BAL BHARATI PUBLIC SCHOOL, PITAMPURA, DELHI – 110034

SUBJECT:- MATHEMATICS CLASS:- VIII

CHAPTER:-6

TOPIC:- SQUARE AND SQUARE ROOTS(Part 2)

GUIDELINES

Dear students kindly refer to the following notes/video links for the Chapter- "SQUARE AND SQUARE ROOTS"(PART 2) and thereafter do the questions in your Mathematics notebook.

NOTE- Students can download the NCERT textbook using the following link:-

http://ncert.nic.in/textbook/textbook.htm?hemh1=0-16

INTRODUCTION

Pythagorean triplets

Consider the following
$3^2 + 4^2 = 9 + 16 = 25 = 5^2$
The collection of numbers 3, 4 and 5 is known as **Pythagorean triplet**.
6, 8, 10 is also a Pythagorean triplet,
Since $6^2 + 8^2 = 36 + 64 = 100 = 10^2$
Again, observe that
$5^2 + 12^2 = 25 + 144 = 169 = 13^2$. The numbers 5, 12, 13 form another such triplet.

Square Roots

Study the following situations.

Area of a square is 144 cm^2. What could be the side of the square? We know that the area of a square = side^2. If we assume the length of the side to be '*a*', then 144 = a^2.To find the length of side it is necessary to find a number whose square is 144.

The inverse (opposite) operation of addition is subtraction and the inverse operation of multiplication is division. Similarly, finding the square root is the inverse operation of squaring.

We have, $1^2 = 1$, therefore square root of 1 is 1.
$2^2 = 4$, therefore square root of 4 is 2.
$3^2 = 9$, therefore square root of 9 is 3.

Positive square root of a number is denoted by the symbol $\sqrt{}$. In this chapter, we shall take up only positive square root of a natural number.

We find square root by many methods, one of the methods is Repeated Subtraction method.

SUBTOPICS

1) Pythagorean triplets
2) Square root by repeated subtraction method

KEY POINTS AND IMPORTANT LINKS FOR REFERENCE

1) **Pythagorean triplets**

   https://www.youtube.com/watch?v=4ozDhcQhNf4

For any natural number $m > 1$, we have $(2m)^2 + (m^2 – 1)^2 = (m^2 + 1)^2$. So, $2m, m^2 – 1$ and $m^2 + 1$ form a Pythagorean triplet.
Try to find some more Pythagorean triplets using this form.

Example 1: Write a Pythagorean triplet whose smallest member is 8.
Solution: We can get Pythagorean triplets by using general form $2m$, $m^2 – 1$, $m^2 + 1$.
Case1:Let us first take $m^2 – 1 = \mathbf{8}$
So $m^2 = 8 + 1 = 9$
which gives $m = 3$
Therefore $2m = \mathbf{6}$ and $m^2 + 1 = \mathbf{10}$.
The triplet is thus **6, 8, 10**. But 8 is not the smallest member of this.

Case2: Let us try $2m = \mathbf{8}$
Then $m = 4$
We get $m^2 – 1 = 16 – 1 = \mathbf{15}$
and $m^2 + 1 = 16 + 1 = \mathbf{17}$
The triplet is **8, 15, 17** with 8 as the smallest member.

Note: Whenever a smallest member is given we will check it with only 2m and m^2-1 (only two cases to be done).

Example 2: Find a Pythagorean triplet in which one member is 12.
Solution: : We can get Pythagorean triplets by using general form $2m$, $m^2 – 1$, $m^2 + 1$
Case1: If we take $m^2 – 1 = 12$
Then $m^2 = 12 + 1 = 13$
Then the value of m will not be an integer.

Case2:So we try to take $m^2 + 1 = 12$.
Again $m^2 = 11$ will not give an integer value for m.

Case3: So let us take $2m = \mathbf{12}$
then $m = 6$
Thus $m^2 – 1 = 36 – 1 = \mathbf{35}$ and $m^2 + 1 = 36 + 1 = \mathbf{37}$
Therefore, the required triplet is **12, 35, 37.**
Note:

a) Whenever one member is given we will check it with all the three 2m, m^2-1 and m^2+1(all three cases to be done) .

b) All Pythagorean triplets may not be obtained using this form. For example another triplet 5, 12, 13 also has 12 as a member.

2) Sqaure Root Intoduction (Click on the link to learn)

https://www.youtube.com/watch?v=2TbmLNoDkv8

Repeated Subtraction to find square root (Click on the link to learn)

https://www.youtube.com/watch?v=2jazz6_6KgU

POINTS TO REMEMBER:-

1) For any natural number $m > 1$, we have $(2m)^2 + (m^2 - 1)^2 = (m^2 + 1)^2$.
 So $2m, m^2 - 1$ and $m^2 + 1$ forms a **Pythagorean triplet**.

2) Square root of a number.

1) If $\mathbf{p = q^2}$, **q** is called the square root of **p.**

The Square root of a number is the number which when multiplied with itself gives the number as the product. The square root of a number is denoted by the symbol $\sqrt{\ }$ for e.g. $\sqrt{81} = 9$.

But we know, $(9)^2 = (-9)^2 = 81$

So, we can Say $\sqrt{81} = \pm 9$

Similarly $\sqrt{169} = \pm 13$

$\sqrt{49} = \pm 7$.

In this chapter, we shall take up only **positive square** root of a natural number.

2) Some Properties of Square Root

(i) The Square root of an even perfect square is even and that of an odd Perfect square is odd.
(ii) Since there is no number whose square is negative the square root of a negative number is not defined.
(iii) If a number ends with an odd number of zeroes, then it cannot have a square root which is a natural number.
(iv) If the units digit of a number is 2, 3, 7 or 8 then square root of that number (in natural numbers) is not possible.

ASSIGNMENTS

a) **From NCERT textbook the following questions are to be done in Mathematics notebook:**

{ Ex 6.2 Q2 ii) , iv)

Ex 6.3 Q1, Q2 and Q3 }

b) Online Practice assignment on introduction to square roots.

https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:rational-exponents-radicals/x2f8bb11595b61c86:radicals/e/square_roots