Knowledge Map for
6th Grade Math

CONFIDENCE LEVEL: Prime Time

<table>
<thead>
<tr>
<th>Confidence Level</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I have no idea what this is.</td>
<td>I’ve heard of this, but I’m not sure what it means.</td>
<td>I know this.</td>
<td>I could teach this to a classmate</td>
</tr>
<tr>
<td>Total Before Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total After Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Prime Time
(Factors and Multiples)

1. A factor is a whole number that is multiplied by another whole number to get a product. (Ex: 2 x 5 = 10; therefore, 2 and 5 are factors of 10.)
2. A factor pair is two whole numbers that are multiplied to get a product. (2 is a factor of 10, 5 is a factor of 10, and 2x5 is a factor pair for 10.)
3. A common factor is a factor that two or more numbers share. (7 is a factor of 35 and 7 is a factor of 49; therefore, 7 is a common factor of 35 and 49.)
4. All the factors of a number, except the number itself are proper factors. (The proper factors for 12 are 1,2,3,4 and 6)
5. The greatest factor that two or more numbers can share is their greatest common factor (GCF). (The greatest common factor, or GCF, of 15 and 35 is 5.)
6. 1 is a factor of every whole number.
7. A number with exactly two factors, 1 and the number itself, is a prime number. (2, 5, and 13 are examples of prime numbers, but there are many more!)
8. A composite number is a whole number with factors other than itself and 1. (24 is a composite number)
9. A multiple is the product of a given whole number and another whole number. (For example: Take any whole number, like the number 3. Multiply 3 by any other whole number, like 7, and you have found a multiple of 3. Since 3 x 7 = 21, we say that 21 is a multiple of 3.)
10. A common multiple is a multiple that two or more numbers share. (28 is a common multiple of 7 and 14 because 28 is a multiple of 7 and 28 is a multiple of 14.)
11. The least multiple that two or more numbers share is the least common multiple (LCM). (The least common multiple, or LCM, for 12 and 36 is 12)
12. A factorization breaks down a product into its factors. (For example, one factorization for 60 is 2x3x10. Another factorization for 60 is 3x20.)
13. A **prime factorization** breaks down a product into its prime factors. There is only one prime factorization for each product. (For example, the prime factorization for 60 is \(2\times2\times3\times5\). Each factor is a prime number.)
14. An **exponent** is a small raised number that tells how many times a factor is used. For example, \(5^3\) means \(5\times5\times5 = 125\). 3 is the exponent.
15. A number that is a result of the product of a number multiplied by itself is a **square number**. (\(6\times6 = 6^2 = 36\). 36 is a square number)
16. A number that is a result of the product of number multiplied by itself two times is a **cubed number**. (\(2\times2\times2 = 2^3 = 8\). 8 is a cubed number)
17. An **even number** is a whole number that can be split into two equal parts. It is a multiple of two and can be divided by two evenly. (2,4,6…are even numbers)
18. An **odd number** is a whole number that cannot be split into two equal parts. It is not a multiple of two and cannot be divided by two evenly. (1,3,5…are odd numbers)
19. **Whole numbers** are zero and the counting numbers: 1, 2, 3, 4, 5, 6, and so on. If a number has a negative sign, a decimal point, or a part that’s a fraction, it’s not a whole number.
20. **Integers** are the set of whole numbers and their opposites. (…-2,-1,0,+1,+2…)
21. **Consecutive** means “in order.” 8, 9, and 10 are consecutive whole numbers.
22. A **digit** is any one of the ten symbols: 0,1,2,3,4,5,6,7,8,9.
23. **Order of Operations**
   The rules for carrying out arithmetic operations:
   a. Work first inside parentheses or other grouping symbols
   b. Inside grouping symbols or if there are no grouping symbols:
      i. First, take all powers;
      ii. Second, do all multiplications or divisions in order, from left to right;
      iii. Finally, do all additions or subtractions in order, from left to right
CONFIDENCE LEVEL: Bits and Pieces I

<table>
<thead>
<tr>
<th>Confidence Level</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I have no idea what this is.</td>
<td>I’ve heard of this, but I’m not sure what it means.</td>
<td>I know this.</td>
<td>I could teach this to a classmate</td>
</tr>
<tr>
<td>Total Before Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total After Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bits and Pieces I
(Understanding Fractions, Decimals and Percents)

24. A number in the form that has a numerator and a denominator is a fraction. A fraction can represent (1) a part of a whole object, set or unit; (2) a ratio of two quantities; or (3) a division.

25. A ratio is a number, often seen as a fraction, used to make comparisons between two quantities.

26. A rational number is a number than can be written as a quotient of two positive numbers (ratio). (For example, \(\frac{1}{2}\) really means \(1 \div 2\)). A rational number can be terminating or non-terminating. If a rational number is non-terminating, then it will repeat.

27. An irrational number is a number that cannot be written as a ratio. An irrational number does not terminate and does not repeat. (Ex: \(\pi\) and \(\sqrt{2}\))

28. The number written below the fraction bar in a fraction is the denominator.

29. The number written above the fraction bar in a fraction is the numerator.

30. A unit fraction is a fraction with a numerator of 1.

31. A proper fraction is a fraction in which the numerator is smaller than the denominator.

32. An improper fraction is a fraction in which the numerator is larger than the denominator.

33. Fractions that are equal in value, but may have different numerators and denominators are equivalent fractions.

34. A decimal is a special form of a fraction. Decimals (or decimal fractions) are fractions with denominators equal to 10, 100, 1000, and so on. (For example, \(\frac{3}{100} = .03\))

35. A percent is a special decimal fraction in which the denominator is 100. (For example, \(\frac{3}{100} = .03 = 3\%\)) Percent means “out of 100.”

36. A proportion is an equation showing that two ratios are equivalent. (Ex: \(\frac{1}{2} = 2/4\))
CONFIDENCE LEVEL: Shapes and Designs

<table>
<thead>
<tr>
<th>Confidence Level</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I have no idea what this is.</td>
<td>I’ve heard of this, but I’m not sure what it means.</td>
<td>I know this.</td>
<td>I could teach this to a classmate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Before Unit</th>
<th>After Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Shapes and Designs
(Two-Dimensional Geometry)

37. A **line segment** consists of two points of a line and all the points between these two points.
38. Lines in a plane that never meet are **parallel lines**.
39. Two lines that intersect to form right angles are **perpendicular lines**.
40. A part of a line consisting of a point and all the points on the line on one side of the endpoint is called a **ray**.
41. A **vertex** is a point (location) where two line segments, lines, or rays meet.
42. A corner of a polygon is a **vertex**. The plural for vertex is **vertices**.
43. A **diagonal** is a line segment connecting two non-adjacent vertices of a polygon.
44. The figure formed by two rays or line segments that have a common vertex is called an **angle**.
45. A **degree** is a unit of measure of angles and is also equal to 1/360 of a complete circle.
46. An **acute angle** is an angle whose measure is *less than 90 degrees*.
47. An **obtuse angle** is an angle whose measure is *more than 90 degrees and less than 180 degrees*.
48. A **straight angle** is an angle whose measure *equals 180 degrees*.
49. An angle that measures 90 degrees is a **right angle**.
50. An **angle sum** is the sum of all the measures of the interior angles of a polygon.
51. An **exterior angle** is an angle at a vertex of a polygon where the sides of the angle are one side of the polygon and the extension of the other side meeting at the vertex.
52. An **interior angle** is the angle inside a polygon formed by two adjacent sides of the polygon.
53. A **polygon** is a shape formed by line segments, called sides.
54. A **regular polygon** has all of its sides AND all of its angles equal.
55. A polygon which has at least two sides with different lengths or two angles with different measures is an **irregular polygon**.
56. A polygon with three sides is a **triangle**.
57. A triangle with all three sides the same length is an **equilateral triangle**.
58. A triangle with two sides the same length is an **isosceles triangle**.
59. A triangle with no sides the same length is a **scalene triangle**.
60. A triangle with one right angle is a **right triangle**.
61. A triangle with all acute angles is an **acute triangle**.
62. A triangle with one obtuse angle is an **obtuse triangle**.
63. A polygon with four sides is a **quadrilateral**.
64. A quadrilateral with opposite sides that are parallel is a **parallelogram**.
65. A **rectangle** is a parallelogram with all right angles. **Squares** are a special type of rectangle.
66. A **square** is a rectangle with all sides equal. Squares have four right angles and four equal sides.
67. A **trapezoid** is a quadrilateral with AT LEAST one pair of opposite sides that are parallel. This definition means that parallelograms are trapezoids.
68. A **rhombus** is a quadrilateral that has all sides the same length.
69. A **transversal** is a line that intersects two or more lines.
70. A flat surface that extends infinitely in all directions is a **plane**.
71. The number of points needed to identify a plane in space is 3.
72. **Planes** can be parallel, perpendicular, or intersect in space.
73. The covering of a plane surface with geometric shapes without gaps or overlaps is a **tiling** or a **tessellation**.
74. A **line of symmetry** is a line such that if a shape is folded over this line the two halves of the shape match exactly.
75. A shape with **reflection symmetry** has two halves that are mirror images of each other. (This is also called a FLIP)
76. A shape has **rotation symmetry** if it can be rotated *less than a full turn* about its center point to a position where it looks exactly as it did before it was rotated. (This is also called a TURN)
77. A shape that moves across a plane but does not turn or flip is a **translation**. (This is also called a SLIDE)
78. A transformation that preserves the shape of a figure, but allows the size to change is a **dilation**.
79. A shape that contracts to become smaller is a **contraction**.
80. Translations, reflections, and rotations are all called **transformations**.
81. **Congruent** means having the exact same size and shape.
82. **Similar** describes figures that have the same shape, but not necessarily the same size. Corresponding sides of similar figures are proportional.
83. A **property** is a characteristic or an attribute of a shape. (Ex: all 90 degree angles)
84. The **altitude** (height) of a plane figure is the distance from a vertex to the opposite side.
85. **Adjacent** means next to.
86. **Opposite** means directly across from.
CONFIDENCE LEVEL:  Bits and Pieces II

<table>
<thead>
<tr>
<th>Confidence Level</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have no idea what this is.</td>
<td>I've heard of this, but I'm not sure what it means.</td>
<td>I know this.</td>
<td>I could teach this to a classmate</td>
<td></td>
</tr>
</tbody>
</table>

| Total Before Unit | | | |
| Total After Unit | | | |

**Bits and Pieces II**
(Using Fraction Operations)

87. A set of rules for performing a procedure is an algorithm. Some examples of algorithms are the rule for long division or the rule for adding fractions.
88. A fact family is a set of related addition-subtraction sentences or multiplication-division sentences. (Here is an entire addition-subtraction fact family: 1+2=3, 2+1=3, 3-1=2, and 3-2=1.)
89. A reciprocal is a factor by which you multiply a given number so that their product is 1. (For example, 2/3 x 3/2 = 1; so 2/3 is the reciprocal of 3/2)
90. Be able to add fractions or mixed numbers with like denominators.
91. Be able to subtract fractions or mixed numbers with like denominators.
92. Be able to add fractions or mixed numbers with unlike denominators.
93. Be able to subtract fractions or mixed numbers with unlike denominators.
94. Be able to multiply fractions.
95. Be able to divide fractions.
96. Be able to simplify fractions.
**Confidence Level: Covering and Surrounding**

<table>
<thead>
<tr>
<th>Confidence Level</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I have no idea what this is.</td>
<td>I’ve heard of this, but I’m not sure what it means.</td>
<td>I know this.</td>
<td>I could teach this to a classmate</td>
</tr>
</tbody>
</table>

|                      | 97. Linear measurements, such as length, width, base, and height, which describe the size of figures, are **linear dimensions**. |
| 98. **Area** is the measure of the amount of surface enclosed by the boundary of a figure. (covering) (painting a room) |
| 99. The measure of the distance around a figure is the **perimeter**. (surrounding) (fencing a garden) |
| 100. The distance around (or perimeter of) a circle is its **circumference**. |
| 101. A **circle** is a two-dimensional object in which every point is the same distance from a point called the center. |
| 102. The **diameter** is a segment that goes from one point on a circle through the center of the circle to another point on the circle. |
| 103. The **chord** is a segment that goes from one point on a circle and **not necessarily through the center** of the circle to another point on the circle. |
| 104. A **radius** is a segment from the center of a circle to a point on the circle. A radius is half of the measurement of the diameter. |
| 105. **Pi** (π) is the mathematical name for the ratio of a circle’s circumference to its diameter. This ratio is the same for every circle, and is approximately equal to 3.1416. |
| 106. A **sector** is a part of a circle bounded by two radii and the arc they create. |
CONFIDENCE LEVEL: Bits and Pieces III

<table>
<thead>
<tr>
<th>Confidence Level</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have no idea what this is.</td>
<td>I’ve heard of this, but I’m not sure what it means.</td>
<td>I know this.</td>
<td>I could teach this to a classmate</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Before Unit</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Total After Unit</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

Bits and Pieces III
(Computing with Decimals and Percents)

107. A **dividend** is the name for the number into which you are dividing in a division problem. For example, 72 is the dividend in the problem $72 \div 8$.

108. A **divisor** is the name for the number you are dividing by in a division problem. For example, 8 is the divisor in the problem $72 \div 8$.

109. **Quotient** is the name for the answer to a division problem. For example, 9 is the quotient to $72 \div 8 = 9$.

110. A **repeating decimal** is a decimal with a pattern of digits that repeats over and over, such as 0.33333….

111. A **terminating decimal** is a decimal that ends, or terminates, such as 0.5 or 0.125.

112. Be able to **add decimals**.

113. Be able to **subtract decimals**.

114. Be able to **multiply decimals**.

115. Be able to **divide decimals**.

116. Be able to **round decimals** to the nearest tenth or hundredth.
CONFIDENCE LEVEL: How Likely Is It?

<table>
<thead>
<tr>
<th>Confidence Level</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I have no idea what this is.</td>
<td>I’ve heard of this, but I’m not sure what it means.</td>
<td>I know this.</td>
<td>I could teach this to a classmate</td>
</tr>
</tbody>
</table>

Total Before Unit

Total After Unit

How Likely Is It?
(Understanding Probability)

117. **Possible** is a word used to describe an outcome or result that can happen.
118. A possible result of an action is an **outcome**.
119. A set of outcomes is an **event**.
120. Two or more events that have the same chance of happening are **equally likely events**.
121. A result of an event that is certain to happen is a **certain outcome**.
122. An outcome that gives a desired result is a **favorable outcome**.
123. An outcome that cannot happen is an **impossible outcome**.
124. The likelihood that something will happen is a **chance**.
125. A number with a value from 0 to 1 that describes the likelihood that an event will occur is a **probability**.
126. A probability found by analyzing a situation is a **theoretical probability**.
127. A probability found as a result of an experiment is an **experimental probability**.
128. A game is **fair** when each player has the same chance of winning.
Data About Us
(Statistics)

129. **Data** are values such as counts, ratings, measurements, or opinions that are gathered to answer questions.

130. Values that are numbers such as counts, measurements, and ratings are considered **numerical data**.

131. **Categorical data** are “words” that represent possible responses within a given category.

119. A **table** is a tool for organizing information in rows and columns.

120. A **bar graph** is a graphical representation of a table of data in which the height or length of each bar indicates its frequency.

121. A **coordinate graph** is a way to show the relationship between two variables.

122. The **x-axis** is the horizontal line used to make a coordinate graph.

123. The **y-axis** is the vertical line used to make a coordinate graph.

124. The size of the units on an axis of a graph or number line is the **scale**.

125. A **line plot** is a quick, simple way to organize data along a number line where the X’s (or other symbols) above a number represent how often each value is mentioned.

126. A **mean** is the value you would get if all the data are combined and then redistributed evenly. (average)

127. The **median** is the number that marks the middle of an ordered set of data.

128. The **mode** is the category or numerical value that occurs most often.

129. The difference between the least value and the greatest value in a distribution is its **range**.

130. An **outlier** is a number in a set of data that is much larger or smaller than most of the other numbers in the set.

131. A **histogram** is a graph in which the labels for the bars are numerical intervals.
CONFIDENCE LEVEL: Miscellaneous

<table>
<thead>
<tr>
<th>Confidence Level</th>
<th>0: I have no idea what this is.</th>
<th>1: I’ve heard of this, but I’m not sure what it means.</th>
<th>2: I know this.</th>
<th>3: I could teach this to a classmate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Before Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total After Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Filling and Wrapping

132. **Surface area** is the total area of the faces including the bases and curved surfaces of a solid figure.

133. **Volume** is the amount of space occupied by a 3-dimensional shape or it is the number of unit cubes that will fit inside a 3-dimensional shape.

<table>
<thead>
<tr>
<th>Confidence Level</th>
<th>0: I have no idea what this is.</th>
<th>1: I’ve heard of this, but I’m not sure what it means.</th>
<th>2: I know this.</th>
<th>3: I could teach this to a classmate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Before Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total After Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Algebra

134. **The Commutative Property** of addition and multiplication (but not of subtraction or division) says that changing the order of the numbers being added or multiplied doesn’t change the answer. (For example, $5 + 10 = 15$ and $10 + 5 = 15$)

135. **The Associative Property** of addition and multiplication (but not of subtraction and division) says that when you add or multiply three numbers, it doesn’t matter which two are added or multiplied first. For example, $(4 + 3) + 7 = 4 + (3 + 7)$

136. **The Distributive Property** is a property that relates multiplication and addition or subtraction. This property gets its name because it “distributes” a factor over terms inside parentheses. Distributive property of multiplication over addition: $1 \times (2 + 3) = (1 \times 2) + (1 \times 3)$
<table>
<thead>
<tr>
<th>Before Unit</th>
<th>After Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Unit</td>
<td>After Unit</td>
</tr>
<tr>
<td>Before Unit</td>
<td>After Unit</td>
</tr>
<tr>
<td>Before Unit</td>
<td>After Unit</td>
</tr>
<tr>
<td>Before Unit</td>
<td>After Unit</td>
</tr>
<tr>
<td>Before Unit</td>
<td>After Unit</td>
</tr>
<tr>
<td>Before Unit</td>
<td>After Unit</td>
</tr>
<tr>
<td>Before Unit</td>
<td>After Unit</td>
</tr>
<tr>
<td>Before Unit</td>
<td>After Unit</td>
</tr>
<tr>
<td>Before Unit</td>
<td>After Unit</td>
</tr>
<tr>
<td>Before Unit</td>
<td>After Unit</td>
</tr>
<tr>
<td>Before Unit</td>
<td>After Unit</td>
</tr>
</tbody>
</table>