Diagnostic and Placement Tests for Grades K through 8, Algebra 1, Geometry, and Algebra 2

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Placement Options
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Answer Keys

Scoring Guides
- simplify placement decisions

Diagnostic Chart
- suggestions for intervention and remediation

Intervention/Remediation
- suggested materials

connectED.mcgraw-hill.com
Student Name

For each part, mark the box under the number of correctly answered questions.

The Number System

Expressions and Equations

Functions

Geometry

Statistics and Probability

Mark the total number correct below.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Total

Key: Consider this student for...

Math Triumphs

Grade 8 Strategic Intervention—See page 103 for materials list.

Glencoe Math, Course 3
Student Name _______________________

In the column on the left, mark the questions that the student answered *incorrectly*.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Question Number</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Number System</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Use rational approximations of irrational numbers to compare the size of irrational numbers.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Use rational approximations of irrational numbers to estimate the value of expressions.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Know that numbers that are not rational are called irrational.</td>
</tr>
<tr>
<td><strong>Expressions and Equations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Graph proportional relationships.</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Solve linear equations in one variable.</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Solve linear equations in one variable.</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Perform operations with numbers expressed in scientific notation.</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Perform operations with numbers expressed in scientific notation.</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Know and apply the properties of integer exponents to generate equivalent numerical expressions.</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Analyze and solve pairs of simultaneous linear equations.</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Solve linear equations with rational number coefficients, including equations whose solutions require using the distributive property.</td>
</tr>
<tr>
<td><strong>Functions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Construct a function to model a linear relationship between two quantities.</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>Understand that a function is a rule that assigns to each input exactly one output.</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>Understand that a function is a rule that assigns to each input exactly one output.</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line.</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Describe qualitatively the functional relationship between two quantities by analyzing a graph.</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).</td>
</tr>
<tr>
<td>Domain</td>
<td>Question Number</td>
<td>Objective</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</td>
</tr>
<tr>
<td>Geometry</td>
<td>22</td>
<td>Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>Use informal arguments to establish facts about the angles created when parallel lines are cut by a transversal.</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.</td>
</tr>
<tr>
<td>Statistics and Probability</td>
<td>28</td>
<td>Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities.</td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects.</td>
</tr>
</tbody>
</table>
### A Special Note About Intervention

When using diagnostic tests, teachers should always question the reason behind the students’ scores. Students can struggle with mathematics concepts for a variety of reasons. Personalized instruction is recommended for English language learners, students with specific learning disabilities, students with certain medical conditions, or for those who struggle with traditional instructional practice. Teachers should always consider the needs of the individual student when determining the best approach for instruction and program placement.

<table>
<thead>
<tr>
<th>Student Performance Level</th>
<th>Number of Questions Correct</th>
<th>Suggestions for Intervention and Remediation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intensive Intervention</strong></td>
<td>0–17</td>
<td>Use <em>Math Triumphs</em> to accelerate the achievement of students who are two or more years below grade level. Students should follow a personalized remediation plan. A variety of materials and instructional methods are recommended. For example, instruction and practice should be provided in print, technology, and hands-on lessons.</td>
</tr>
<tr>
<td><strong>Strategic Intervention</strong></td>
<td>18–23</td>
<td>Use the additional Intervention and Remediation materials listed on the next page. This list of materials can provide helpful resources for students who struggle in the traditional mathematics program. Strategic intervention allows students to continue to remain in the <em>Glencoe Math</em> program, while receiving the differentiated instruction they need. Teaching Tips and other resources are also listed in the Teacher Edition.</td>
</tr>
<tr>
<td><strong>Grade 8</strong></td>
<td>24 or more</td>
<td>Use <em>Glencoe Math</em>. This student does not require overall intervention. However, based on the student’s performance on the different sections, intervention may be required. For example, a student who missed 1 or more questions in the Function section may require extra assistance as you cover these skills throughout the year.</td>
</tr>
</tbody>
</table>
### Intervention/Remediation Materials

**Grade 8**

*Find these materials at [www.connectED.mcgraw-hill.com](http://www.connectED.mcgraw-hill.com).*

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reteach Masters</td>
<td>A brief explanation, along with examples and exercises, for every lesson in the Student Edition (Two pages for Problem-Solving Lessons and one page per lesson for all other lessons) and included in the Chapter Resource Masters</td>
</tr>
<tr>
<td>Skills Practice Masters</td>
<td>Additional practice in computational and application exercises for each lesson in the Student Edition and included in the Chapter Resource Masters</td>
</tr>
<tr>
<td>Homework Practice Masters</td>
<td>Additional practice in computational and spiral review exercises for each lesson in the Student Edition and included in the Chapter Resource Masters</td>
</tr>
<tr>
<td>Self-Check Quizzes</td>
<td>Students can check their understanding for each lesson and email their results to the teacher</td>
</tr>
<tr>
<td>Chapter Readiness Quizzes</td>
<td>Online assessment to use at the beginning of each chapter in the Student Edition</td>
</tr>
<tr>
<td>Personal Tutor</td>
<td>Online instructions for step-by-step solutions for the examples of each lesson in the student textbook</td>
</tr>
<tr>
<td>Quick Review Skills Workbook</td>
<td>Additional computational practice in basic skills</td>
</tr>
</tbody>
</table>

### Additional Technology

**ExamView® Assessment Suite**

Networkable software includes a Worksheet Builder to make worksheets and tests, a Student Module to take tests on-screen, and a Management System to keep student records.
# Mathematics Chart

<table>
<thead>
<tr>
<th>LENGTH</th>
<th>CAPACITY AND VOLUME</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metric</strong></td>
<td><strong>Metric</strong></td>
</tr>
<tr>
<td>1 kilometer = 1,000 meters</td>
<td>1 liter = 1,000 milliliters</td>
</tr>
<tr>
<td>1 meter = 100 centimeters</td>
<td></td>
</tr>
<tr>
<td>1 centimeter = 10 millimeters</td>
<td></td>
</tr>
<tr>
<td><strong>Customary</strong></td>
<td><strong>Customary</strong></td>
</tr>
<tr>
<td>1 mile = 1,760 yards</td>
<td>1 gallon = 4 quarts</td>
</tr>
<tr>
<td>1 mile = 5,280 feet</td>
<td>1 gallon = 128 ounces</td>
</tr>
<tr>
<td>1 yard = 3 feet</td>
<td>1 quart = 2 pints</td>
</tr>
<tr>
<td>1 foot = 12 inches</td>
<td>1 pint = 2 cups</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MASS AND WEIGHT</th>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metric</strong></td>
<td></td>
</tr>
<tr>
<td>1 kilogram = 1,000 grams</td>
<td>1 year = 365 days</td>
</tr>
<tr>
<td>1 gram = 1000 milligrams</td>
<td>1 year = 12 months</td>
</tr>
<tr>
<td><strong>Customary</strong></td>
<td>1 year = 52 weeks</td>
</tr>
<tr>
<td>1 ton = 2,000 pounds</td>
<td>1 week = 7 days</td>
</tr>
<tr>
<td>1 pound = 16 ounces</td>
<td>1 day = 24 hours</td>
</tr>
</tbody>
</table>

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

### PERIMETER

<table>
<thead>
<tr>
<th>Shape</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>square</td>
<td>$P = 4s$</td>
</tr>
<tr>
<td>rectangle</td>
<td>$P = 2\ell + 2w$ or $P = 2(\ell + w)$</td>
</tr>
</tbody>
</table>

### AREA

<table>
<thead>
<tr>
<th>Shape</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>square</td>
<td>$A = s^2$</td>
</tr>
<tr>
<td>rectangle</td>
<td>$A = \ell w$ or $A = bh$</td>
</tr>
<tr>
<td>triangle</td>
<td>$A = \frac{1}{2} bh$ or $A = \frac{bh}{2}$</td>
</tr>
<tr>
<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>circle</td>
<td>$A = \pi r^2$</td>
</tr>
</tbody>
</table>

### CIRCUMFERENCE

<table>
<thead>
<tr>
<th>Shape</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>circle</td>
<td>$C = 2\pi r$ or $C = \pi d$</td>
</tr>
</tbody>
</table>

### VOLUME

<table>
<thead>
<tr>
<th>Shape</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>cube</td>
<td>$V = s^3$</td>
</tr>
<tr>
<td>rectangular prism</td>
<td>$V = \ell \ell h$ or $V = Bh^*$</td>
</tr>
<tr>
<td>triangular prism</td>
<td>$V = Bh^*$</td>
</tr>
<tr>
<td>cylinder</td>
<td>$V = \pi r^2h$ or $V = Bh^*$</td>
</tr>
<tr>
<td>cone</td>
<td>$V = \frac{1}{3} \pi r^2h$ or $V = \frac{1}{3} Bh^*$</td>
</tr>
<tr>
<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

$\pi \approx 3.14$ or $\pi \approx \frac{22}{7}$

### PYTHAGOREAN THEOREM

$a^2 + b^2 = c^2$
Diagnostic and Placement
Grade 8

This test contains 30 multiple-choice questions. Work each problem in the space on this page. Select the best answer. Write the letter of the answer on the blank at the right.

1. Which set of numbers is ordered from least to greatest?
   A. $\frac{3}{8}, \frac{1}{2}; 1; \sqrt{2}; 4$
   B. $\frac{3}{8}, \frac{1}{2}; \sqrt{2}; 1; 4$
   C. $4; \sqrt{2}; 1; \frac{1}{2}; \frac{3}{8}$
   D. $\frac{1}{2}; \frac{3}{8}; 1; 4; \sqrt{2}$

2. The area of a square is 8 square meters. Which of these is closest to the length of one side of the square?
   F. 2 meters
   G. 2.8 meters
   J. 4 meters
   H. 3.5 meters

3. Which of the following sets of numbers does $\sqrt{49}$ NOT belong?
   A. integer
   B. real number
   C. rational number
   D. irrational number
4 The table shows circles and their corresponding diameters. Which of the following graphs show the correct relationship between the radius and the area of each circle?

<table>
<thead>
<tr>
<th>Circles</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Circle</td>
<td>Diameter (feet)</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

4 _________

5 The picture models the equation $5x + 2 = 3x + 6$.

What value of $x$ makes the equation true?

A $x = 1$  
B $x = 2$  
C $x = 4$  
D $x = 6$

5 _________

6 In $\triangle ABC$, the measure of $\angle A$ is $33^\circ$ and the measure of $\angle C$ is $90^\circ$. What is the measure of $\angle B$?

F $17^\circ$  
G $57^\circ$  
H $137^\circ$  
J $147^\circ$

6 _________
7 Light travels at a speed of about $2.998 \times 10^8$ meters per second. Express this number in standard notation.

A 299,800,000  
B 0.00002998  
C 0.0000002998  
D 29,980,000

8 A thunderstorm cloud holds about 6,200,000,000 raindrops. Which of the following shows this number in scientific notation?

F $0.62 \times 10^{10}$  
G $6.2 \times 10^9$  
H $6.2 \times 10^8$  
J $62.0 \times 10^8$

9 Which of the following is equivalent to the expression $4^4 \times 4^{-6}$?

A $\frac{1}{4^2}$  
B $\frac{1}{4^{10}}$  
C $4^{10}$  
D $4^2$

10 What is true concerning the lines graphed by the system of equations shown below?

\[
\begin{align*}
8x + 6 &= 2y \\
12x - 3 &= 3y
\end{align*}
\]

F The lines intersect.  
G The lines are perpendicular.  
H The lines are parallel.  
J The lines are the same.

11 What is the solution of the equation?

\[
\frac{1}{3}(x + 15) = 7
\]

A $x = \frac{2}{3}$  
B $x = 2$  
C $x = 6$  
D $x = 36$

12 What function is represented in the table?

<table>
<thead>
<tr>
<th>$n$</th>
<th>$f(n)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>$n$</td>
<td></td>
</tr>
</tbody>
</table>

F $f(n) = n + 3$  
G $f(n) = 4n - 1$  
H $f(n) = 4n + 2$  
J $f(n) = 3n - 2$
13 Mr. Wilson wrote the function \( f(x) = 7x - 15 \) on the chalkboard. What is the value of this function for \( f(6) \)?

A 27  B 37  C 42  D 57

14 On average, a dog runs 5.5 times faster than a child. Which function can be used to find the speed of a dog, given the speed of the child?

F  \( f(c) = 5.5c \)  H  \( f(c) = c + 5.5 \)

G  \( f(c) = \frac{5.5}{c} \)  J  \( f(c) = \frac{c}{5.5} \)

15 What is the slope and y-intercept of the equation \( 6x - 1 = 3y - 10 \)?

A  \( m = 2, b = 3 \)  C  \( m = 3, b = 4 \)

B  \( m = 2, b = -3 \)  D  \( m = 6, b = 9 \)

16 Which best describes the graph of the function \( f(x) = 4x \)?

F  A straight line through the origin with a steep slope upward to the right.

G  A straight line through the origin with a steep slope downward to the right.

H  A straight line through 4 on the x-axis with a slope downward to the right.

J  A straight line through 4 on the y-axis with a slope upward to the right.

17 Which function described below has the greatest rate of change?

I  \( f(x) = 4x - 3 \)

II  \( f(x) = \frac{1}{2}x + 5 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( f(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
</tr>
</tbody>
</table>

A  I

B  II

C  III

D  They all have the same rate of change.

18 The delivery ramp at the Corner Café is a right triangle. The hypotenuse is 4 meters long. One leg is 3 meters long. What is the length of the other leg?

F  \( \sqrt{7} \) meters  H  3.5 meters

G  \( \sqrt{12} \) meters  J  5 meters
19 The map below shows where four of Nahimana’s friends live. Each unit on the map represents 1 mile.

![Map of friends' locations]

About how far apart do Aesha and Josh live?

A. about 5 mi  
B. about 6 mi  
C. about 7.5 mi  
D. about 8.5 mi

20 What is the volume of the cylinder shown below?

![Cylinder diagram]

F. $44 \, \text{ft}^3$  
G. $69.08 \, \text{ft}^3$  
H. $138.16 \, \text{ft}^3$  
J. $276.32 \, \text{ft}^3$

21 What is the difference in the volume of the two triangular prisms shown below?

![Triangular prisms diagram]

A. $32 \, \text{cm}^3$  
B. $158 \, \text{cm}^3$  
C. $1,675 \, \text{cm}^3$  
D. $3,350 \, \text{cm}^3$

22 A photo with a length of 3 inches and a width of 5 inches is enlarged to poster size. The poster and the photo are similar. The length of the poster is 21 inches. What is the width of the poster?

F. 7.2 inches  
G. 12.6 inches  
H. 19 inches  
J. 35 inches
23 Rectangle $ABCD$ is shown on the coordinate grid below. Which of the following graphs represent the translation of Rectangle $ABCD$ over the following: $(x, y) \rightarrow (x+1, y-2)$?

![Coordinate grid with rectangles A, B, C, D]

A  

B  

C  

D

---

24 A rectangle is cut along its diagonal. The measure of $\angle A$ is 55°. What is the measure of $\angle B$?

25 A 26-foot rope is used to brace a tent pole at the county fair. The rope is anchored 10 feet from the box of the pole. How tall is the tent pole?

A  21.8ft  
B  24ft  
C  28ft  
D  30ft
26 A cylindrical water tower is 24 feet high and has a diameter of 20 feet. Approximately how many cubic feet of water could the tower hold?
   F 2,400 cubic feet
   H 9,600 cubic feet
   G 7,500 cubic feet
   J 30,200 cubic feet

27 The triangles below are similar triangles. Find the value of \( x \) and \( y \).

\[
\begin{align*}
3 \text{ cm} & \quad 5 \text{ cm} \\
4 \text{ cm} & \\
& \\
& \\
\end{align*}
\]

\[
\begin{align*}
x & \quad 10 \text{ cm} \\
& \\
& \\
y & \\
& \\
\end{align*}
\]

A \( x = 6, y = 8 \)  
B \( x = 3, y = 4 \)  
C \( x = 1.5, y = 2 \)  
D \( x = 12, y = 16 \)

28 The scatter plot below shows the yearly advertising expenditures and the relative sales for a small company. What can be concluded from this data?

\[
\begin{array}{c}
\text{Sales (in thousands of dollars)} \\
\hline
250 & \text{ } \text{ } \text{ } \text{ } \text{ } \\
225 & \text{ } \text{ } \text{ } \text{ } \text{ } \\
200 & \text{ } \text{ } \text{ } \text{ } \text{ } \\
175 & \text{ } \text{ } \text{ } \text{ } \text{ } \\
150 & \text{ } \text{ } \text{ } \text{ } \text{ } \\
125 & \text{ } \text{ } \text{ } \text{ } \text{ } \\
100 & \text{ } \text{ } \text{ } \text{ } \text{ } \\
75 & \text{ } \text{ } \text{ } \text{ } \text{ } \\
50 & \text{ } \text{ } \text{ } \text{ } \text{ } \\
25 & \text{ } \text{ } \text{ } \text{ } \text{ } \\
\hline
500 & \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \\
1000 & \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \\
1500 & \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \\
2000 & \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \\
\hline
\end{array}
\]

\[
\begin{align*}
\text{Advertising Expenditures (in dollars)} & \\
500 & \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \\
1000 & \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \\
1500 & \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \\
2000 & \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \text{ } \\
\end{align*}
\]

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30 A survey is taken to determine which type of vehicle is most popular. The data is shown in the bar graph below.

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The area of a square is 8 square meters. Which of these is closest to the length of one side of the square?

- F 2 meters
- G 2.8 meters
- J 4 meters
- H 3.5 meters

Which of the following sets of numbers does \( \sqrt{49} \) NOT belong?

- A integer
- B real number
- C rational number
- D irrational number

What value of \( x \) makes the equation true?

- A \( x = 1 \)
- B \( x = 2 \)
- C \( x = 4 \)
- D \( x = 6 \)

In \( \triangle ABC \), the measure of \( \angle A \) is 33° and the measure of \( \angle C \) is 90°. What is the measure of \( \angle B \)?

- F 17°
- G 57°
- H 137°
- J 147°
7. Light travels at a speed of about $2.998 \times 10^8$ meters per second. Express this number in standard notation.

A 299,800,000  
B 0.0000002998  
C 2,998,000,000  
D 29,980,000

8. A thunderstorm cloud holds about $6,200,000,000$ raindrops. Which of the following shows this number in scientific notation?

F $6.2 \times 10^9$  
H $6.2 \times 10^8$  
G $62.0 \times 10^8$  
J $620.0 \times 10^8$

9. Which of the following is equivalent to the expression $4^4 \times 4^{10}$?

A $4^{14}$  
B $4^{24}$  
C $4^{40}$  
D $4^2$

10. What is true concerning the lines graphed by the system of equations shown below?

\[
\begin{align*}
8x + 6 &= 2y \\
12x - 3 &= 3y
\end{align*}
\]

F The lines intersect.  
H The lines are parallel.  
G The lines are perpendicular.  
J The lines are the same.

11. What is the solution of the equation?

\[
\frac{1}{3}(x + 15) = 7
\]

A $x = \frac{3}{2}$  
B $x = 2$  
C $x = 6$  
D $x = 36$

12. What function is represented in the table?

<table>
<thead>
<tr>
<th>n</th>
<th>f(n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
</tr>
</tbody>
</table>

F $f(n) = n + 3$  
G $f(n) = 4n - 1$  
H $f(n) = 4n + 2$  
J $f(n) = 3n - 2$

13. Mr. Wilson wrote the function $f(x) = 7x - 15$ on the chalkboard. What is the value of this function for $f(6)$?

A 27  
B 37  
C 42  
D 57

14. On average, a dog runs $5.5$ times faster than a child. Which function can be used to find the speed of a dog, given the speed of the child?

F $f(c) = 5.5c$  
H $f(c) = c + 5.5$  
G $f(c) = \frac{5.5}{c}$  
J $f(c) = \frac{c}{5.5}$

15. What is the slope and y-intercept of the equation $6x - 1 = 3y - 10$?

A $m = 2, b = 3$  
B $m = 2, b = -3$  
C $m = 3, b = 4$  
D $m = 6, b = 9$

16. Which best describes the graph of the function $f(x) = 4x$?

F A straight line through the origin with a steep slope upward to the right.  
G A straight line through the origin with a steep slope downward to the right.  
H A straight line through 4 on the x-axis with a slope downward to the right.  
J A straight line through 4 on the y-axis with a slope upward to the right.

17. Which function described below has the greatest rate of change?

I $f(x) = 4x - 3$  
II $f(x) = \frac{4}{x} + 5$  

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
</tr>
</tbody>
</table>

A I  
B II  
C III  
D They all have the same rate of change.

18. The delivery ramp at the Corner Café is a right triangle. The hypotenuse is 4 meters long. One leg is 3 meters long. What is the length of the other leg?

F $\sqrt{7}$ meters  
H $3.5$ meters  
G $\sqrt{12}$ meters  
J $5$ meters
19. The map below shows where four of Nahimana's friends live. Each unit on the map represents 1 mile.

About how far apart do Aesha and Josh live?
A about 5 mi  B about 6 mi  C about 7.5 mi  D about 8.5 mi

20. What is the volume of the cylinder shown below?

F 44 ft³  G 69.08 ft³  H 138.16 ft³  J 276.32 ft³

21. What is the difference in the volume of the two triangular prisms shown below?

A 32 cm³  B 158 cm³  C 1,675 cm³  D 3,350 cm³

22. A photo with a length of 3 inches and a width of 5 inches is enlarged to poster size. The poster and the photo are similar. The length of the poster is 21 inches. What is the width of the poster?
F 7.2 inches  H 19 inches  G 12.6 inches  J 35 inches

23. Rectangle ABCD is shown on the coordinate grid below. Which of the following graphs represent the translation of Rectangle ABCD over the following: (x, y) → (x+1, y-2)?

24. A rectangle is cut along its diagonal. The measure of ∠A is 55°. What is the measure of ∠B?
F 125°  G 105°  H 45°  J 35°

25. A 26-foot rope is used to brace a tent pole at the county fair. The rope is anchored 10 feet from the box of the pole. How tall is the tent pole?
A 21.8 ft  B 24 ft  C 28 ft  D 30 ft
26. A cylindrical water tower is 24 feet high and has a diameter of 20 feet. Approximately how many cubic feet of water could the tower hold?
   - F 2,400 cubic feet
   - G 7,500 cubic feet
   - H 9,600 cubic feet
   - J 30,200 cubic feet

27. The triangles below are similar triangles. Find the value of x and y.
   - A x = 6, y = 8
   - B x = 3, y = 4
   - C x = 1.5, y = 2
   - D x = 12, y = 16

28. The scatter plot below shows the yearly advertising expenditures and the relative sales for a small company. What can be concluded from this data?

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