Appendix 2: Solutions

Lesson 3:1: Introduction to Radicals

Practice Solutions – I

1. Simplify the following radicals.

   a. $\sqrt{180}$

   $\sqrt{180} = \sqrt{36 \cdot 5}$
   $= 6\sqrt{5}$

   b. $\sqrt[3]{72h^3}$

   $\sqrt[3]{72h^3} = \sqrt[3]{8 \cdot 9 \cdot h^3}$
   $= 2h\sqrt[3]{9}$

2. Write the following radicals as entire radicals.

   a. $4\sqrt{21}$

   $4\sqrt{21} = \sqrt{4^2 \cdot 21}$
   $= \sqrt{336}$

   b. $2\sqrt[4]{7}$

   $2\sqrt[4]{7} = \sqrt[4]{2^4 \cdot 7}$
   $= \sqrt[4]{112}$

3. Order the following radicals from smallest to largest, without using a calculator.

$$6, 5\sqrt[3]{7}, 5\sqrt[3]{2}, \sqrt[3]{155}, 3\sqrt[3]{6}$$

$6 = \sqrt[3]{6^3} = \sqrt[3]{216}$
$5\sqrt[3]{7} = \sqrt[3]{5^3 \cdot 7} = \sqrt[3]{875}$
$5\sqrt[3]{2} = \sqrt[3]{5^3 \cdot 2} = \sqrt[3]{250}$
$\sqrt[3]{155}$
$3\sqrt[3]{6} = \sqrt[3]{3^3 \cdot 6} = \sqrt[3]{162}$

The order is $\sqrt[3]{155}, 3\sqrt[3]{6}, 6, 5\sqrt[3]{2}, 5\sqrt[3]{7}$.

4. Identify the restrictions on the variables for the following radical expressions.

   a. $3\sqrt{5n}$

   $n \geq 0, n \in \mathrm{R}$

   b. $\sqrt[4]{y-5}-1$

   $y-5 \geq 0$

   $y \geq 5, y \in \mathrm{R}$

   c. $\frac{1}{2a}\sqrt{7a}$

   $a \geq 0$, but $a \neq 0$ because of the a in the denominator

   $a > 0, a \in \mathrm{R}$

Please complete *Lesson 3.1 Explore Your Understanding Assignment* located in *Workbook 3A* before proceeding to *Lesson 3.2*.

Lesson 3.2: Operations with Radicals

Practice Solutions – II

1. Georgia simplified the expression $5\sqrt{45}-\sqrt{20}$.

$$\begin{aligned} 5\sqrt{45}-\sqrt{20} &= (5-1)\sqrt{45-20} \\ &= 4\sqrt{25} \\ &= 4(5) \\ &= 20 \end{aligned}$$

Explain the error(s) Georgia made, and correct the solution.

The coefficients cannot be subtracted because the radicals are not like radicals. Also, the radicands are not subtracted from each other, ever. First, simplify the radicals. Then, add/subtract the coefficients of any like radicals.

The correct solution is:

$$\begin{aligned} 5\sqrt{45}-\sqrt{20} &= 5\sqrt{9\cdot 5}-\sqrt{4\cdot 5} \\ &= 15\sqrt{5}-2\sqrt{5} \\ &= 13\sqrt{5} \end{aligned}$$