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DepED
DEPARTMENT OF EDUCATION

Lesson Exemplar for Mathematics

Quarter 2
Lesson
1

Lesson Exemplar for Mathematics Grade 7
Quarter 2: Lesson 1 (Week 1)
SY 2024-2025

Development Team

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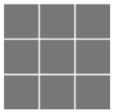
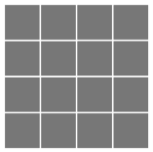
MATHEMATICS / QUARTER 2 / GRADE 7

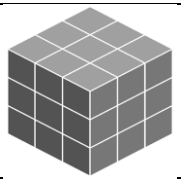
I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	The learners should have knowledge and understanding of square roots of perfect squares, cube roots of perfect cubes, and irrational numbers.
B. Performance Standards	By the end of the quarter, the learners are able to determine square roots of perfect squares and cube roots of perfect cubes, and identify irrational numbers. (NA)
C. Learning Competencies and Objectives	***The learners determine the square roots of perfect squares and the cube roots of perfect cubes.*** 1. The learners define perfect square and perfect cube. 2. The learners identify perfect squares and perfect cubes. 3. The learners define square root and cube root. 4. The learners determine the square roots of perfect squares. 5. The learners determine the cube roots of perfect cubes. ***The learners identify irrational numbers involving square roots and cube roots, and their locations on the number line.*** 1. The learners define irrational numbers. 2. The learners identify irrational numbers involving square roots and cube roots. 3. The learners determine the location of irrational numbers involving square roots and cube roots by plotting them on a number line.
D. Content	Perfect square and perfect cube Square root and cube root Irrational numbers (involving square root and cube root)
E. Integration	

II. LEARNING RESOURCES
Department of Education. (2020). Alternative Delivery Mode. Quarter 1-Module 7: Principal Roots and Irrational Numbers. Department of Education. (2020). Alternative Delivery Mode. Quarter 1-Module 8: Estimating Square Roots of Whole Numbers and Plotting Irrational Numbers Sipnayan. (2020, October 10). How to Plot Irrational Numbers on the Number Line Part 1 [with English subtitles] [Video]. YouTube. https://www.youtube.com/watch?v=ESGkaZnrwrI

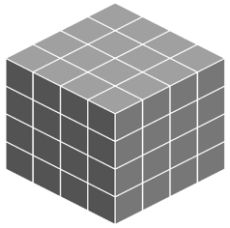
III. TEACHING AND LEARNING PROCEDURE		NOTES TO TEACHERS
A. Activating Prior Knowledge	**DAY 1** **1. Short Review** Compute the area of each square.	**(10 minutes)** Lead the students to the concept that the area of the square is obtained by multiplying a number (length of the side of the square) to itself. Follow up by reviewing the lesson on exponents.

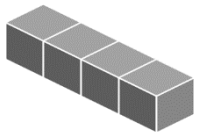
Square	s x s	Area
 s = 1	1 x 1	_____
 s = 2	2 x 2	_____
 s = 3	_____ x _____	_____
 s = 4	_____ x _____	_____

Find the volume of each cube.

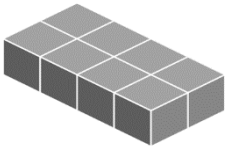
Cube	s x s x s	Volume
 s = 1	1 x 1 x 1	_____
 s = 2	2 x 2 x 2	_____
		

Lead the students to the concept that the volume of the cube is obtained by multiplying the number (length of the side of the cube) to itself three times. Follow up by reviewing the lesson on exponents.

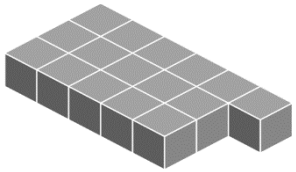
	s = 3  s = 4	___ x ___ x ___ ___ x ___ x ___	_____ _____
	2. Feedback (Optional)	
B. Establishing Lesson Purpose	**1. Lesson Purpose** **Perfect square and cube** 1. Can you form a square with the given unit squares? a.  # of unit squares: _____ Can you form a square? _____ b.  # of unit squares: _____ Can you form a square? _____ c.  # of unit squares: _____ Can you form a square? _____ d.  # of unit squares: _____ Can you form a square? _____ • Which of the four given figures formed a square? _____ • Observe the # of unit squares in a, b, and d. What can you say about the numbers? _____ 2. Can you form a cube with the given unit cubes?	**(15 minutes)** This activity may be explored using manipulatives (physical or virtual). This may also be given as a whole class activity or discussion as the teacher presents the figure through slides presentation.

a. 

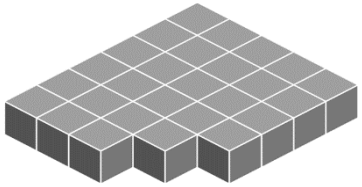
# of unit cubes: _____
Can you form a cube? _____

b. 

# of unit cubes: _____
Can you form a cube? _____

c. 

# of unit cubes: _____
Can you form a cube? _____

d. 

# of unit cubes: _____
Can you form a cube? _____

- Which of the four given figures formed a cube? _____
- Observe the # of unit cubes in b and d. What can you say about the numbers? _____

3. How can you find the length of the sides of a square if its area is given?
   _____
4. How can you find the length of the sides of a cube if its volume is given?
   _____

2. Unlocking Content Area Vocabulary

- The number of square units that can form a square is called a **perfect square**.
- The number of cube units that can form a cube is called a **perfect cube**.
- The **square root** of the area of the square (perfect square) is the length of the side of the square.
- The **cube root** of the volume of a cube (perfect cube) is the length of each side of the cube.

Questions 3 and 4 maybe given as a whole class discussion.

(5 minutes)

C. Developing and Deepening Understanding

SUB-TOPIC 1: Perfect Square and Square Root **(20 minutes)**

1. Explicitation

When a number n is multiplied by itself, such as when we compute the area of a square, we write n^2 and read it "n squared". The result is called the **square of *n***. That is, if $n^2 = m$, then m is a square of n and m is a **perfect square**.

2. Worked Example

Example: Complete the following table to show the squares of the whole numbers.

Number	0	1	2	3	4	5	6	7	8	9	10	11	12
Square	0	1			16					81			

All the given activities here may be done individually or collaboratively, depending on the type of students the teacher has.

The numbers in the second row are called **perfect square numbers.**

What can you say about the square of negative numbers?

Sometimes, we will need to look at the relationship between numbers and their squares in reverse. For example: Because $10^2 = 100$, we say 100 is the square of 10. We also say that 10 is the square root of 100. A number whose square is m is called a **square root of *m***.

The symbol, $\sqrt{m}$, is read "the square root of m", where m is called the **radicand**, and $\sqrt{\square}$ is called the **radical sign**.

3. Lesson Activity

A. Complete the table below.

Perfect Square	Exponential Form *(a number that when multiplied by itself, the answer is the number in column one)*	Square Root
9	3 x 3	3
36	6 x 6	6
49	7 x 7	
81		
121		
625		
4/25		

DAY 2

B. Perfect Square and Square Root. Place each number in its appropriate column:

0, 25, 40, 49, 121, 625, 8, 18/2, ¼, 27

Perfect Square Number	Not Perfect Square Number
Square Root of Perfect Square Numbers	

Begin Day 2 with recalling concepts covered in the previous day.
(10 minutes) for review
(10 minutes) for the activity

Questions for discussion:

1. How did you decide which column the given number should be placed in?
2. Were all your answers correct? If not, why do you think some of your answers were not correct? What will you do to avoid this error next time?
3. How did you compute the square roots of the perfect square numbers?

Let the students discuss their answers.

SUB-TOPIC 2: Perfect Cube and Cube Root

1. Explicitation

A perfect cube is a number that is obtained by multiplying the same integer three times. For example, multiplying the number 2 three times results in 8. Therefore, 8 is a perfect cube.

When a number is cubed, we write n^3 and read it "n cubed". The result is called the **cube of *n***. That is, if $n^3 = m$, then m is a cube of n and m is a **perfect cube**.

2. Worked Example

Example: Complete the following table to show the cubes of the following integers.

Number	–5	–4	–3	–2	–1	0	1	2	3	4
Cube	–125			–8						

The numbers in the second row are called **perfect cube numbers**.

When a number is cubed, it means that it is multiplied three times. Cube root is reversing the process of cubing a number. For example, when a number 5 is cubed, then it is multiplied 3 times: 5 x 5 x 5, which is 125. The cube root of 125 is 5. This is because 125 is obtained when the number 5 is multiplied three times.

The symbol for cube root is $\sqrt[3]{\square}$. The $\sqrt[3]{m}$ is read as "cube root of m".

(15 minutes)

3. Lesson Activity

A. Complete the table below.

Perfect Cube	Exponential Form *(a number that when multiplied three times, the result is the given perfect cube)*	Cube Root
1	1 x 1 x 1	1
–8	–2 x –2 x –2	–2
125		
–216		
1,000		
1/8		
8/27		

(15 minutes)

B. Perfect Cube and Cube Root. Place each number in its appropriate column:

–27, 0, 9, 64, 81, 512, 729, –1/27, 4/64

Perfect Cube Number	Not Perfect Cube Number
Cube Root of Perfect Cube Numbers	

Questions for discussion:

1. How did you decide which column the given number should be placed in?
2. Were all your answers correct? If not, why do you think some of your answers were not correct? What will you do to avoid this error next time?
3. How did you compute the cube roots of the perfect cube numbers?

DAY 3

SUB-TOPIC 3: Irrational Numbers

1. Explicitation

Place the following numbers in the appropriate columns:

$1/2$, -3, $\sqrt{9}$, $\sqrt{7}$, $\sqrt{100}$, $\sqrt{17}$, $\sqrt[3]{1}$, $\sqrt[3]{-8}$, $\sqrt[3]{9}$, $\sqrt[3]{12}$

Rational Number	Irrational Number

Questions for discussion:

1. Observe the numbers in the first column. What do you observe about the rational numbers?
2. Observe the numbers in the second column. What do you observe about the irrational numbers? (What can you say about the number inside the radical sign?)

Let the students discuss their answers.

Lead the students to the definition of irrational numbers:

If the radicand of a square root is not a perfect square, then it is considered an **irrational number**. Likewise, if the radicand of a cube root is not a perfect cube, then it is an **irrational number**. These numbers cannot be written as a fraction because the decimal does not end (or non-terminating) and does not repeat a pattern (or non-repeating).

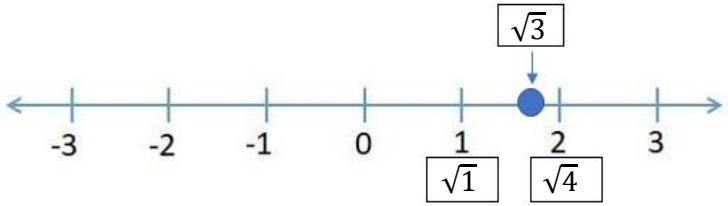
In plotting an irrational number involving square root or cube root on a number line, estimate first the square root or cube root of the given irrational number and to which two consecutive integers it lies in between.

Begin Day 3 with recalling concepts covered in the previous day.
(5 minutes) for review
(15 minutes) for the activity

2. Worked Example

For example, to locate and plot $\sqrt{3}$ on the number line, we identify two perfect squares nearest to the radicand 3. These are 1 and 4. So, $\sqrt{3}$ is between 1 and 2 (the square roots of 1 and 4, respectively). Since, 3 is closer to 4 than to 1, $\sqrt{3}$ is closer to 2.

Let student view the video on how to plot irrational numbers involving square roots using this link: www.youtube.com/watch?v=ESGkaZnrwrI.



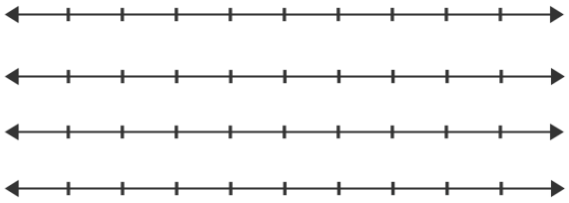
(10 minutes)

Locate and plot the following square roots and cube roots on a number line:

a. $\sqrt{90}$

b. $\sqrt{27}$

c. $\sqrt[3]{20}$



d. $\sqrt[3]{75}$

3. Lesson Activity

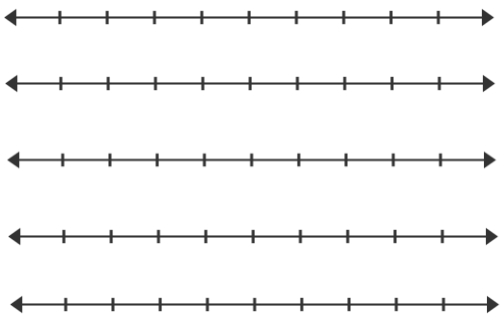
Irrational Numbers.

A. Estimate the given square root or cube root and find the letter that corresponds to it on the number line.

1. $\sqrt{15}$
2. $\sqrt{38}$
3. $\sqrt{99}$
4. $\sqrt[3]{20}$
5. $\sqrt[3]{388}$

B. Plot the points on a number line.

1. Point A: $\sqrt{26}$
2. Point B: $\sqrt{32}$
3. Point C: $\sqrt{68}$
4. Point D: $\sqrt[3]{40}$
5. Point E: $\sqrt[3]{-199}$



D. Making Generalizations

1. Learner's Takeaways

A. Define and give an example for each term:

Perfect square	Perfect cube
Square root	Cube root
Irrational numbers (involving square root and cube root)	

B. Answer the following questions:

1. How do you compute the square root of a perfect square?
2. How do you compute the cube root of a perfect cube?

(20 minutes)
Let the students answer the questions and then afterward, ask some learners to share their answers.

	3. How do you plot irrational numbers involving square root and cube root? **2. Reflection on Learning** Are there any challenges and misconceptions you encountered while studying the lesson? What are those?	

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		**NOTES TO TEACHERS**
A. Evaluating Learning	**DAY 4** **1. Formative Assessment** A. Find the square root if the given number is a perfect square. Find its cube root if it is a perfect cube.	Assessment helps teachers gauge how well students understand mathematical concepts and principles. It provides feedback on their comprehension, problem-solving skills, and ability to apply mathematical knowledge. Let students answer all items here individually or collaboratively.

Number	Square Root of the Number if it is a Perfect Square	Cube Root of the Number if it is a Perfect Cube
49		
121		
–27		
1/4		
9/25		
216		
–8		
324		
512		
400		

B. Solve the following problems.

1. Mr. Agra has a square vegetable plot which has an area of 144 square meters. If Mr. Agra will put a fence around the vegetable plot, how long should be the fencing material that he will need?
2. Mrs. San Jose has two cubic containers of different sizes. The larger of the two has sides that measure 25 cm while the smaller one has sides that measure 18 cm. Will the two containers be enough for 1,000 cubic

<table>
<tr><td></td><td colspan="3">centimeters of water?

C. Plot the following numbers on a number line.
1. $\sqrt{17}$ 3. $\sqrt{41}$ 5. $\sqrt{100}$
2. $\sqrt[3]{55}$ 4. $\sqrt[3]{25}$

2. Homework (Optional)</td><td>The teacher may give homework to master the lesson.</td></tr>
<tr><td rowspan="5">B. Teacher's Remarks</td><td>Note observations on any of the following areas:</td><td>Effective Practices</td><td>Problems Encountered</td><td rowspan="5">The teacher may take note of some observations related to the effective practices and problems encountered after utilizing the different strategies, materials used, learner engagement, and other related stuff.

Teachers may also suggest ways to improve the different activities explored/lesson exemplar.</td></tr>
<tr><td>strategies explored</td><td></td><td></td></tr>
<tr><td>materials used</td><td></td><td></td></tr>
<tr><td>learner engagement/ interaction</td><td></td><td></td></tr>
<tr><td>others</td><td></td><td></td></tr>
<tr><td>C. Teacher's Reflection</td><td colspan="3">Reflection guide or prompt can be on:
• <u>principles behind the teaching</u>
What principles and beliefs informed my lesson?
Why did I teach the lesson the way I did?

• <u>students</u>
What roles did my students play in my lesson?
What did my students learn? How did they learn?

• <u>ways forward</u></td><td>Teacher's reflection in every lesson conducted/facilitated is essential and necessary to improve practice. You may also consider this as an input for the LAC/Collab sessions.</td></tr>
</table>

	What could I have done differently? *What can I explore in the next lesson?*	