Achieve
Forecast Student Test Results

Increasing Achievement for Schools, Teachers, & Students
Mathematics Reference Sheet

Area

Triangle \[ A = \frac{1}{2} bh \]

Rectangle \[ A = lw \]

Trapezoid \[ A = \frac{1}{2} h (b_1 + b_2) \]

Parallelogram \[ A = bh \]

Circle \[ A = \pi r^2 \]

Circumference
\[ C = \pi d = 2\pi r \]

Volume

Right Circular Cylinder \[ V = \pi r^2 h \]

Rectangular Solid \[ V = lwh \]

Sphere \[ V = \frac{4}{3} \pi r^3 \]

Total Surface Area

Right Circular Cylinder \[ S.A. = 2\pi rh + 2\pi r^2 \]

Rectangular Solid \[ S.A. = 2(lw) + 2(hw) + 2(lh) \]

Sphere \[ S.A. = 4 \pi r^2 \]

Key
- \( b \) = base
- \( h \) = height
- \( l \) = length
- \( w \) = width
- \( \ell \) = slant height
- \( S.A. \) = surface area
- \( d \) = diameter
- \( r \) = radius
- \( A \) = area
- \( C \) = circumference
- \( V \) = volume

Use 3.14 or \( \frac{22}{7} \) for \( \pi \).

In a polygon, the sum of the measures of the interior angles is equal to \( 180(n - 2) \), with \( n \) representing the number of sides.

In a regular polygon, the measure of an interior angle is equal to \( \frac{180(n - 2)}{n} \).
Pythagorean theorem: \[ c^2 = a^2 + b^2 \]

\[ y = mx + b \]
Slope-intercept form of an equation of a line, where \( m = \text{slope} \) and \( b = \text{the y-intercept} \).

\[ d = rt \]
Distance, rate, time formula, where \( d = \text{distance} \), \( r = \text{rate} \), \( t = \text{time} \).

\[ I = prt \]
Simple interest formula, where \( p = \text{principal} \), \( r = \text{rate} \), \( t = \text{time} \).

**Conversions**

1 yard = 3 feet = 36 inches
1 mile = 1,760 yards = 5,280 feet
1 acre = 43,560 square feet
1 hour = 60 minutes
1 minute = 60 seconds

1 liter = 1000 milliliters = 1000 cubic centimeters
1 meter = 100 centimeters = 1000 millimeters
1 kilometer = 1000 meters
1 gram = 1000 milligrams
1 kilogram = 1000 grams

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 pound = 16 ounces
1 ton = 2,000 pounds

---

**Begin with Question #45 on Your Answer Sheet for the Math Portion of the Assessment.**

45. If an object travels at five feet per second, how many feet does it travel in one hour?

A. 30
B. 300
C. 720
D. 18,000
46. In a class of 78 students, 41 are taking Spanish, 22 are taking French, and 9 students are taking both Spanish and French (these 9 students have been included in both of the totals for the 41 students taking Spanish and the 22 students taking French). How many students are not enrolled in either course? *(Hint: a Venn Diagram may be used to determine your answer).*
   A. 6 students
   B. 33 students
   C. 24 students
   D. 54 students

47. A cubical block of metal weighs 6 pounds. How much will another cube of the same metal weigh if its sides are twice as long?
   A. 48 pounds
   B. 32 pounds
   C. 24 pounds
   D. 18 pounds

48. What is the average (arithmetic mean) of all the multiples of ten from 10 to 190 inclusive?
   A. 90
   B. 95
   C. 100
   D. 105

49. Which number represents the greatest value?
   A. 0.323232
   B. $\frac{3}{5}$
   C. $\frac{7}{12}$
   D. 0.67

50. Which of the following is equivalent to $3^2 - | -2 |$?
   A. 3 squared minus the absolute value of negative 2
   B. radical 3 minus the absolute value of negative 2
   C. square root of 3 minus radical negative 2
   D. 3 squared minus the square root of negative 2
51. \( \sqrt{125} = ? \)
   A. \( 5 \sqrt{5} \)
   B. \( 10 \sqrt{5} \)
   C. \( 5 \sqrt{10} \)
   D. \( 5 \sqrt{25} \)

52. \( 2^{30} + 2^{30} + 2^{30} + 2^{30} = \)
   A. \( 8^{120} \)
   B. \( 8^{30} \)
   C. \( 2^{32} \)
   D. \( 2^{30} \)

53. What is the first step to use when rearranging these numbers to make the computation easier?
   \[ \left( \frac{7}{8} \times 24 \right) \times \left( 10 \times \frac{8}{7} \right) \]
   A. commutative property for addition
   B. commutative property for multiplication
   C. associative property for addition
   D. associative property for division

54. Circle \( R \) has a radius of 4.3 units. Circle \( V \) has a radius of 8.6 units. Angles \( QRS \) and \( UVW \) are congruent. If the length of arc \( QS \) is 4.5 units, what is the length of arc \( UW \), measured to the nearest tenth of a unit?
   A. 2.3 units
   B. 4.1 units
   C. 8.2 units
   D. 9.0 units
55. The diagonal of a rectangular rug is almost 6 yards. Which pair of dimensions is closest to the length and the width of the rug?
   A. 2 yd and 3 yd
   B. 2 yd and 4 yd
   C. 3 yd and 5 yd
   D. 4 yd and 9 yd

56. Six students are participating in a fitness program. They are required to workout in pairs. How many DIFFERENT combinations of pairs of students are possible?
   A. 3
   B. 5
   C. 15
   D. 30

57. A repair service charges $25 to send a service person on a call and $30 per hour for labor. If \( h \) stands for the number of hours of labor, which expression below can the company use to compute the charge for the service call?
   A. \( 25h + 30 \)
   B. \( 25 + 30h \)
   C. \( 55h \)
   D. \( \frac{25}{30h} \)

58. A test on a sample of 492 in-line skate wheels identified 3 defective wheels. Based on this rate of defects, approximately how many defective wheels will be found per 10,000 wheels?
   A. 60
   B. 20
   C. 100
   D. 300

59. Which could be the next step in solving the equation below? \( 3(x + 2) = 3 - (x + 1) \)
   A. \( 3x + 6 = 3 - x - 1 \)
   B. \( 3x + 2 = 3 - x - 1 \)
   C. \( 3x + 6 = 3 - x + 1 \)
   D. \( 3x + 5 = 3 - x + 1 \)
The function table below reflects the number of different handshakes (H) for groups of (n) relatives.

<table>
<thead>
<tr>
<th>n</th>
<th>7</th>
<th>8</th>
<th>12</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>21</td>
<td>28</td>
<td>66</td>
<td>190</td>
</tr>
</tbody>
</table>

60. For any size gathering of people, which formula gives the correct number of handshakes for n people?

A. \[ H = \frac{n(n + 1)}{2} \]

B. \[ H = \frac{(n-1)}{2} \]

C. \[ H = \frac{n(n - 1)}{2} \]

D. \[ H = \frac{n + 1}{2} \]

61. One man and two women are seated randomly in a row. What is the mathematical probability that the two women are seated together?

A. \[ \frac{1}{3} \]

B. \[ \frac{1}{2} \]

C. \[ \frac{5}{6} \]

D. \[ \frac{2}{3} \]

62. The lengths of three sides of a triangle are in the ratio of 3:4:5, and the perimeter of the triangle is 48 inches. The length of the longest side of the triangle is:

A. 15 inches
B. 20 inches
C. 25 inches
D. 28 inches
### Table

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>-3</td>
<td>7</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>-4</td>
<td>8</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>-5</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>-6</td>
<td>10</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

63. Look at the spreadsheet above. Each cell is identified by its column and row. For example, cell C4 contains the number 10. Using the formula \( E1 = B3 + 2(C1 + D4) \), what value should be placed in cell E1?

- A. -33
- B. -17
- C. 13
- D. 17

64. How many numbers between 200 and 400 begin or end with 3?

- A. 110
- B. 120
- C. 130
- D. 100

65. If the area of a rectangle is \( 8x^2 - 12x \), the dimensions of the rectangle could be:

- A. \( 2x \) and \( x - 3 \)
- B. \( 4x \) and \( x \)
- C. \( 4x \) and \( 2x - 3 \)
- D. \( 4x \) and \( x - 3 \)

### Table

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>13</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

66. Ms. Schwendimann grouped students together to work on a project in her 3rd period math class. Group A created a spreadsheet to arrange natural numbers. Group A’s spreadsheet appears above. What numbers will be in the 50th row of Group A’s spreadsheet?

- A. 16, 17, 18
- B. 148, 149, 150
- C. 150, 151, 152
- D. 223, 224, 225
The hours Donald worked at the Arts Center last week are shown in the chart below.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>8 hours</td>
</tr>
<tr>
<td>Tuesday</td>
<td>6 hours</td>
</tr>
<tr>
<td>Wednesday</td>
<td>7 hours</td>
</tr>
<tr>
<td>Thursday</td>
<td>4 hours</td>
</tr>
<tr>
<td>Friday</td>
<td>6 hours</td>
</tr>
</tbody>
</table>

67. Which measure of this data would change if Donald worked 2 hours less on Wednesday?
   A. the mean
   B. the median
   C. the mode
   D. the range

68. If the surface area of a ball is approximately 76 in.², what is the approximate radius of this ball?
   A. 9.84 in.
   B. 8.72 in.
   C. 4.36 in.
   D. 2.46 in.

69. William’s Appliance Center purchased a communications system. The original price was $30,000, but the system depreciated. The graph above shows the value of the system during a period of several years. Which is a reasonable conclusion about the value of the system?
   A. The system depreciated the same amount each year.
   B. The system depreciated more rapidly the first year than it did after the seventh year.
   C. The system depreciated more slowly the first year than it did after the eighth year.
   D. The system lost half of its value each year after it was purchased.
### Marathon Results

<table>
<thead>
<tr>
<th></th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bill</td>
<td>4 hrs. 10 min.</td>
</tr>
<tr>
<td>Kerry</td>
<td>3 hrs. 50 min.</td>
</tr>
<tr>
<td>Bryce</td>
<td>4 hrs. 15 min.</td>
</tr>
<tr>
<td>Daniel</td>
<td>3 hrs. 55 min.</td>
</tr>
<tr>
<td>Kyle</td>
<td>4 hrs. 30 min.</td>
</tr>
</tbody>
</table>

70. Look at the table above. If Joel runs the marathon in 4 hours and 20 minutes, by how many minutes will the average time in the box increase?
   A. 2 minutes
   B. 5 minutes
   C. 10 minutes
   D. 250 minutes

71. Which statement about the figures above is true?
   A. These three figures are similar to one another.
   B. Each of the three figures is a rhombus.
   C. Each of these figures has four congruent angles.
   D. These three figures are rectangles.

72. Tony participated in a 5-kilometer race, and he completed \( \frac{1}{4} \) of the race. How many centimeters did Tony run in the race?
   A. 1.25 centimeters
   B. 500000 centimeters
   C. 125000 centimeters
   D. 25000 centimeters
73. In the figure above, AD = 4, AB = 3, and CD = 9. What is the area of triangle AEC?
A. 18
B. 13.5
C. 5.9
D. 4.5

74. Simplify: \((-4x^3y^2z)^3(4x^5y^4z^3)\)
A. \(-16x^{11}y^6z^7\)
B. \(-16x^{14}y^{10}z^6\)
C. \(-256x^{11}y^9z^7\)
D. \(-256x^{14}y^{10}z^6\)

75. 60% of the cars owned by Best Value Car Rental are white, and 30% have a standard transmission. If you randomly choose a rental car, what is the probability that you will get a white car with a standard transmission?
A. \(\frac{9}{10}\)
B. \(\frac{30}{60}\)
C. \(\frac{9}{50}\)
D. \(\frac{90}{100}\)
76. Solve and simplify: \( \frac{3}{8} + \frac{1}{3} - \frac{1}{4} = \)

A. \( \frac{3}{7} \)
B. \( \frac{1}{2} \)
C. \( \frac{5}{12} \)
D. \( \frac{11}{24} \)

*The Arts Center planned a rectangular space represented by Figure 1 for an outdoor garden. The location was too close to a river, so the garden spot was moved as shown by Figure 2.*

77. What term best describes the transformation of Figure 1 to Figure 2?
A. translation
B. rotation
C. reflection
D. dilation
78. Which figure can be folded to make a cube?

A.  
B.  
C.  
D.  

79. Which of the following is an example of a reflection?

A.  
B.  
C.  
D.  

80. Look at Figure 1 and Figure 2 below. What term best describes the transformation of Figure 1 to Figure 2?

A. translation  
B. dilation  
C. rotation  
D. reflection