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SQUARES AND SQUARE ROOTS

PERIOD 1

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 3
CHAPTER NAME : SQUARES AND SQUARE ROOTS

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Learning outcome

- Students will be able to find the perfect square
- Students will be able to find the square root of a perfect square number using prime factor method.

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Perfect squares

If a number is ends with 2, 3, 7 and 8 at unit's place. So it must not be a square number.

Example: 132, 72 , 28

If a number ends with 1, 4, 5, 6 and 9 at unit's place. So it may be a square number.

Example:

1) 16 (Yes) 16 = 4 x 4

2) 15 (No) As it ends with 5.

Introduction to Square roots

https://www.youtube.com/watch?v=mbc3_e5lWw0 (5:23)

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Squares & Perfect Squares

- In mathematics, a square is a product of whole number with itself. For instance, the product of a number 2 by itself is 4. In this case, 4 is termed as a perfect square.
- A square of a number is denoted as: $n \times n$, similarly, the exponential notation of the square of a number is n^2, usually pronounced as "n" squared. Square numbers are usually non- negative.

- A perfect square is a number which is generated by multiplying two equal integers by each other. For example, number 9 is a perfect square because it can be expressed as a product two equal integers being: 9 = 3 x 3.

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How to Find Square Root By Prime Factorisation?

To find the square root of a perfect square by using the prime factorization method when a given number is a perfect square:

Step I: Resolve the given number into prime factors.

Step II: Make pairs of similar factors.

Step III: Take the product of prime factors, choosing one factor out of every pair.

Find the square root of 484 by prime factorization method.

Sol: Resolving 484 as the product of primes, we get

$484 = 2 \times 2 \times 11 \times 11$

$\sqrt{484} = \sqrt{(\underline{2 \times 2} \times \underline{11 \times 11})}$

$= 2 \times 11$

Therefore, $\sqrt{484} = 22$

(i) $\sqrt{11025}$

$= \sqrt{\overline{5\times5}\times\overline{7\times7}\times\overline{3\times3}}$

$= 5\times7\times3 = 105$

5	11025
5	2205
7	441
7	63
3	9
	3

(ii) $\sqrt{396900}$

$= \sqrt{\overline{2\times2}\times\overline{3\times3}\times\overline{3\times3}\times\overline{5\times5}\times\overline{7\times7}}$

$= 2\times3\times3\times5\times7 = 630$

2	396900
2	198450
3	99225
3	33075
3	11025
3	3675
5	1225

Exercise-3(A)

8) A man, after a tour, finds that he had spent every day as many rupees as the number of days he had been on tour. How long did his tour last, if he had spent in all Rs 1,296

Sol:

Let the number of days he had spent = x

Number of rupees spent in each day = x

Total money spent = x x x = x^2 = 1,296 (given)

$\therefore x = \sqrt{1296}$

$\Rightarrow x = \sqrt{4 \times 4 \times 9 \times 9}$

$x = 4 \times 9$

$\Rightarrow x = 36$

4	1296
4	324
9	81
	9

Hence required number of days = 36

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9) Out of 745 students, maximum are to be arranged in the school field for a P.T. display, such that the number of rows is equal to the number of columns. Find the number of rows if 16 students were left out after the arrangement.

Sol:

Total number of students = 745

Students left after standing in arrangement = 16

No. of students who were to be arranged = 745 − 16 = 729

The number of rows = no. of students in each row

No. of rows = $\sqrt{729}$

3	729
3	243
3	81
3	27
3	9
3	3
	1

$$= \sqrt{\overline{3\times3}\times\overline{3\times3}\times\overline{3\times3}} = 3 \times 3 \times 3 = 27$$

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10) 13 and 31 is a strange pair of numbers such that their squares 169 and 961 are also mirror images of each other. Find two more such pairs.

Sol:

$(13)^2 = 169$ and $(31)^2 = 961$

Similarly, two such number can be 12 and 21

$\therefore$ $(12)^2 = 144$ and $(21)^2 = 441$

and 102, 201

$(102)^2 = 102 \times 102 = 10404$

and $(201)^2 = 201 \times 201 = 40401$

102	201
×102	×201
204	201
1020	4020
10404	40401

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Evaluation Questions

Ex 3A

1 (ii) Square of 6.3=6.3×6.3=39.69

2. (iii) √194481

= √3 x3 x3 x3 x7 x7 x7 x 7(Splitting the terms)

=3×3×7×7=441

Home assignment

Exercise 3(A) – Q No 1 to 5

1. **Is 176 a perfect square? If not, find the smallest number by which it should be multiplied to get a perfect square.**
2. **Find the length of the side of a square, if the length of its diagonal is 10 cm.**
3. **Find the least square, number, which is exactly divisible by 3, 4, 5, 6 and 8.**

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