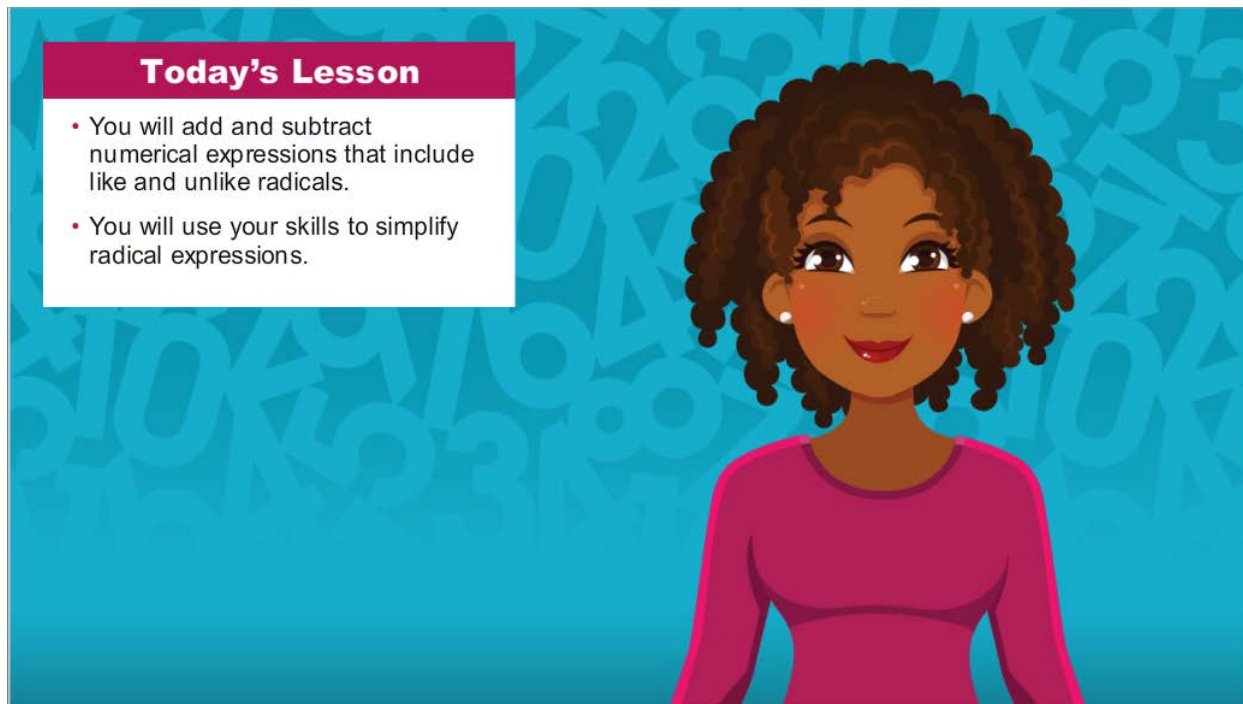


# Module 4: Radical Expressions

## Topic 1 Content: Adding and Subtracting Radical Expressions

### Introduction



**Today's Lesson**

- You will add and subtract numerical expressions that include like and unlike radicals.
- You will use your skills to simplify radical expressions.

Hello and welcome! I'm so glad to have you here for this lesson in Algebra I. In this lesson, you will learn how to add and subtract numerical expressions that include like and unlike radicals. Your skills simplifying radical expressions will be a useful resource during this lesson.

**Module 4: Radical Expressions**  
**Topic 1 Content: Adding and Subtracting Radical Expressions**

**Adding and Subtracting Radical Expressions**

**ADDING AND SUBTRACTING  
RADICAL EXPRESSIONS**

**Click the Examples Below to Learn More**

Example One

Self-Check

Example Two

Click the examples below to learn more.

- Example One
- Example Two
- Self-Check

## Module 4: Radical Expressions

### Topic 1 Content: Adding and Subtracting Radical Expressions

#### Example 1

Simplify the following expression:  $-10\sqrt[3]{7} + 6\sqrt[3]{7}$

To simplify a numerical expression containing like radicals, treat each radical as a variable. Consider this.

If you replaced each radical with the variable,  $x$ , you would combine the coefficients to simplify the expression.

$$-10 + 6 = -4$$

You would then multiply  $-4$  by  $x$ . You could then conclude that  $-10x + 6x = -4x$ .

Essentially what you have done is used the distributive property to factor  $x$  out of the expression.

When combining like radicals, you will follow a similar process of treating the radical as you would a variable. Use the distributive property to factor the radical out of the expression and combine the coefficients.

$$-10 + 6 = -4$$

So you can conclude that  $-10\sqrt[3]{7} + 6\sqrt[3]{7} = -4\sqrt[3]{7}$ .

**Steps to solve this problem:**

$$\begin{aligned} & -10\sqrt[3]{7} + 6\sqrt[3]{7} \\ & -10x + 6x \\ & (-10 + 6)x \\ & -4x \end{aligned}$$

$$\begin{aligned} & -10\sqrt[3]{7} + 6\sqrt[3]{7} \\ & (-10 + 6)\sqrt[3]{7} \\ & -4\sqrt[3]{7} \end{aligned}$$

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**Example 2**

**EXAMPLE 2**

Simplify the following expression:  $14\sqrt[3]{5} - 4\sqrt[3]{40}$

$14\sqrt[3]{5} - 4\sqrt[3]{40}$

What is the simplest radical form of  $4\sqrt[3]{40}$ ?  
Click your answer below.

$8\sqrt[3]{2}$

$5\sqrt[3]{8}$

$8\sqrt[3]{5}$

Simplify the following expression:  $14\sqrt[3]{5} - 4\sqrt[3]{40}$

$$14\sqrt[3]{5} - 4\sqrt[3]{40}$$

When a numerical expression includes unlike radicals, the first step is to verify that the radicals are in simplest form. In the given expression, the first radical is in simplest form; the radicand contains no perfect square factors other than 1. The second radical, however, can be simplified.

What is the simplest radical form of  $4\sqrt[3]{40}$ ? Click your answer below.

- A)  $8\sqrt[3]{2}$
- B)  $5\sqrt[3]{8}$
- C)  $8\sqrt[3]{5}$

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Example 2 (continued)

**EXAMPLE 2**

Simplify the following expression:  $14\sqrt[3]{5} - 4\sqrt[3]{40}$

$$14\sqrt[3]{5} - 4\sqrt[3]{40}$$

The simplest radical form of  $4\sqrt[3]{40}$  is  $8\sqrt[3]{5}$ .

$8\sqrt[3]{5}$

[View Work](#) [Next](#)

$$14\sqrt[3]{5} - 4\sqrt[3]{40}$$

The simplest radical form of  $4\sqrt[3]{40}$  is  $8\sqrt[3]{5}$ .

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Example 2 (continued)

**EXAMPLE 2**

Simplify the following expression:  $14\sqrt[3]{5} - 4\sqrt[3]{40}$

$14\sqrt[3]{5} - 4\sqrt[3]{40}$

$4\sqrt[3]{40} = 4 \cdot \sqrt[3]{2 \cdot 2 \cdot 2 \cdot 5}$ $= 4 \cdot \sqrt[3]{2^3 \cdot 5}$ $= 4 \cdot \sqrt[3]{2^3} \cdot \sqrt[3]{5}$ $= 4 \cdot 2 \cdot \sqrt[3]{5}$ $= 8\sqrt[3]{5}$	<p>Complete the prime factorization of 40.</p> <p>Represent multiple factors as a cube.</p> <p>Apply the Product Property of Radicals.</p> <p>Simplify the perfect cube.</p> <p>Simplify the expression.</p>
--	--

[Next](#)

$$14\sqrt[3]{5} - 4\sqrt[3]{40}$$

$$\begin{aligned} 4\sqrt[3]{40} &= 4 \cdot \sqrt[3]{2 \cdot 2 \cdot 2 \cdot 5} \\ &= 4 \cdot \sqrt[3]{2^3 \cdot 5} \\ &= 4 \cdot \sqrt[3]{2^3} \cdot \sqrt[3]{5} \\ &= 4 \cdot 2 \cdot \sqrt[3]{5} \\ &= 8\sqrt[3]{5} \end{aligned}$$

Complete the prime factorization of 40.  
Represent multiple factors as a cube.  
Apply the Product Property of Radicals.  
Simplify the perfect cube.  
Simplify the expression.

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Example 2 (continued)

**EXAMPLE 2**

Simplify the following expression:  $14\sqrt[3]{5} - 4\sqrt[3]{40}$

$$14\sqrt[3]{5} - 4\sqrt[3]{40}$$
$$14\sqrt[3]{5} - 8\sqrt[3]{5}$$
  
$$14\sqrt[3]{5} - 8\sqrt[3]{5} = ?$$

Click your answer below.

$6\sqrt[3]{5}$ 0 $24\sqrt[3]{5}$

$$14\sqrt[3]{5} - 4\sqrt[3]{40}$$
$$14\sqrt[3]{5} - 8\sqrt[3]{5}$$

In the expression, replace  $4\sqrt[3]{40}$  with  $8\sqrt[3]{5}$ . Notice that the expression now includes like radicals. Apply the distributive property to subtract the radical expressions.

$$14\sqrt[3]{5} - 8\sqrt[3]{5} = ?$$

Click your answer below.

- A)  $6\sqrt[3]{5}$
- B) 0
- C)  $24\sqrt[3]{5}$

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Example 2 (continued)

**EXAMPLE 2**

Simplify the following expression:  $14\sqrt[3]{5} - 4\sqrt[3]{40}$

$14\sqrt[3]{5} - 4\sqrt[3]{40}$

The expression includes like radicals.

$14\sqrt[3]{5} - 8\sqrt[3]{5}$

Apply the distributive property.  $(14 - 8)\sqrt[3]{5}$

Simplify.  $6\sqrt[3]{5}$

$6\sqrt[3]{5}$ Menu

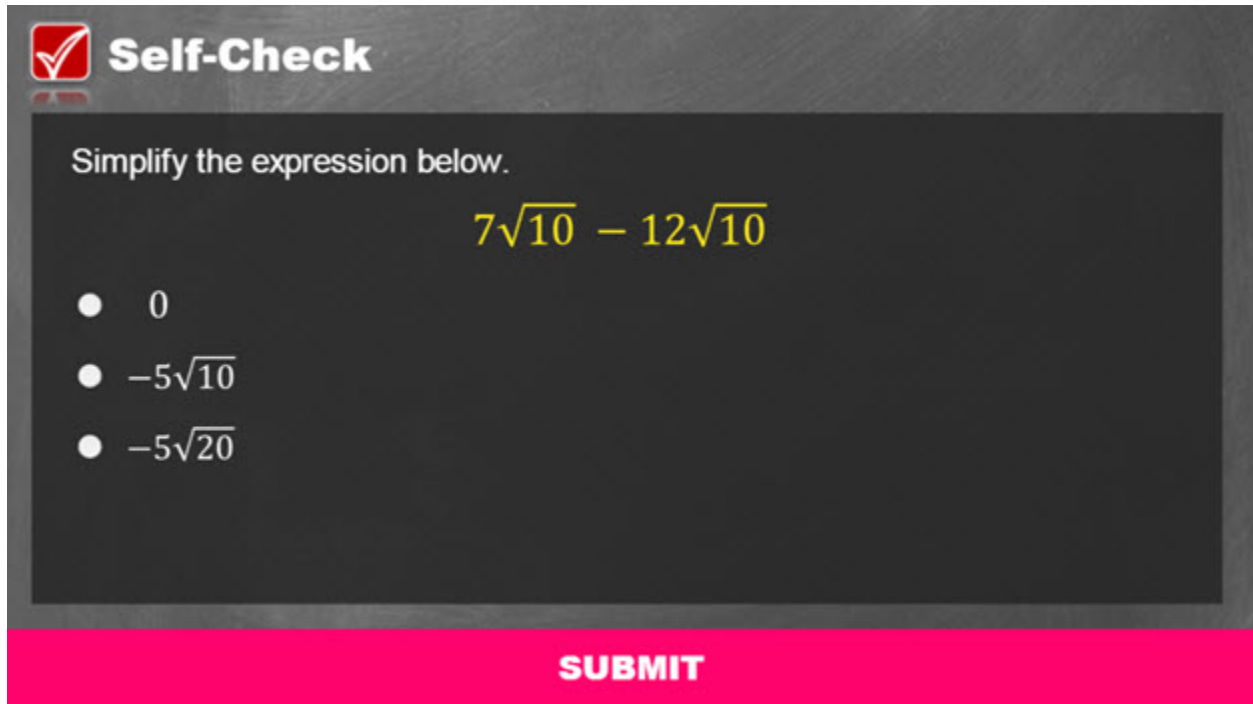
$$14\sqrt[3]{5} - 4\sqrt[3]{40}$$

$14\sqrt[3]{5} - 8\sqrt[3]{5}$      The expression includes like radicals.  
 $(14 - 8)\sqrt[3]{5}$      Apply the distributive property.  
 $6\sqrt[3]{5}$              Simplify.



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Self-Check 1



**Self-Check**

Simplify the expression below.

$$7\sqrt{10} - 12\sqrt{10}$$

- 0
- $-5\sqrt{10}$
- $-5\sqrt{20}$

**SUBMIT**

Solve the problem in the image above to check your understanding of the content.

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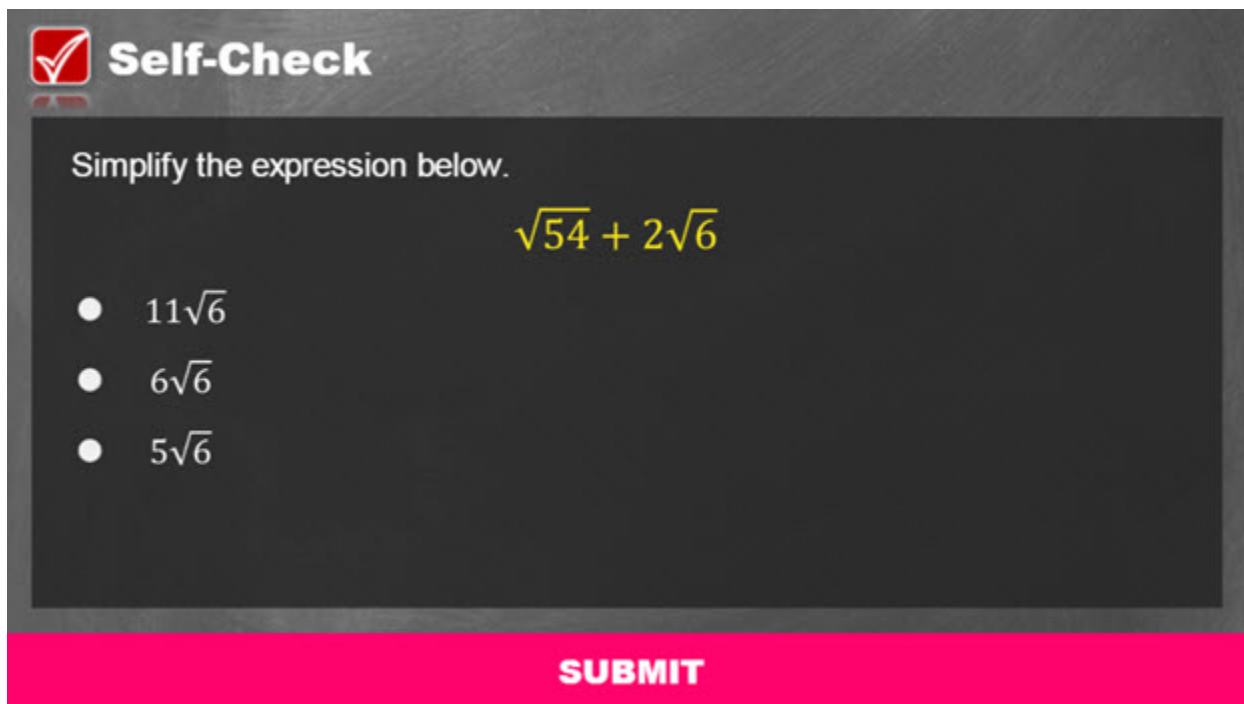
**Self-Check 1: Answer**

The screenshot shows a self-check interface with a grey background and a red checkmark icon in the top left corner. The text "Self-Check" is partially visible. The main content is a white rounded rectangle with a grey border. At the top left of this rectangle is the word "Correct" in bold. Below it, the text "That's correct!" is displayed. The next line shows the text "The expression includes like radicals." followed by the expression  $7\sqrt{10} - 12\sqrt{10}$ . The following line shows "Apply the distributive property." followed by the expression  $(7 - 12)\sqrt{10}$ . The final line shows "Simplify." followed by the expression  $-5\sqrt{10}$ , which is enclosed in a red rectangular box. At the bottom center of the white rectangle is a button labeled "Continue". Below the white rectangle, on a red background, is the word "SUBMIT" in white capital letters.

For your reference, the image above shows the correct solution to the self-check problem.

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Self-Check 2



**Self-Check**

Simplify the expression below.

$$\sqrt{54} + 2\sqrt{6}$$

- $11\sqrt{6}$
- $6\sqrt{6}$
- $5\sqrt{6}$

**SUBMIT**

Solve the problem in the image above to check your understanding of the content.

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**Self-Check 2: Answer**

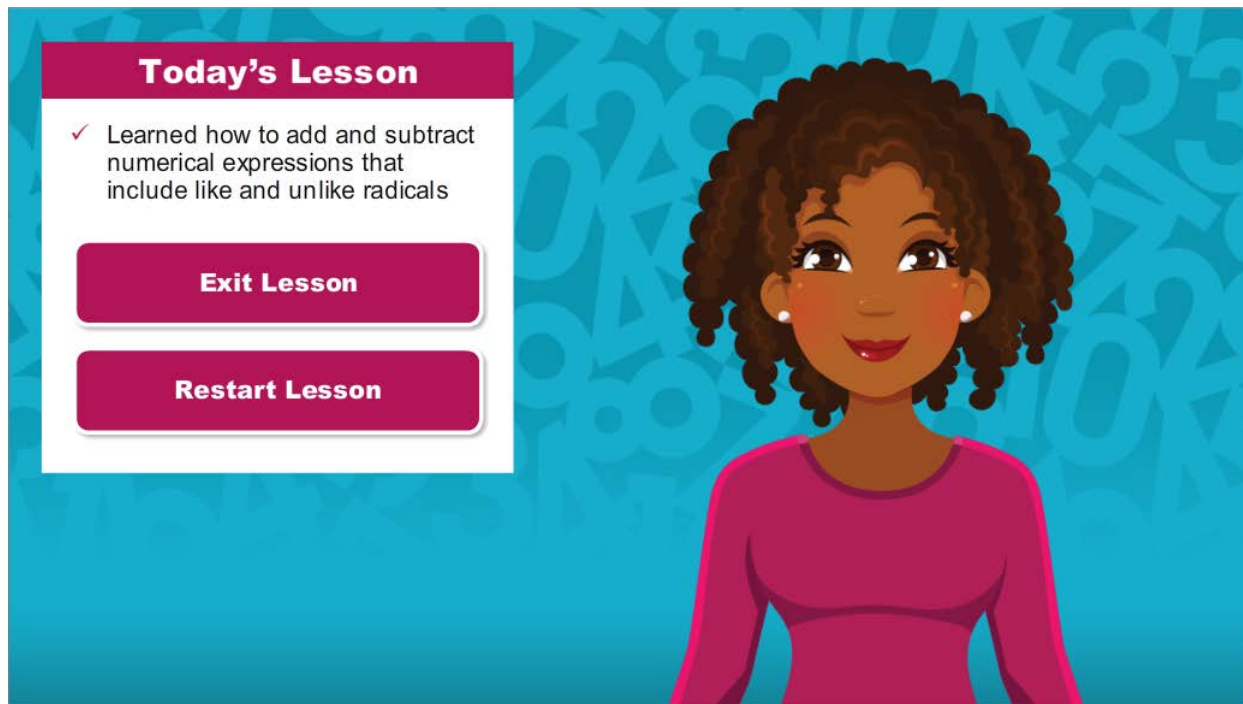
The screenshot shows a self-check interface with a grey background and a red checkmark icon in the top left corner. The text "Self-Check" is partially visible. Below the icon, the word "Correct" is displayed in bold. The interface provides a step-by-step solution to a problem involving radical expressions. The steps are: "That's correct!", "The expression includes unlike radicals." followed by the expression  $\sqrt{54} + 2\sqrt{6}$ , "The simplest form of  $\sqrt{54}$  is  $3\sqrt{6}$ ." followed by the expression  $3\sqrt{6} + 2\sqrt{6}$ , "Apply the distributive property." followed by the expression  $(3 + 2)\sqrt{6}$ , and "Simplify." followed by the final answer  $5\sqrt{6}$  enclosed in a red box. A "Continue" button is located at the bottom of the grey area. Below the grey area, a red bar contains the word "SUBMIT" in white capital letters.

For your reference, the image above shows the correct solution to the self-check problem.

## Module 4: Radical Expressions

### Topic 1 Content: Adding and Subtracting Radical Expressions

#### Conclusion



The image shows a digital lesson conclusion screen. On the right side, there is a cartoon illustration of a young woman with dark, curly hair, wearing a pink long-sleeved top. The background is a light blue color with a pattern of faint mathematical symbols like pi, infinity, and numbers. On the left side, there is a white rectangular box with a pink header that says "Today's Lesson". Inside this box, there is a checkmark icon followed by the text "Learned how to add and subtract numerical expressions that include like and unlike radicals". Below this text are two pink buttons: "Exit Lesson" and "Restart Lesson".

You have reached the conclusion of this lesson where you learned how to add and subtract numerical expressions that include like and unlike radicals.