| Strand: Number and Number Sense | |
|---|---|
| **6.4 The student will recognize and represent patterns with whole number exponents and perfect squares.** | |
| **Suggested Pacing** | |
| 6.4 - 3 Instructional Days | |
| **Spiraling Standards** | |
| **5.7** The student will simplify whole number numerical expressions using the order of operations.* | **7.1** The student will<br>d) determine square roots of perfect squares. |
| **Essential Questions** | **Common Misconceptions** |
| • How can patterns be used to make predictions?<br>• How does a perfect square relate to a geometric square?<br>• How do you use powers of 10 when converting measurements in the metric system? | • Students often select values beyond the pattern due to lack of understanding of how to evaluate exponents.<br><br>• When asked to **recognize** and **describe** the pattern of perfect squares, students often select numbers that are located in between the perfect squares. Since they aren't required to know the perfect squares they must know how to use the root key ( $\sqrt{x}$ ), to help them do this.<br><br>• Students know the place values but they don't understand how it is connected to the powers of 10. |

| Understanding the St andard | Essential Knowledge and Skills |
|---|---|
| • The symbol ( • ) can be used in grade six in place of "x" to indicate multiplication.<br>• In exponential notation, the base is the number that is multiplied, and the exponent represents the number of times the base is used as a factor. In , 8 is the base and 3 is the exponent (e.g.,$8^3=8 \cdot 8 \cdot 8$).<br>• Any real number other than zero raised to the zero power is 1. Zero to the zero power is undefined.<br>• A perfect square is a whole number whose square root is an integer (e.g., $36 = 6 \cdot 6 = 6^2 = 36$). Zero (a whole number) is a perfect square.<br>• Perfect squares may be represented geometrically as the areas of squares the length of whose sides are whole numbers (e.g., $1^1$, $2^2$, $3^3$, etc.). This can be modeled with grid paper, tiles, geoboards and virtual manipulatives.<br>• The examination of patterns in place value of the powers of 10 in grade six leads to the development of scientific notation in grade seven. | **The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**<br>• Recognize and represent patterns with bases and exponents that are whole numbers.<br>• Recognize and represent patterns of perfect squares not to exceed $20^2$, by using grid paper, square tiles, tables, and calculators.<br>• Recognize powers of 10 with whole number exponents by examining patterns in place value. |
| **Vocabulary** | **Instructional Activities Organized by Learning Objective** |
| Base<br>Exponent<br>Exponential Notation<br>Factor<br>Integers<br>Perfect Square<br>Power | Textbook<br>Eureka:<br>Eureka Grade \| Module \| Topic \| Lesson(s)<br>6 \| 4 \| B \| 5-6<br>***Need Square Roots** |

| | |
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| Square Root<br>Whole Number<br>Pattern<br>Place value | Virginia Math Connects, Course 1, ©2012, Glencoe/McGraw-Hill<br>page(s) 62 – 65 (exponents and perfect squares)<br>page(s) 270 – 273 (Order of Operations)<br>Extra Practice page –EP3 Lesson 1-3 / EP12 Lesson 5-1<br><br>Notes<br>6.5 Interactive Notes |
| **Assessment** | Resources<br>● Print<br>Virginia Department of Education<br>Build a Square – lesson plan<br>Math Strategies – Instructional video<br>SOL 6.5 – lesson plan<br><br>Technology-based<br>Gizmo-Square Roots<br><br>Smart Exchange - interactive skill practice<br>Squares and Square Roots [SMART Notebook lesson]<br>Math Exponents [SMART Notebook lesson]<br><br>Station Activities<br>http://studyjams.scholastic.com/studyjams/jams/math/algebra/aorder-of-operations.htm |
| **Cross-Curricular Connections** | Tiered Differentiations |

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| In certain science lessons, scientific notations are used to abbreviate very small (weight of molecules) and large numbers (distances of planes). | Use grid paper to help students visualize and model perfect squares. |