MATH ASSIGNMENT NO. 1
SQUARES AND SQUARE ROOTS
CLASS-VIII

Q1. (i) If one number of the Pythagorean triplet is 6, then find the triplet.
(ii) If one number of the Pythagorean triplet is 9, then find the triplet.

Q2. Find the square root of the following correct to two places of decimal:

(i) $\frac{20}{3}$ (ii) $3\frac{1}{5}$ (iii) $\frac{1}{3}$

Q3. Using properties of squares and square roots calculate: $100^2 - 98^2$

Q4. By what least number should 2028 be multiplied so that the product is a perfect square? Find the square root of the product so obtained.

Q5. By what least number should 3528 be divided so that the quotient is a perfect square? Find the square root of the quotient so obtained.

Q6. What least number must be added to 6412 to make the sum a perfect square? Find this perfect square and its square root.

Q7. Simplify: $\frac{\sqrt{0.2304}+\sqrt{0.1764}}{\sqrt{0.2304}-\sqrt{0.1764}}$

Q8. Which number can replace the question marks in the equation?

$\frac{?}{\sqrt{128}} = \frac{\sqrt{162}}{?}$ (nstse)

Q9. Area of a square field is $80\frac{244}{729}m^2$. What is the length of each side? (ASSET)
(i) 8.96 m (ii) 10.26 m (iii) 13.54 m (iv) 9.86 m

Q10. A sports teacher wants to arrange 6000 students in a field such that the number of rows is equal to number of columns. Find the number of rows if 71 were left out after arrangement. (D.A.V. Board 2019)

Q12. The cost of levelling a square lawn at `2.50 per square metre is `13322.50. Find the cost of fencing the lawn at `5 per metre. (D.A.V. Board 2020)

Q13. Evaluate $\sqrt{3675}$x $\sqrt{2352}$ (D.A.V. Board 2020)

Q14. Express 16 as sum of odd numbers. (D.A.V. Board 2020)

D.A.V. PUBLIC SCHOOL, SECTOR – 14, GURUGRAM
CLASS VIII
SQUARES AND SQUARE ROOTS

In previous classes, we have studied squares of many natural numbers.

For example: if a square is of side 3 units then

Area of square = side x side

= 3 x 3 = 9 square units

SQUARES

Look at the examples given below:

$2 \times 2 = 4 = 2^2$

$3 \times 3 = 9 = 3^2$

$4 \times 4 = 16 = 4^2$

Similarly, $a \times a = a^2$

So, we conclude that—

The square of a number is the product obtained by multiplying the number by itself.

Numbers, such as 1, 4, 9, 16, 25, 36 are called **perfect squares**.

Remember

A given number is called a **perfect square** or a **square number** if it is the square of some natural number. These numbers are exact squares and do not involve any decimals or fractions.

Now, complete the following table by writing squares of first 20 natural numbers.

$1^2 = 1 \times 1 = 1$	$11^2 =$
$2^2 = 2 \times 2 = 4$	$12^2 =$
$3^2 = 3 \times 3 = 9$	$13^2 =$
$4^2 =$	$14^2 =$
$5^2 =$	$15^2 =$
$6^2 =$	$16^2 =$
$7^2 =$	$17^2 =$
$8^2 =$	$18^2 =$
$9^2 =$	$19^2 =$
$10^2 =$	$20^2 =$

To find out whether a given number is a perfect square or not, write the number as a product of its prime factors. If these factors can be grouped into pairs then the number is a perfect square.

Now watch the following videos to find out whether the given numbers are perfect squares or not

https://drive.google.com/file/d/10Bdp996WZfQumDhV_I5xuzLG9bm2vyFz/view?usp=drivesdk

https://drive.google.com/file/d/10K-PXMXeKZn2RfAKqN717K8XRFrA8_3r/view?usp=drivesdk

Question for practice: Which of the following numbers are perfect square

(i)243 (ii) 529

<u>Facts about perfect squares</u>

Now observe the squares of first 20 natural numbers to derive the following facts on perfect squares.

1. A number ending with odd number of zeros (i.e. one zero, three zeros and so on) is never a perfect square. Eg: 150, 25000, 3500000 are not perfect squares.

However, this does not mean that numbers ending with even number of zeros are always perfect squares. Eg: 500

2. Squares of even numbers are always even.
   Eg: $8^2 = 64$, $12^2 = 144$

3. Squares of odd numbers are always odd
   Eg: $7^2 = 49$, $13^2 = 169$, $21^2 = 441$

4. Numbers ending with 2, 3, 7 and 8 are not perfect squares.
   Eg: 32, 243, 37, 368 are not perfect squares.

5. Square of a number other than 0 and 1 is either a multiple of 3 or exceeds the multiple of 3 by 1.
   Eg: $3^2 = 9$ (multiple of 3)
   $4^2 = 16 = 15 + 1$ (multiple of 3 +1)

6. Square of a number other than 0 and 1 is either a multiple of 4 or exceeds the multiple of 4 by 1.
   Eg: $6^2 = 36$ (multiple of 4)
   $9^2 = 81 = 80 + 1$ (multiple of 4 +1)

7. Let us take squares of two consecutive natural numbers
   $4^2 = 16$ and $3^2 = 9$
   Now, $4^2 – 3^2 = 16 - 9 = 7 = 4 + 3$
   So, we conclude that difference between the squares of two consecutive natural numbers is equal to their sum.
   Thus, in general if n and n+1 are two consecutive natural numbers then
   $(n + 1)^2 – n^2 = n + 1 + n = 2n + 1$

8. Square of a natural number ‘n’ is equal to the sum of first ‘n’ odd natural numbers.
   Eg: $1^2 = 1$ (sum of first one odd natural number)
   $2^2 = 4 = 1 + 3$ (sum of first two odd natural number)
   $3^2 = 9 = 1 + 3 + 5$ (sum of first third odd natural number)

Now do Q1, Q2, Q3, Q4 and Q6 of Worksheet 1.

Some interesting patterns

1. Squares of natural numbers composed of only digit1, follow the following pattern
   $1^2 = 1$
   $11^2 = 121$
   $111^2 = 12321$
   $1111^2 = 1234321$

   We can observe that the sum of the digits of every such number is a perfect square.

   $1 = 1 = 1^2$

   $1 + 2 + 1 = 4 = 2^2$

   $1 + 2 + 3 + 2 + 1 = 9 = 3^2$

Observe the following pattern and fill in the blanks.

$1 + 3 = 2^2$

$1 + 3 + 5 = 3^2$

$1 + 3 + 5 + 7 =$ ___________

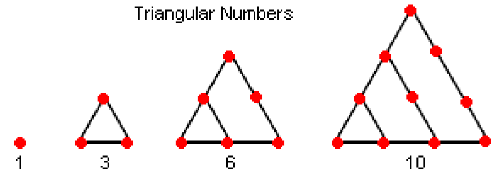
$1 + 3 + 5 + 7 + 9 =$ ___________

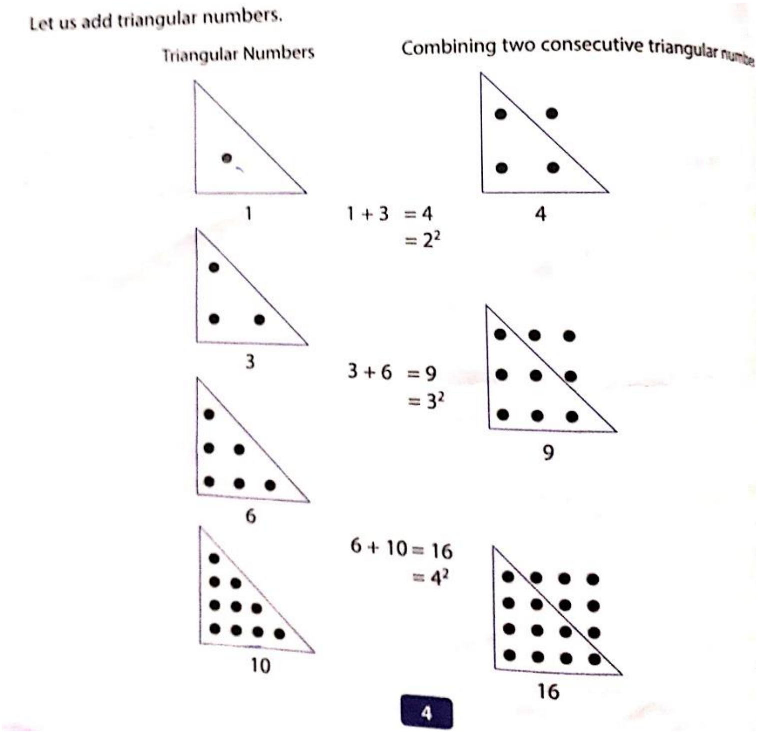
$1 + 3 + 5 + 7 + 9 + 11 =$ ___________

$1 + 3 + 5 + 7 + 9 + 11 + 13 =$ ___________

Triangular Numbers

Numbers whose dot patterns can be arranged as triangles are called Triangular Numbers.





So combining two consecutive triangular numbers we get a square number

NUMBERS BETWEEN SQUARE NUMBERS

- 2n Non Perfect Square numbers are between the squares of the numbers n and n+1

Consecutive square numbers	**Non square numbers**	**Number of non square numbers**
1 and 4	2, 3	2
4 and 9	5, 6, 7, 8	4
9 and 16	10, 11, 12, 13, 14, 15	6
16 and 25	17, 18, 19, 20, 21, 22, 23, 24	8

Worksheet 1

Q5. I) 7^2 and 8^2

Here n=7 (smaller number between 7 and 8)

So number of non-square numbers between 7^2 and 8^2 are 2 x 7 =14

Now do Q5 and Q7 of Worksheet 1.

Note:

Write the definitions and facts along with examples given in the content in your CW notebook and WS-1 Q5 in HW notebook as done above.