Name _____ Date _____ Class _____

**TEKS** 2A.2.A

LESSON 8-6

# Problem Solving

## *Radical Expressions and Rational Exponents*

**Louise is building a guitar-like instrument. It has small metal bars, called frets, positioned across its neck so that it can produce notes of a specific scale on each string. The distance a fret should be placed from the bridge is related to a string's root note length by the function $d(n) = r\left(2^{-\frac{n}{12}}\right)$, where *r* is the length of the root note string and *n* is the number of notes higher than that string's root note. Louise wants to know where to place frets to produce different notes on a 50-cm string.**

**1.** Find the distance from the bridge for a fret that produces a note exactly one octave (12 notes) higher than the root note.

**a.** Substitute values for *r* and *n* in the given function. _____

**b.** How far from the bridge should the fret be placed? _____

**c.** What fraction of the string length is the distance of this fret from the bridge? _____

**2.** Complete the table to find the distance from the bridge, for frets that produce every other note of an entire scale on this string.

| **Notes Higher than the Root Note** | 2 | 4 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|---|
| **Distance of Fret from Bridge (cm)** | | | | | | |

**Choose the letter for the best answer.**

**3.** Rafael made a ceramic cube in art class. The cube has a volume of 336 $cm^3$. What is the side length of the cube to the nearest centimeter?

**A** 7

**B** 12

**C** 18

**D** 56

**4.** Yolanda has an exercise ball with a volume of 7234 $in.^3$. Find the radius of the exercise ball to the nearest inch.

**A** 24

**B** 21

**C** 19

**D** 12

**5.** Which formula could you use to find the area of one side of a cube if the volume were given?

**A** $A = V^{\frac{3}{2}}$

**B** $A = V^{-\frac{3}{2}}$

**C** $A = V^{\frac{2}{3}}$

**D** $A = V^{-\frac{2}{3}}$

**6.** A party tent in the shape of a hemisphere has a volume of 14,130 $m^3$. What is the area of the ground that the tent covers in square meters?

**A** 653.1

**B** 706.5

**C** 1121.5

**D** 1256.0

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**1.** Find the distance from the bridge for a fret that produces a note exactly one octave (12 notes) higher than the root note.

**a.** Substitute values for *r* and *n* in the given function. $d(12) = 50\left(2^{-\frac{12}{12}}\right)$

**b.** How far from the bridge should the fret be placed? 25 cm

**c.** What fraction of the string length is the distance of this fret from the bridge? $\frac{1}{2}$

**2.** Complete the table to find the distance from the bridge, for frets that produce every other note of an entire scale on this string.

| **Notes Higher than the Root Note** | 2 | 4 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|---|
| **Distance of Fret from Bridge (cm)** | 44.5 | 39.7 | 35.4 | 31.5 | 28.1 | 25 |

**Choose the letter for the best answer.**

**3.** Rafael made a ceramic cube in art class. The cube has a volume of 336 $cm^3$. What is the side length of the cube to the nearest centimeter?

(A) 7
**B** 12
**C** 18
**D** 56

**4.** Yolanda has an exercise ball with a volume of 7234 $in.^3$. Find the radius of the exercise ball to the nearest inch.

**A** 24
**B** 21
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(D) 12

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**B** $A = V^{-\frac{3}{2}}$
(C) $A = V^{\frac{2}{3}}$
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**6.** A party tent in the shape of a hemisphere has a volume of 14,130 $m^3$. What is the area of the ground that the tent covers in square meters?

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**B** 706.5
(C) 1121.5
**D** 1256.0