Just In Time Quick Check

Standard of Learning (SOL) 6.4

Strand: Number and Number Sense

Standard of Learning (SOL) 6.4

The student will recognize and represent patterns with whole number exponents and perfect squares.

Grade Level Skills:

- Recognize and represent patterns with bases and exponents that are whole numbers.
- Recognize and represent patterns of perfect squares not to exceed 20^2, by using grid paper, square tiles, tables, and calculators.
- Recognize powers of 10 with whole number exponents by examining patterns in place value.

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Just in Time Quick Check Teacher Notes

Supporting Resources:

- VDOE Mathematics Instructional Plans (MIPS)
  - 6.4 - Whole Number Exponents and Perfect Squares (Word) / PDF Version
- VDOE Algebra Readiness Formative Assessments
  - SOL 6.4 (Word) / PDF
- VDOE Algebra Readiness Remediation Plans
  - Powers of Ten (Word) / PDF
- VDOE Word Wall Cards: Grade 6 (Word) | (PDF)
  - Perfect Squares
  - Exponential Form
  - Powers of Ten
- Desmos Activity
  - Looking for Patterns in Tables and Graphs

Supporting and Prerequisite SOL: 5.18, 4.15

SOL 6.4 - Just in Time Quick Check

1. Based on the pattern below, what is the value of 6^5? Explain your thinking.

$6^1 = 6$

$6^2 = 36$

$6^3 = 216$

2. Complete the table below.

Square Root	1		8	12		20
Perfect Square	1	16	64		256	

3. Use a place value chart to represent 10^5.

Ten Millions	Millions	Hundred Thousands	Ten thousands	Thousands	Hundreds	Tens	Ones

4. What is equivalent to 3^4? Explain your thinking using pictures, numbers, and words.

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Common Errors/Misconceptions and their Possible Indications

1. Based on the pattern below, what is the value of 6^5? Explain your thinking.

$6^1 = 6$

$6^2 = 36$

$6^3 = 216$

Some students may find it challenging to recognize and extend a pattern that includes bases and exponents. To build student understanding, emphasize that the exponent represents how many times the base is used as a factor. Encourage students to write out the exponential expression in expanded form to assist them with understanding that the bases are being multiplied.

Another possible student error is finding 6^4 instead of 6^5 because that would be the next term in the pattern. Provide these students with practice finding patterns similar to this where they have to find more than just the very next term.

2. Complete the table below.

Square Root	1		8	12		20
Perfect Square	1	16	64		256	

A common student error may be to treat the table as a function machine, attempting to find a common factor that applies to every square root and perfect square. A possible misconception is thinking that a perfect square can be divided by 2 (cut in half) to find the square root. A possible teaching strategy could be to use grid paper and have students explore perfect squares through the 6.4 - Whole Number Exponents and Perfect Squares lesson. Students can observe and recognize the patterns using the square grids. Students can also make a connection between perfect squares and geometric squares.

3. Use a place value chart to represent 10^5.

Ten Millions	Millions	Hundred Thousands	Ten thousands	Thousands	Hundreds	Tens	Ones

A common student error is writing the number in standard form by writing 10 and then using the exponent to determine the number of zeroes written after the 10. In this example, students may write 1,000,000 because they place 5 zeroes after the initial 10. This may result from a procedural focus on using the exponent to determine the number of zeroes rather than a conceptual focus on base ten understanding. Students may understand the place value of numbers, but may not be able to relate it to powers of 10.

These students may benefit from using concrete materials like base ten blocks to build conceptual understanding by building 10^2 as 10 groups of 10, then building 10 groups of 10^2 (100) to show 10^3, etc. Then students can record the patterns as number sentences as they explore powers of 10, beginning with thinking of 10^2 as 10 x 10

= 100, then 10^3 as 10 x 10 x 10, etc. As students build these patterns, they begin to see the connections between powers of 10 and place value.

4. What is equivalent to 3^4? Explain your thinking using pictures, numbers, and words.

   A common student error is to multiply the base by the exponent. Students may have the misconception that exponents are another way to write basic multiplication facts. These students may benefit from practice with exponential notation by evaluating numbers written in exponential form and writing the repeated factors out to obtain the product. Students can also complete activities such as matching expanded form with exponential notation.