

Class: 8	Subject: Mathematics	Topic: Cubes and Cube Roots
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SUMMARY SHEET		
Learner Previous Knowledge	Square numbers - Patterns and Properties including the pythagorean triplets Finding square roots using long divisions for big numbers and prime factorisation for small numbers. Estimating square roots of non-perfect square numbers using long division method and method of approximation Verifying whether a number is a perfect square	
Target Knowledge for this Topic	Properties and patterns in cubes of numbers Verifying whether a number is a perfect cube or not by using prime factorisation method. Finding cube roots of a number by prime factorisation/long division/method of approximation.	
Learning Goals		Taxonomy Level
<i>More Complex Learning Goal- Students will be able to generalize and verify the patterns and properties related to cube roots.</i>		Generalizing
<i>Target Learning Goal- Students will be able to find cube roots using different methods; perform properties and patterns in cubes numbers including the Pythagoras triplets</i>		Executing
<i>Simpler Learning Goal- Students will be able to describe the properties of cube roots.</i>		Recalling
Period No.	Lesson Objectives	Teaching Learning Materials Required
1	- Recapitulate the methods to of finding out square roots - Estimate square roots - Generate & understand the properties of cube numbers	Research Work: Worksheet-1 (1 per student of the group); Discussion: Projector (1 per class)
2 and 3 <i>Note: this lesson requires 2 days.</i>	- Compare & contrast various ways to find the perfect cube& perfect square - Extend the prime factorization method to find cube root - Finding cube roots of a number by division or method of approximation.	Worksheet: Worksheet-2 (1 per student& 1 for the teacher); Discussion: Projector (1 per class); Research Work: Worksheet-3 (1 per student of the group);

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Period 1

Lesson Objectives

At the end of this lesson students will be able to:

- Introduce perfect cubes
- Patterns of cubes
- Generate & understand the properties of cube numbers

Teaching Learning Materials required

- **Research Work: Worksheet-1** (1 per student of the group);
- **Discussion:** Projector (1 per class)

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4 to 6

Lesson Beginning <u>Time:</u> 10 min <u>Purpose:</u> Activate prior knowledge	<u>Research/Groups</u> • Inform students that this class will be about researching the cube numbers, its properties & its patterns. • Distribute research Worksheet-1 to each student. • Instruct them to go to the library and go through different books/Encyclopedia for their research work on the topic <i>Note: Though students will be recording responses individually, they will be working in groups to research and find information.</i>
Lesson Middle <u>Time:</u> 15 min <u>Purpose:</u> Introduce the topic Generate interest to the topic	<u>Discussion/Groups</u> • Project Worksheet-1 • Call groups one by one to share their research data with others. • Ask groups to share their responses and explain their observations. • Discuss the research findings in support of cube numbers, perfect cubes and various patterns followed by the cube numbers. • To build consensus for conclusion regarding properties and patterns, ask others if they agree or not. • If they disagree, ask them to justify the disagreement. • Encourage students to add more information. • Use the NCERT book for reference in case of doubts. <i>Note: students may come up with different or incorrect conclusions. In this case, ask other students who may have the correct analysis to explain and justify. It is</i>

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	<i>important to build consensus on all properties& patterns – this will help eradicate any errors. Also the intent here is to help them understand cube numbers and their properties. Discuss all the conclusions drawn from the patterns and build consensus on the conclusions Student can give different examples but the conclusion drawn should be same.</i> Ask students to finish up and come up with any queries that they may have regarding their research findings.
Lesson End <u>Time:</u> 15 mins <u>Purpose:</u> Develop conceptual understanding	<u>Home Assignment</u> Tell students to practice questions on Pg 114-Exercise 7.1 of NCERT Textbook.

Name: _____

Worksheet-1

Skill: Logical Reasoning

Research Work:

Direction: Research and find answers!

- What do you understand by a cube and cube number? Give an example to explain.

- What do you understand by a perfect cube?

3. Generate at next 5 cube numbers & complete the sequence 1, 8, 27, 64,

4. Observe the above number sequence:
What can you conclude about the one's digit?

5. Research & explain different patterns of cube numbers by giving examples.

Write the conclusion for each pattern on cube numbers.

Period 2 and 3

Lesson Objectives

At the end of this lesson students will be able to:

- Compare and contrast various ways to find the perfect cube & perfect square
- Extend the prime factorization method to find cube root
- Finding cube roots of a number by division or method of approximation.

Teaching Learning Materials required

- Worksheet-2 (1 per class);
- Research Work: Worksheet-3 (1 per student of the group);

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4 to 6

Lesson Beginning	<u>Find if the number is a perfect square or perfect cube /groups</u>
<u>Time:</u> 35mins <u>Purpose:</u> Activate prior knowledge Introduce the topic Develop conceptual understanding	• Distribute Worksheet-2 to each student. • Ask them to read & attempt the worksheet by discussing with their group members • Give them 20 minutes to complete the sheet. • <i>They need to:</i> ○ <i>Use the prior knowledge about properties of perfect square & perfect cubes and answer the questions.</i> ○ <i>Compare & contrast the method being used for perfect square & perfect cube</i>

Note: The students can discuss with their group members but work in their individual sheets.

Discussion/Groups

- Project Worksheet-2
- Ask groups to share their responses and explain their observations.
- Discuss the various methods followed for perfect square & cube numbers.
- To build consensus for conclusion regarding methods, ask others if they agree or not.
- If they disagree, ask them to justify the disagreement.
- Encourage students to add more information.
- Use the worksheet-2 for reference in case of doubts.

Note: students may come up with different or incorrect methods and explanations. In this case, ask other students who may have the correct methods to explain and justify how prime factorization method can be used to find the cube roots. It is important to build consensus on all methods– this will help eradicate any errors. Also the intent here is compare & contrast the methods used for perfect square & cube numbers. Also, to understand how we can extend prime factorization method to find the cube roots

Lesson Middle

Time: 40 mins.

Purpose:

Activate prior knowledge

Develop the conceptual understanding

Research/Groups

- Inform students that this class will be about researching the other methods to find the cube roots.
- Distribute research **Worksheets-3** to each student.
- Instruct them to go to the computer lab and use computers for their research work.
- Then gather in the classroom after 20 mins.

Note: Though students will be recording responses individually, they will be working in groups to research and find information.

Presentation/groups

- Tell different groups to share their methods and give justification for their work done.

Note: Try to cover different types of methods (like approximation & division method.) and in the case where students come up with incorrect methods tell other

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	<i>groups to cross question them, which helps them identify the error done by them and rectify them or give the justifications for their work done. The aim here is to build consensus on steps of the methods used by students.</i>
Lesson End <u>Time:</u> 5 min Purpose: Finish up	Ask students to finish up and come up with any queries that they may have regarding the methods to find square & cube root. <u>Home Assignment</u> Tell students to practice questions on Pg 116-Exercise 7.2 of NCERT Textbook.

Name: _____

Worksheet-2

Skill: Logical reasoning

Topic: Find if the number is a perfect square or perfect cube

Q1. Classify the numbers as perfect square or perfect cube and justify it.

81

125

729

1000

3375

2. Compare & contrast the methods used for perfect square & cubes

Method for perfect square	Method for perfect cube

3. Extend your knowledge about square root & explain what do you understand by cube root.
Give examples also.

4. Can you use the same method to find the cube root of numbers? Try & find out the cube root of 3375.

5. What is the difference when we use the same method to find the cube root of a number?
Explain

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Name:_____

Worksheet-3

Skill: Logical reasoning

Research Work:

Direction: Research and find answers!

1. What are the other methods that can be used to find cube root of numbers?

2. Explain the methods by taking one example for each method.

3. Compare all the methods that can be used to find cube roots (include the prime factorization method as well). Which method do you prefer & why?

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4. Use your preferred method to find the cube root of following numbers.

a) 13824

b) 46656
