Just In Time Quick Check

Standard of Learning (SOL) AII.1b

Strand: Expressions and Operations

Standard of Learning (SOL) AII.1b

The student will add, subtract, multiply, divide, and simplify radical expressions containing rational numbers and variables, and expressions containing rational exponents.

Grade Level Skills:

- Simplify radical expressions containing positive rational numbers and variables.
- Convert between radical expressions and expressions containing rational exponents.
- Add and subtract radical expressions.
- Multiply and divide radical expressions. Simplification may include rationalizing denominators

Just in Time Quick Check

Just in Time Quick Check Teacher Notes

Supporting Resources:

- VDOE Mathematics Instructional Plans (MIPS)
  - AII.1b – Exponents and Radicals (Word) / PDF Version
- VDOE Word Wall Cards: Algebra II (Word) | (PDF)
  - Square Root
  - Cube Root
  - n^{th} Root
  - Simplify Radical Expressions
  - Add and Subtract Radical Expressions
  - Product Property of Radicals
  - Quotient Property of Radicals

Supporting and Prerequisite SOL: A.2a, A.3a, A.3b, A.3c, 8.3b, 8.14b

SOL AII.1b - Just in Time Quick Check

1. Simplify the expression completely. Show your work/thinking.

$$\sqrt[4]{256a^8b^{30}}$$

2. Rewrite the expression $6\frac{1}{5}x\frac{9}{5}y\frac{4}{5}$ in simplest radical form. Show your work/thinking.

3. What is the simplified radical form of the expression below? Show your work/thinking.

$$2\sqrt{28x^3} + 7x\sqrt[3]{8x} - 2\sqrt[3]{27x^4} + 3x\sqrt{63x}$$

4. Express the product of $-\sqrt[5]{27xy^2}$ and $2\sqrt[5]{9x^4y}$ in simplest radical form. Show your work/thinking.

5. Simplify the expression $(2 + \sqrt{5})^2$. Write your answer in simplest radical form. Show your work/thinking.

6. Simplify the expression. Write your answer in simplest radical form, when the denominator does not equal 0. Show your work/thinking.

$$\frac{4x + 2}{\sqrt{x} - 3}$$

SOL AII.1b - Just in Time Quick Check Teacher Notes

Common Errors/Misconceptions and their Possible Indications

1. Simplify the expression completely. Show your work/thinking.

$$\sqrt[4]{256a^8b^{30}}$$

A common error some students may make is to find the square root of the expression instead of the fourth root. This may indicate that some students do not understand what the index represents in a radical expression. Teachers may want to encourage students to circle the index, then make a factor tree and circle the same number of groups of factors that is equivalent to the value of the index.

2. Rewrite the expression $6\frac{1}{5}x\frac{9}{5}y\frac{4}{5}$ in simplest radical form. Show your work/thinking.

A common error some students may make is to rewrite the expression as a 5th root without simplifying. This may indicate that some students do not understand that terms with common bases in the expression in the radicand must first be simplified and the radicand is in simplest radical form when the exponent of a base is less than the value of the index. Students may benefit from writing the expression in expanded form as $\sqrt[5]{6 \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y \cdot y \cdot y}$. *This may help students identify that a group of five x terms can be simplified as x because* $\sqrt[5]{x^5} = x$.

3. What is the simplified radical form of the expression below? Show your work/thinking.

$$2\sqrt{28x^3} + 7x\sqrt[3]{8x} - 2\sqrt[3]{27x^4} + 3x\sqrt{63x}$$

A common error some students may make is to combine roots with different indices. This may indicate that some students do not understand what the index represents. Teachers may find it beneficial to have students circle the terms with like indices or create a graphic organizer to help outline the steps to add/subtract radicals. In addition, it may be beneficial to revisit problems such as $\sqrt{24} + \sqrt[3]{24}$ *prior to simplifying and performing operations on radicals with different indices involving algebraic expressions.*

4. Express the product of $-\sqrt[5]{27xy^2}$ and $2\sqrt[5]{9x^4y}$ in simplest radical form. Show your work/thinking.

A common error some students may make is to correctly multiply the coefficients and radicands, but not simplify the expression. This may indicate that some students believe writing the expression as one radicand means they have expressed the answer in simplified form. Students may benefit from creating a graphic organizer that will remind them to utilize a factor tree to ensure the expression is completely simplified.

5. Simplify the expression $(2 + \sqrt{5})^2$. Write your answer in simplest radical form. Show your work/thinking.

A common error some students may make is to only square the first and second term of the binomial resulting in a value of 9. This may indicate that some students do not understand that the expression can be written as $(2 + \sqrt{5})(2 + \sqrt{5})$ *before distributing. Students may benefit from writing out their work as* $2(2) + 2\sqrt{5} + 2\sqrt{5} + \sqrt{25}$ *and then circling like terms as they work to simplify. Teachers may also want to have students compare and contrast the difference between* $(2 + \sqrt{5})(2 + \sqrt{5})$ *and* $(2 + \sqrt{5})(2 - \sqrt{5})$.

6. Simplify the expression. Write your answer in simplest radical form, when the denominator does not equal 0. Show your work/thinking.

$$\frac{4x+2}{\sqrt{x}-3}$$

A common error some students may make is to multiply the given rational expression by $\left(\frac{\sqrt{x}}{\sqrt{x}}\right)$ in an attempt to rationalize the denominator. This may indicate some students do not understand that rationalizing the denominator involves multiplying the numerator and denominator of the given rational expression by the conjugate of $\left(\sqrt{x}-3\right)$. Teachers may find it beneficial to compare and contrast problems like $\sqrt{x}\left(\sqrt{x}-5\right)$ and $(\sqrt{x}-5)(\sqrt{x}+5)$ to help students identify the differences. In addition, completing simpler problems like $\frac{\sqrt{20x^3}}{\sqrt{3x}}$ may help students develop an understanding of what it means to rationalize the denominator.