Lesson 3.3: Radical Equations

Complete the *Practice* below. When you have completed all the questions for *Lesson 3.3 Practice – V* with your best work, mark your work by first comparing your answers to the solutions provided in the *Appendix*. Then, apply the rubric found at the beginning of the *Workbook*.

Practice – V

1. The formula for the volume of a square-based pyramid is $V = \frac{1}{3}s^2h$.

   a. Rewrite the formula to solve for s.

   b. What restrictions are on the variables V and h?

2. The velocity, v, in feet per second, of a roller coaster at the bottom of a hill is related to the vertical drop, h, in feet. The velocity, v_0, in feet per second, of the roller coaster at the top of the hill can be calculated using the formula $v_0 = \sqrt{v^2 - 64h}$.

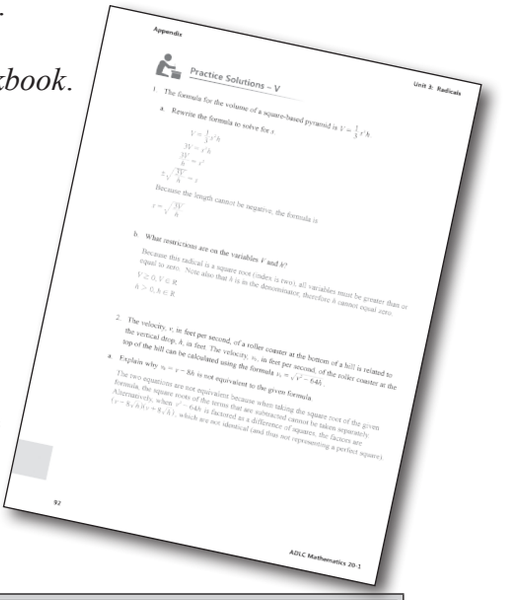
   a. Explain why $v_0 = v - 8h$ is not equivalent to the given formula.

   b. What velocity will a roller coaster have at the bottom of a 225 ft hill if it starts with a velocity of 0 ft/s at the top?

Mark your work for *Lesson 3.3 Practice – V* using the solutions provided in *Appendix 2: Solutions*. Then, apply the rubric found at the beginning of the *Workbook*.

Transfer your self-assessed mark to the front cover of the *Workbook*.

My self-assessed mark on *Lesson 3.3 Practice – V* is _____.


Appendix

Practice Solutions – V

Unit 3: Radicals

1. The formula for the volume of a square-based pyramid is $V = \frac{1}{3}s^2h$

a. Rewrite the formula to solve for s.

$V = \frac{1}{3}s^2h$

$3V = s^2h$

$\frac{3V}{h} = s^2$

$s = \sqrt{\frac{3V}{h}}$

$s = \frac{\sqrt{3V}}{\sqrt{h}}$

Because the length cannot be negative, the formula is

$s = \frac{\sqrt{3V}}{\sqrt{h}}$

b. What restrictions are on the variables V and h?

Because this radical is a square root (index is two), all variables must be greater than or equal to zero. Note also that h is in the denominator, therefore h cannot equal zero.

$V \geq 0, V \in R$

$h > 0, h \in R$

2. The velocity, v, in feet per second, of a roller coaster at the bottom of a hill is related to the vertical drop, h, in feet. The velocity, v_t, in feet per second, of the roller coaster at the top of the hill can be calculated using the formula $v_t = \sqrt{v^2 - 64h}$.

a. Explain why $v_t = v - 8h$ is not equivalent to the given formula.

The two equations are not equivalent because when taking the square root of the given formula, the square roots of the terms that are subtracted cannot be taken separately. Alternatively, when $v^2 - 64h$ is factored as a difference of squares, the factors are $(v - 8\sqrt{h})(v + 8\sqrt{h})$, which are not identical (and thus not representing a perfect square).

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Reflect on your understanding of the concepts addressed in the *Practice* exercises in the table provided.

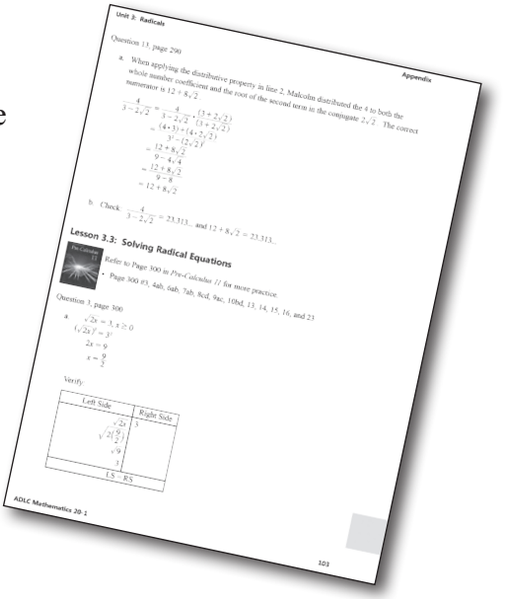
Question Number	Got it!	Almost there…	Need to retry or ask for help.	Similar questions from *Pre-Calculus 11*
1				p. 302 #16, 23
2				p. 301 #13, 14, 15

You may proceed to *Explore Your Understanding Assignment* on the next page of this *Workbook*.

Note: Before you complete *Explore Your Understanding*, you may review your skills and get more practice by completing the following problems in *Pre-Calculus 11*.

- Page 300, #3, 4ab, 6ab, 7ab, 8cd, 9ac, 10bd, 13, 14, 15, 16, and 23

Check your work in *Enhance Your Understanding*.


Unit 3: Radicals

Question 13, page 290

a. When applying the distributive property in line 2, Malcolm distributed the 4 to both the whole number coefficient and the root of the second term in the conjugate $2\sqrt{2}$. The correct numerator is $12 + 8\sqrt{2}$.

$\frac{4}{3 - 2\sqrt{2}} = \frac{4}{3 - 2\sqrt{2}} \cdot \frac{(3 + 2\sqrt{2})}{(3 + 2\sqrt{2})}$

$= \frac{(4 \cdot 3) + (4 \cdot 2\sqrt{2})}{3^2 - (2\sqrt{2})^2}$

$= \frac{12 + 8\sqrt{2}}{9 - 4 \cdot 4}$

$= \frac{12 + 8\sqrt{2}}{9 - 8}$

$= 12 + 8\sqrt{2}$

b. Check: $\frac{4}{3 - 2\sqrt{2}} = 23.313...$ and $12 + 8\sqrt{2} = 23.313...$

Appendix

Lesson 3.3: Solving Radical Equations

Refer to Page 300 in *Pre-Calculus 11* for more practice.

- Page 300 #3, 4ab, 6ab, 7ab, 8cd, 9ac, 10bd, 13, 14, 15, 16, and 23

Question 3, page 300

a. $\sqrt{2x} = 3, x \geq 0$

$(\sqrt{2x})^2 = 3^2$

$2x = 9$

$x = \frac{9}{2}$

Verify:

Left Side	Right Side
$\sqrt{2\left(\frac{9}{2}\right)}$	3
$\sqrt{9}$	
3	
LS = RS	

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