Squares and Square Roots
Exercise 3A

Q1

Answer :

A perfect square can always be expressed as a product of equal factors.

(i)
Resolving into prime factors:
$441 = 49 \times 9 = 7 \times 7 \times 3 \times 3 = 7 \times 3 \times 7 \times 3 = 21 \times 21 = (21)^2$

Thus, 441 is a perfect square.

(ii)
Resolving into prime factors:
$576 = 64 \times 9 = 8 \times 8 \times 3 \times 3 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 24 \times 24 = (24)^2$

Thus, 576 is a perfect square.

(iii)
Resolving into prime factors:
$11025 = 441 \times 25 = 49 \times 9 \times 5 \times 5 = 7 \times 7 \times 3 \times 3 \times 5 \times 5 = 7 \times 5 \times 3 \times 7 \times 5 \times 3$
$= 105 \times 105 = (105)^2$

Thus, 11025 is a perfect square.

(iv)
Resolving into prime factors:
$1176 = 7 \times 168 = 7 \times 21 \times 8 = 7 \times 7 \times 3 \times 2 \times 2 \times 2$

1176 cannot be expressed as a product of two equal numbers. Thus, 1176 is not a perfect square.

(v)
Resolving into prime factors:
$5625 = 225 \times 25 = 9 \times 25 \times 25 = 3 \times 3 \times 5 \times 5 \times 5 \times 5 = 3 \times 5 \times 5 \times 3 \times 5 \times 5 = 75 \times 75 = (75)^2$

Thus, 5625 is a perfect square.

(vi)
Resolving into prime factors:
$9075 = 25 \times 363 = 5 \times 5 \times 3 \times 11 \times 11 = 55 \times 55 \times 3$

9075 is not a product of two equal numbers. Thus, 9075 is not a perfect square.

(vii)
Resolving into prime factors:
$4225 = 25 \times 169 = 5 \times 5 \times 13 \times 13 = 5 \times 13 \times 5 \times 13 = 65 \times 65 = (65)^2$

Thus, 4225 is a perfect square.

(viii)
Resolving into prime factors:
$1089 = 9 \times 121 = 3 \times 3 \times 11 \times 11 = 3 \times 11 \times 3 \times 11 = 33 \times 33 = (33)^2$

Thus, 1089 is a perfect square.

Q2

Answer :

A perfect square is a product of two perfectly equal numbers.

(i)
Resolving into prime factors:

$1225 = 25 \times 49 = 5 \times 5 \times 7 \times 7 = 5 \times 7 \times 5 \times 7 = 35 \times 35 = (35)^2$

Thus, 1225 is the perfect square of 35.

(ii)
Resolving into prime factors:
$2601 = 9 \times 289 = 3 \times 3 \times 17 \times 17 = 3 \times 17 \times 3 \times 17 = 51 \times 51 = (51)^2$

Thus, 2601 is the perfect square of 51.

(iii)
Resolving into prime factors:

$5929 = 11 \times 539 = 11 \times 7 \times 77 = 11 \times 7 \times 11 \times 7 = 77 \times 77 = (77)^2$

Thus, 5929 is the perfect square of 77.

(iv)
Resolving into prime factors:
$7056 = 12 \times 588 = 12 \times 7 \times 84 = 12 \times 7 \times 12 \times 7 = (12 \times 7)^2 = (84)^2$

Thus, 7056 is the perfect square of 84.

(v)
Resolving into prime factors:

$8281 = 49 \times 169 = 7 \times 7 \times 13 \times 13 = 7 \times 13 \times 7 \times 13 = (7 \times 13)^2 = (91)^2$

Thus, 8281 is the perfect square of 91.

Q3

Answer :

1. Resolving 3675 into prime factors:

$3675 = 3 \times 5 \times 5 \times 7 \times 7$

Thus, to get a perfect square, the given number should be multiplied by 3.

New number= $\left(3^2 \times 5^2 \times 7^2\right) = \left(3 \times 5 \times 7\right)^2 = \left(105\right)^2$

Hence, the new number is the square of 105.

2. Resolving 2156 into prime factors:

$2156 = 2 \times 2 \times 7 \times 7 \times 11 = \left(2^2 \times 7^2 \times 11\right)$

Thus to get a perfect square, the given number should be multiplied by 11.

New number = $\left(2^2 \times 7^2 \times 11^2\right) = \left(2 \times 7 \times 11\right)^2 = \left(154\right)^2$

Hence, the new number is the square of 154.

3. Resolving 3332 into prime factors:

$3332 = 2 \times 2 \times 7 \times 7 \times 17 = 2^2 \times 7^2 \times 17$

Thus, to get a perfect square, the given number should be multiplied by 17.

New number = $\left(2^2 \times 7^2 \times 17^2\right) = \left(2 \times 7 \times 17\right)^2 = \left(238\right)^2$

Hence, the new number is the square of 238.

4. Resolving 2925 into prime factors:

$2925 = 3 \times 3 \times 5 \times 5 \times 13 = 3^2 \times 5^2 \times 13$

Thus, to get a perfect square, the given number should be multiplied by 13.

New number = $\left(3^2 \times 5^2 \times 13^2\right) = \left(3 \times 5 \times 13\right)^2 = \left(195\right)^2$

Hence, the number whose square is the new number is 195.

5. Resolving 9075 into prime factors:

$9075 = 3 \times 5 \times 5 \times 11 \times 11 = 3 \times 5^2 \times 11^2$

Thus, to get a perfect square, the given number should be multiplied by 3.

New number $= \left(3^2 \times 5^2 \times 11^2\right) = \left(3 \times 5 \times 11\right)^2 = \left(165\right)^2$

Hence, the new number is the square of 165.

6. Resolving 7623 into prime factors:
$7623 = 3 \times 3 \times 7 \times 11 \times 11 = 3^2 \times 7 \times 11^2$

Thus, to get a perfect square, the given number should be multiplied by 7.

New number $= \left(3^2 \times 7^2 \times 11^2\right) = \left(3 \times 7 \times 11\right)^2 = \left(231\right)^2$

Hence, the number whose square is the new number is 231.

7. Resolving 3380 into prime factors:
$3380 = 2 \times 2 \times 5 \times 13 \times 13 = 2^2 \times 5 \times 13^2$

Thus, to get a perfect square, the given number should be multiplied by 5.

New number $= \left(2^2 \times 5^2 \times 13^2\right) = \left(2 \times 5 \times 13\right)^2 = \left(130\right)^2$

8. Resolving 2475 into prime factors:
$2475 = 3 \times 3 \times 5 \times 5 \times 11 = 3^2 \times 5^2 \times 11$

Thus, to get a perfect square, the given number should be multiplied by 11.

New number $= \left(3^2 \times 5^2 \times 11^2\right) = \left(3 \times 5 \times 11\right)^2 = \left(165\right)^2$

Hence, the new number is the square of 165.

Q4

Answer :

(i) Resolving 1575 into prime factors:
$1575 = 3 \times 3 \times 5 \times 5 \times 7 = 3^2 \times 5^2 \times 7$

Thus, to get a perfect square, the given number should be divided by 7

New number obtained$= \left(3^2 \times 5^2\right) = \left(3 \times 5\right)^2 = \left(15\right)^2$

Hence, the new number is the square of 15

(ii) Resolving 9075 into prime factors:

$9075 = 3 \times 5 \times 5 \times 11 \times 11 = 3 \times 5^2 \times 11^2$

Thus, to get a perfect square, the given number should be divided by 3

New number obtained$= \left(5^2 \times 11^2\right) = \left(5 \times 11\right)^2 = \left(55\right)^2$

Hence, the new number is the square of 55

(iii) Resolving 4851 into prime factors:

$$4851 = 3 \times 3 \times 7 \times 7 \times 11 = 3^2 \times 7^2 \times 11$$

Thus, to get a perfect square, the given number should be divided by 11

New number obtained= $\left(3^2 \times 7^2\right) = \left(3 \times 7\right)^2 = \left(21\right)^2$

Hence, the new number is the square of 21

(iv) Resolving 3380 into prime factors:

$$3380 = 2 \times 2 \times 5 \times 13 \times 13 = 2^2 \times 5 \times 13^2$$

Thus, to get a perfect square, the given number should be divided by 5

New number obtained= $\left(2^2 \times 13^2\right) = \left(2 \times 13\right)^2 = \left(26\right)^2$

Hence, the new number is the square of 26

(v) Resolving 4500 into prime factors:

$$4500 = 2 \times 2 \times 3 \times 3 \times 5 \times 5 \times 5 = 2^2 \times 3^2 \times 5^2 \times 5$$

Thus, to get a perfect square, the given number should be divided by 5

New number obtained= $\left(2^2 \times 3^2 \times 5^2\right) = \left(2 \times 3 \times 5\right)^2 = \left(30\right)^2$

Hence, the new number is the square of 30

(vi) Resolving 7776 into prime factors:

$$7776 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 = 2^2 \times 2^2 \times 2 \times 3^2 \times 3^2 \times 3$$

Thus, to get a perfect square, the given number should be divided by 6 whish is a product of 2 and 3

New number obtained= $\left(2^2 \times 2^2 \times 3^2 \times 3^2\right) = \left(2 \times 2 \times 3 \times 3\right)^2 = \left(36\right)^2$

Hence, the new number is the square of 36

(vii) Resolving 8820 into prime factors:

$$8820 = 2 \times 2 \times 3 \times 3 \times 5 \times 7 \times 7 = 2^2 \times 3^2 \times 5 \times 7^2$$

Thus, to get a perfect square, the given number should be divided by 5

New number obtained= $\left(2^2 \times 3^2 \times 7^2\right) = \left(2 \times 3 \times 7\right)^2 = \left(42\right)^2$

Hence, the new number is the square of 42

(viii) Resolving 4056 into prime factors:

$$4056 = 2 \times 2 \times 2 \times 3 \times 13 \times 13 = 2^2 \times 2 \times 3 \times 13^2$$

Thus, to get a perfect square, the given number should be divided by 6, which is a product of 2 and 3

New number obtained= $\left(2^2 \times 13^2\right) = \left(2 \times 13\right)^2 = \left(26\right)^2$

Hence, the new number is the square of 26

Q5

Answer :

The first three digit number (100) is a perfect square. Its square root is 10.
The number before 10 is 9.
Square of 9 = $(9)^2 = 81$
Thus, the largest 2 digit number that is a perfect square is 81.

Q6

Answer :

The largest 3 digit number is 999.

The number whose square is 999 is 31.61.

Thus, the square of any number greater than 31.61 will be a 4 digit number.
Therefore, the square of 31 will be the greatest 3 digit perfect square.

$31^2 = 31 \times 31 = 961$