



## Squares and Square Roots Ex 3.1 Q7

**Answer :**

Factorising each number.

(i)  $8820 = 2 \times 2 \times 3 \times 3 \times 5 \times 7 \times 7$

2	8820
2	4410
3	2205
3	735
5	245
7	49
7	7
	1

Grouping them into pairs of equal factors:

$$8820 = (2 \times 2) \times (3 \times 3) \times (7 \times 7) \times 5$$

The factor, 5 is not paired. For a number to be a perfect square, each prime factor has to be paired.

Hence, 8820 must be multiplied by 5 for it to be a perfect square.

The new number would be  $(2 \times 2) \times (3 \times 3) \times (7 \times 7) \times (5 \times 5)$ .

Furthermore, we have:

$$(2 \times 2) \times (3 \times 3) \times (7 \times 7) \times (5 \times 5) = (2 \times 3 \times 5 \times 7) \times (2 \times 3 \times 5 \times 7)$$

Hence, the number whose square is the new number is:

$$2 \times 3 \times 5 \times 7 = 210$$

(ii)  $3675 = 3 \times 5 \times 5 \times 7 \times 7$

3	3675
5	1225
5	245
7	49
7	7
	1

Grouping them into pairs of equal factors:

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

The factor, 3 is not paired. For a number to be a perfect square, each prime factor has to be paired.

Hence, 3675 must be multiplied by 3 for it to be a perfect square.

The new number would be  $(5 \times 5) \times (7 \times 7) \times (3 \times 3)$ .

Furthermore, we have:

$$(5 \times 5) \times (7 \times 7) \times (3 \times 3) = (3 \times 5 \times 7) \times (3 \times 5 \times 7)$$

Hence, the number whose square is the new number is:

$$3 \times 5 \times 7 = 105$$

(iii)  $605 = 5 \times 11 \times 11$

5	605
11	121
11	11
	1

Grouping them into pairs of equal factors:

$$605 = 5 \times (11 \times 11)$$

The factor, 5 is not paired. For a number to be a perfect square, each prime factor has to be paired.

Hence, 605 must be multiplied by 5 for it to be a perfect square.

The new number would be  $(5 \times 5) \times (11 \times 11)$ .

Furthermore, we have:

$$(5 \times 5) \times (11 \times 11) = (5 \times 11) \times (5 \times 11)$$

Hence, the number whose square is the new number is:

$$5 \times 11 = 55$$

$$(iv) 2880 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5$$

2	2880
2	1440
2	720
2	360
2	180
2	90
3	45
3	15
5	5
	1

Grouping them into pairs of equal factors:

$$2880 = (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (3 \times 3) \times 5$$

There is a 5 as the leftover. For a number to be a perfect square, each prime factor has to be paired.

Hence, 2880 must be multiplied by 5 to be a perfect square.

The new number would be  $(2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (3 \times 3) \times (5 \times 5)$ .

Furthermore, we have:

$$(2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (3 \times 3) \times (5 \times 5) = (2 \times 2 \times 2 \times 3 \times 5) \times (2 \times 2 \times 2 \times 3 \times 5)$$

Hence, the number whose square is the new number is:

$$2 \times 2 \times 2 \times 3 \times 5 = 120$$

$$(v) 4056 = 2 \times 2 \times 2 \times 3 \times 13 \times 13$$

2	4056
2	2028
2	1014
3	507
13	169
13	13
	1

Grouping them into pairs of equal factors:

$$4056 = (2 \times 2) \times (13 \times 13) \times 2 \times 3$$

The factors at the end, 2 and 3 are not paired. For a number to be a perfect square, each prime factor has to be paired. Hence, 4056 must be multiplied by 6  $(2 \times 3)$  for it to be a perfect square.

The new number would be  $(2 \times 2) \times (2 \times 2) \times (3 \times 3) \times (13 \times 13)$ .

Furthermore, we have:

$$(2 \times 2) \times (2 \times 2) \times (3 \times 3) \times (13 \times 13) = (2 \times 2 \times 3 \times 13) \times (2 \times 2 \times 3 \times 13)$$

Hence, the number whose square is the new number is:

$$2 \times 2 \times 3 \times 13 = 156$$

(vi)  $3468 = 2 \times 2 \times 3 \times 17 \times 17$

2	3468
2	1734
3	864
17	289
17	17
	1

Grouping them into pairs of equal factors:

$$3468 = (2 \times 2) \times (17 \times 17) \times 3$$

The factor 3 is not paired. For a number to be a perfect square, each prime factor has to be paired.

Hence, 3468 must be multiplied by 3 for it to be a perfect square.

The new number would be  $(2 \times 2) \times (17 \times 17) \times (3 \times 3)$ .

Furthermore, we have:

$$(2 \times 2) \times (17 \times 17) \times (3 \times 3) = (2 \times 3 \times 17) \times (2 \times 3 \times 17)$$

Hence, the number whose square is the new number is:

$$2 \times 3 \times 17 = 102$$

(vii)  $7776 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3$

2	7776
2	3888
2	1944
2	972
2	486
3	243
3	81
3	27
3	9
3	3
	1

Grouping them into pairs of equal factors:

$$7776 = (2 \times 2) \times (2 \times 2) \times (3 \times 3) \times (3 \times 3) \times 2 \times 3$$

The factors, 2 and 3 at the end are not paired. For a number to be a perfect square, each prime factor has to be paired. Hence, 7776 must be multiplied by 6  $(2 \times 3)$  for it to be a perfect square.

The new number would be  $(2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (3 \times 3) \times (3 \times 3) \times (3 \times 3)$ .

Furthermore, we have:

$$(2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (3 \times 3) \times (3 \times 3) \times (3 \times 3) = (2 \times 2 \times 2 \times 3 \times 3 \times 3) \times (2 \times 2 \times 2 \times 3 \times 3 \times 3)$$

Hence, the number whose square is the new number is:

$$2 \times 2 \times 2 \times 3 \times 3 \times 3 = 216$$

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