

Name:

Unit 8, Day 4 Warm-up

Date:

Period:

Simplify the radicals below.

$$\sqrt{50} = \underline{5\sqrt{2}}$$

$$-2\sqrt{147} = \underline{-14\sqrt{3}}$$

$$\sqrt{9w^2y^8} = \underline{3wy^4}$$

$$\sqrt{4x^4y^3z} = \underline{2x^2y\sqrt{yz}}$$

When  $n > 0$ , which expression is equivalent to  $\sqrt{44n^7}$ ?

- a.  $2\sqrt{11}$
- b.  $4\sqrt{11n^7}$
- c.  $2n^3\sqrt{11n}$
- d.  $4n^3\sqrt{11}$

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Unit 8, Day 4 Notes

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➤ Learning Targets: I can simplify radicals with constants and variables.

### Cube Roots

Perfect cube:  $\sqrt[3]{27} = \underline{3}$

Not a perfect cube:  $\sqrt[3]{45} = \underline{3.55689} \rightarrow$  This is a decimal! What do we do?

1. Simplify the radical expression  $\sqrt[3]{16}$ .

Step 1: Factor the number under the radical.  $\sqrt[3]{2 \cdot 2 \cdot 2 \cdot 2}$

Step 2: Circle groups of three.

For each group of 3, **one** can come out of the cube root.

$$2 \sqrt[3]{2}$$

Step 3: Check your answer in the calculator by comparing the value of  $\sqrt[3]{16}$  to the value of your answer.

$$2.5198, 2.5198 \checkmark$$

2. Simplify the radical expression  $\sqrt[3]{81}$ .

$$\sqrt[3]{3 \cdot 3 \cdot 3 \cdot 3}$$
$$3 \sqrt[3]{3}$$

$$4.3267, 4.3267 \checkmark$$

3. Simplify the radical expression  $\sqrt[3]{576}$

$$\sqrt[3]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3}$$
$$2 \cdot 2 \sqrt[3]{3 \cdot 3} = 4 \sqrt[3]{9}$$

$$8.3203, 8.3203 \checkmark$$

4. What is the value of  $\sqrt[3]{1080}$  in simplest form?

$$\sqrt[3]{2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 5}$$
$$2 \cdot 3 \sqrt[3]{5} = 6 \sqrt[3]{5}$$

$$10.259, 10.259 \checkmark$$

What if there are variables involved?

Simplify the radical  $\sqrt[3]{x^3}$

First, rewrite in factored form:

For every group of 3, one can come out.

$$\text{So, } \sqrt[3]{x^3} = \sqrt[3]{\underbrace{x \cdot x \cdot x}} = x$$

$$\text{Simplify } \sqrt[3]{a^3} = \sqrt[3]{\underbrace{a \cdot a \cdot a}} = a$$

$$\text{Simplify } \sqrt[3]{x^3 a^4} = \sqrt[3]{\underbrace{x \cdot x \cdot x} \cdot \underbrace{a \cdot a \cdot a \cdot a}} = x a \sqrt[3]{a}$$

When  $w$  and  $x > 0$ , write  $\sqrt[3]{8w^3x^6}$  in simplest form.

$$\sqrt[3]{\underbrace{2 \cdot 2 \cdot 2} \cdot \underbrace{w \cdot w \cdot w} \cdot \underbrace{x \cdot x \cdot x} \cdot \underbrace{x \cdot x \cdot x}}$$

$$2wx^2$$

What is  $2w^2x^3\sqrt[3]{10w^3x^4}$  in simplest radical form?

$$2w^2x^3\sqrt[3]{2 \cdot 5 \cdot \underbrace{w \cdot w \cdot w} \cdot \underbrace{x \cdot x \cdot x} \cdot x}$$

$$2w^3x^4\sqrt[3]{10x}$$

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Unit 8, Day 4 Activity

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➤ **Learning Targets:** I can simplify radicals with constants and variables.

**Cube Root Challenge:** Divide students into teams and provide each team with a piece of chart paper. Have each team write the following problem at the top of the chart paper. Teams will use the chart paper to create a factor tree and simplify. The first team to find the correct answer will win. Teams can compete a second time using the second problem and could use the back of their chart paper.

You could project a timer onto the board! Here are some you could use:

<http://www.online-stopwatch.com/classroom-timers/>

$$\sqrt[3]{3456}$$

answer is  $12\sqrt[3]{2}$

$$\sqrt[3]{120x^9y^{16}}$$

answer is  $2x^3y^5\sqrt[3]{15y}$

$$\sqrt[3]{220p^5q^6}$$

answer is  $pq^2\sqrt[3]{220p^2}$

Name:

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Unit 8, Day 4 Practice

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Learning Targets

- I can simplify radicals with constants and variables.

1.) $\sqrt[3]{125}$ $\textcircled{5}$	2.) $\sqrt[3]{216}$ $\sqrt[3]{2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3}$ $\textcircled{6}$	3.) $\sqrt[3]{1000}$ $\textcircled{10}$	4.) $\sqrt[3]{16}$ $\sqrt[3]{2 \cdot 2 \cdot 2} \cdot 2$ $2\sqrt[3]{2}$
5.) $\sqrt[3]{50}$	6.) $\sqrt[3]{24}$ $2\sqrt[3]{3}$	7.) $4\sqrt[3]{81x^3y^3}$ $4\sqrt[3]{3 \cdot 3 \cdot 3 \cdot 3 \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y}$ $12xy\sqrt[3]{3}$	8.) $\sqrt[3]{192w^6y^9}$

$\sqrt[3]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot w \cdot w \cdot w \cdot w \cdot w \cdot w}$   
 $y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y$   
 $4w^2y\sqrt[3]{3}$

SPIRAL BACK in time. DON'T forget how to do these kinds of problems.

1. Simplify  $\sqrt{56x^2y^8}$

~~2xy^4\sqrt{14}~~  $2xy^4\sqrt{14}$

2. What is the solution to  $6 - 3y > -5y$ ?

A.  $y > 3$

B.  $y < 3$

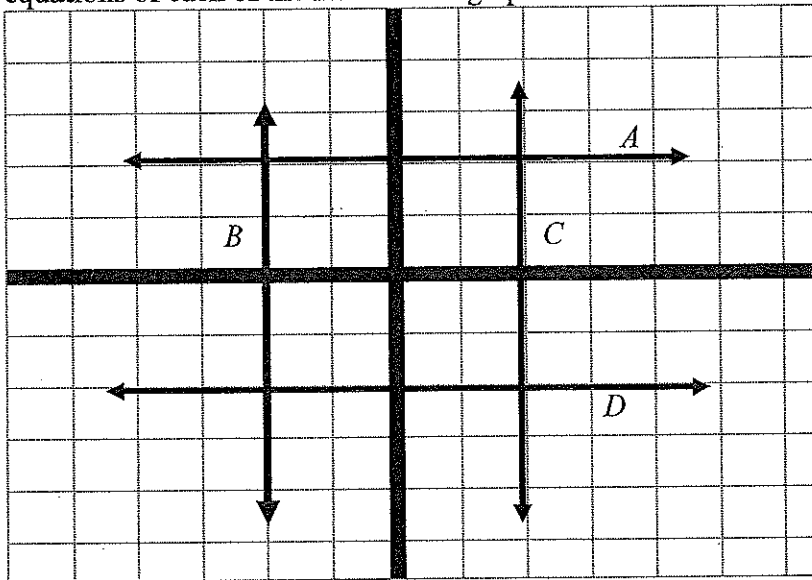
C.  $y > -3$

D.  $y < -3$

3. Which describes the slope of the line that passes through  $(-3, -2)$  and  $(0, -1)$ ?

- A) Positive
- B) Negative
- C) Zero
- D) Undefined

4. Write the equations of each of the lines on the graph.



Equation A:  $y = 2$

Equation B:  $x = -2$

Equation C:  $x = 2$

Equation D:  $y = -2$

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Unit 8, Day 4 Exit Ticket

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1. What is the value of  $\sqrt[3]{192}$  in simplest radical form?

$$4\sqrt[3]{3}$$

2. Which expression is equivalent to  $\sqrt[3]{16m^5x}$ ?

a.)  $2x\sqrt[3]{8m^5}$

b.)  $2m^2\sqrt[3]{2mx}$

c.)  $2m\sqrt[3]{m^2x}$

d.)  $8x\sqrt[3]{m^5}$

3. Simplify the radical expression:  $-2\sqrt[3]{54}$

$$-6\sqrt[3]{2}$$

4. How are square roots different from cube roots? Explain.

answers will vary! ☺

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