sqrt{2}
J 19 \sqrt{3}

31 The net below will fold to make a _____.

A pentagonal prism
B hexagonal prism
C pentagonal pyramid
D hexagonal pyramid

32 Which quilt block has no lines of symmetry?

\[
\begin{align*}
\text{F} & \quad \text{\hspace{2cm}} \\
\text{G} & \quad \text{\hspace{2cm}} \\
\text{H} & \quad \text{\hspace{2cm}} \\
\text{J} & \quad \text{\hspace{2cm}}
\end{align*}
\]

33 A triangle has vertices (0, 1), (5, 3), and (2, -4). Find the coordinates of the vertices of the image of the triangle under a counterclockwise rotation of 90° about the origin.

A (0, -1), (5, -3), (2, 4)
B (0, -1), (-5, -3), (-2, 4)
C (-1, 0), (-3, 5), (4, 2)
D (1, 0), (3, -5), (-4, -2)
34. The isometric drawing of a solid structure is shown below.

Which of the following shows the front view of the structure?

F

G

H

J

35. For which set of points is \( \overrightarrow{AB} \) parallel to \( \overrightarrow{CD} \)?

A. \( A(0, -4), B(-2, 5), C(-9, -11), D(0, -9) \)
B. \( A(3, 8), B(6, 14), C(-7, 10), D(-5, 6) \)
C. \( A(7, 13), B(-3, 13), C(-8, -1), D(-8, 8) \)
D. \( A(12, -1), B(-3, -10), C(4, -2), D(9, 1) \)

36. Which of the lines is perpendicular to the line \( 12x - 3y = 5 \)?

F. \( y = 4x + 6 \)
G. \( y = \frac{1}{4}x - 11 \)
H. \( y = -\frac{1}{4}x + 2 \)
J. \( y = -4x - 17 \)

37. Which three points form the vertices of a right triangle?

A. \((-10, 1), (5, -2), (7, 6)\)
B. \((-3, 8), (2, 1), (16, 11)\)
C. \((4, 12), (0, -6), (-5, -1)\)
D. \((15, -9), (-7, -4), (-13, 3)\)

38. \( \overline{PQ} \) has endpoints \( P(18, 3) \) and \( Q(-2, -17) \). The coordinates of the midpoint of \( \overline{PQ} \) are ______.

F. \((8, -7)\)
G. \((10, -10)\)
H. \((10.5, -9.5)\)
J. \((16, -14)\)

39. The distance between \( F(-4, 11) \) and \( G(12, -1) \) is ______.

A. \( \sqrt{112} \)
B. 14
C. 20
D. 28
40 What is the area of \( \triangle XYZ \)?

\[ \text{X} \quad 7 \quad \text{Z} \]
\[ \text{Y} \]
\[ \text{X} \quad 10 \quad \text{Z} \]

- F 17 units\(^2\)
- G 34 units\(^2\)
- H 35 units\(^2\)
- J 70 units\(^2\)

41 What is the area of the shaded sector of the circle?

\[ \text{135}^\circ \]
\[ \text{16 ft} \]

- A \( 96\pi \) ft\(^2\)
- B \( 160\pi \) ft\(^2\)
- C \( 192\pi \) ft\(^2\)
- D \( 256\pi \) ft\(^2\)

42 A rectangle is 20 inches wide and its area is 960 square inches. What is the length of the diagonal of the rectangle?

- F \( \sqrt{360} \) in.
- G \( \sqrt{1360} \) in.
- H 48 in.
- J 52 in.

43 Find the volume of the triangular prism.

\[ \text{11 m} \]
\[ \text{8 m} \]

- A 31 m\(^3\)
- B 51 m\(^3\)
- C 220 m\(^3\)
- D 440 m\(^3\)

44 What is the value of \( n \)?

\[ \text{4} \quad \text{2.5} \quad \text{1} \]

- F 0.625
- G 1.6
- H 2.0
- J 10.0

45 \( \triangle ABC \) is a right triangle with a 45° angle. \( \triangle JKL \) is a right triangle with side lengths of 9 centimeters, \( 9\sqrt{2} \) centimeters, and \( 9\sqrt{3} \) centimeters. \( \triangle RST \) contains a 30° angle and a 60° angle. Which of these triangles are similar?

- A \( \triangle ABC \) and \( \triangle JKL \)
- B \( \triangle ABC \) and \( \triangle RST \)
- C \( \triangle JKL \) and \( \triangle RST \)
- D None of the triangles are similar.
A bag contains 6 state quarters. Three of the quarters are “Virginia” quarters, and 3 are “Georgia” quarters. You reach into the bag and take out 1 quarter. You record which state it is and return it to the bag. You repeat this operation 3 times. In 3 draws, what is the probability that you will take out 3 Georgia quarters?

F \( \frac{1}{8} \)

G \( \frac{1}{16} \)

H \( \frac{1}{6} \)

J \( \frac{3}{6} \)

Juan is choosing cards from a shuffled deck of 52 playing cards. He draws two cards randomly from the deck. If the first card he picks is the 2 of hearts, what is the probability that he will choose either the 2 of spades, 2 of diamonds, or 2 of clubs on his second draw?

A \( \frac{1}{52} \)

B \( \frac{2}{26} \)

C \( \frac{3}{51} \)

D \( \frac{4}{52} \)

Central High School and Monroe High School are sports rivals. They competed in a track meet and Monroe beat Central by a large margin. One of the following headlines about the meet appeared in the Central High weekly newspaper. The headline was accurate, but misused information to distort the facts. Which headline was it?

F Central Beats Monroe

G Monroe Races to Victory

H Central Wins Big

J Monroe Squeaks by Central

Charlie is planning a trip from Houston to Denver. Checking a map, Charlie discovers that it is approximately 1,028 miles between the cities. Charlie plans to take 3 days to make the trip, driving about 340 or so miles per day. He hopes to average around 50 miles per hour when he’s on the road. Which of the following will give Charlie the most reasonable estimate of how many hours he will drive each day?

A \( 50 \cdot 3 \)

B \( 50 \cdot 340 \)

C \( 350 \div 50 \)

D \( 1,000 \div 50 \)
50  Stephanie is having friends over for dinner. The recipe she is preparing makes enough servings for 6 people, but 8 people will be eating dinner. In order to have enough ingredients, Stephanie needs to

F  multiply the amount of each ingredient by \( \frac{4}{3} \).

G  divide the amount of each ingredient by \( \frac{4}{3} \).

H  double the amount of each ingredient.

J  multiply the amount of each ingredient by \( \frac{3}{4} \).

51  This month Metro Plumbing had the following expenses and incomes:

<table>
<thead>
<tr>
<th>Item</th>
<th>Expense</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaskets</td>
<td>$768.29</td>
<td></td>
</tr>
<tr>
<td>Tool cart</td>
<td>$128.51</td>
<td></td>
</tr>
<tr>
<td>Franklin Inn job</td>
<td>$560.00</td>
<td></td>
</tr>
<tr>
<td>Copper pipe</td>
<td>$231.10</td>
<td></td>
</tr>
<tr>
<td>Hardin Bank job</td>
<td>$876.00</td>
<td></td>
</tr>
<tr>
<td>Shower liners</td>
<td>$977.66</td>
<td></td>
</tr>
<tr>
<td>Insurance for van</td>
<td>$821.50</td>
<td></td>
</tr>
<tr>
<td>Montclair job</td>
<td>$349.00</td>
<td></td>
</tr>
</tbody>
</table>

If the balance in Metro’s bank account was $15,423.89 at the beginning of the month, what was the closing balance at the end of the month?

A  $-1,142.06

B  $12,496.83

C  $14,281.83

D  $17,208.89

52  The state of Rhode Island has a total land area of 1,045 square miles. The state of Texas has a total land area approximately 251 times larger than Rhode Island. What is the land area of Texas? Round your answer to the nearest thousand.

F  250,000 square miles

G  251,000 square miles

H  260,000 square miles

J  262,000 square miles

53  The First Interstate Bank Plaza (h) in Houston is 972 feet high. The Renaissance Tower (d) in Dallas is 866 high. Which of the following equations shows the relationship between the two buildings?

A  \( d = h + 106 \)

B  \( 2d - h = 760 \)

C  \( d - h = 106 \)

D  \( 2d + h = 760 \)
Dividing the numbers 1 through 10 by 11 has a very interesting pattern:

\[ \frac{1}{11} = 0.090909 \]
\[ \frac{2}{11} = 0.181818 \]
\[ \frac{3}{11} = 0.272727 \]
\[ \frac{4}{11} = 0.363636 \]
\[ \frac{5}{11} = 0.454545 \]
\[ \frac{6}{11} = 0.545454 \]
\[ \frac{7}{11} = 0.636363 \]
\[ \frac{8}{11} = 0.727272 \]
\[ \frac{9}{11} = 0.818181 \]
\[ \frac{10}{11} = 0.90909090 \]

What would be the pattern for \( \frac{14}{11} \)?

F \( 1.3636 \)
G \( 0.363636 \)
H \( 1.2727277 \)
J \( 1.3333333 \)

Which property of mathematics allows us to conclude that \( 7r^4(2r^3 + 11) = 14r^7 + 77r^4 \)?

A associative property
B law of exponents
C commutative property
D distributive property

A large cone and a small cone are similar. The volume of the large cone is 64 times the volume of the small cone. The radius of the small cone is 3.5 inches. The radius of the large cone is _____ inches.

Television City's downtown store held a going-out-of-business sale. The first week of the sale, all televisions were discounted 20%. The second week, an additional 10% was taken off. During the final week, Television City discounted its televisions 6% more. If a television originally sold for $639, what would its price be the final week of the sale?

Nöel is making a report to her manager about office supplies and how much money is spent on each kind of supply. Paper for the photocopier and laser printers makes up 22% of her entire budget. If Nöel uses a circle graph to represent the various portions of her office supplies budget, how many degrees of the circle should she use for paper?

The odometer on Isabelle’s six-year-old car reads 71,642 miles. She gets about 19.5 miles per gallon of gas. If the price of gas averages $1.59 a gallon, about how much did Isabelle spend for gas each year?

Ernesto bought a used car. The cash price for the car was $6,799. Ernesto paid a down payment of $875 and will make monthly car payments of $157.78 for 40 months. How much extra will the car cost him by financing it over 40 months?