Chapter 6

Squares & Square Roots

Finding square root by long division method:

To find the square roots of large numbers using prime factorisation becomes lengthy and difficult. So to overcome this problem we use long division method.

Note:

A perfect square number having n – digits, the corresponding square root will have,

(i) $\frac{n}{2}$ digits, if 'n' is even

(ii) $\frac{n+1}{2}$ digits, if 'n' is odd

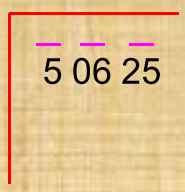
Example:

Find the square root of 50625.

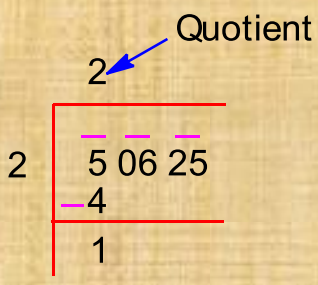
Since it is an 5-digit number, So the square root of the number will have $\frac{n+1}{2}=\frac{5+1}{2}=\frac{6}{2}=3$ digits.

Step 1:

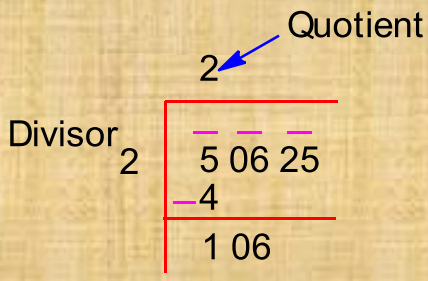
Place a bar and pair the digits starting from the ones place and moving from right to left. If the number of digits in it is odd, then the left most single digit too will have a bar. Each pair of digits is called a period.



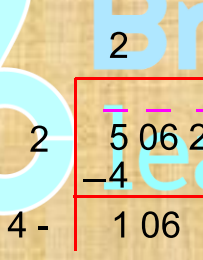
Step 2: Find the largest number whose square is less than or equal to the digits under the first dash on the left. In the example, 2 x 2 = 4 is less than 5. So, take this number (2) as the divisor and the quotient. Now subtract '4' from 5 to get 1.



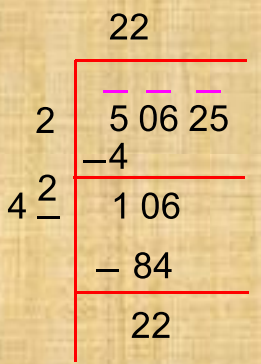
Step 3: Bring down the next two digits together. i.e. bring down '06'. The dividend is now 106.



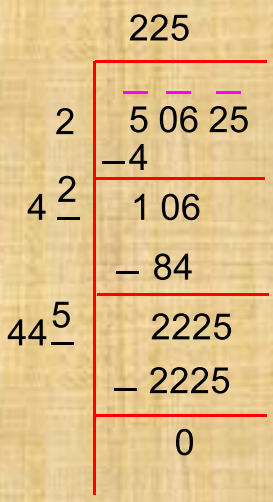
Step 4: Double the partial quotient '2' and write it in the divisor position as shown. i.e. double 2 x 2 = 4. Leave a little gap after '4'.



Step 5: Now choose a number 'x' such that divisor becomes 4x and write 'x' in the quotient place. Then multiply 4x by x such that the product is less than or equal to the dividend. Here we choose 'x' to '2' because 42 x 2 = 84, which is less than 106. Subtract 84 from 106 to get 22.



Step 6: Repeat steps 3 to 5 till the remainder is zero.



Step 7: $\therefore \sqrt{50625} = 225$