

# Squares and Square Roots

## Exercise 3B

Q1

**Answer :**

By observing the properties of square numbers, we can determine whether a given number is a square or not.

(i) 5372

A number that ends with 2 is not a perfect square.

Thus, the given number is not a perfect square.

(ii) 5963

A number that ends with 3 is not a perfect square.

Thus, the given number is not a perfect square.

(iii) 8457

A number that ends with 7 is not a perfect square.

Thus, the given number is not a perfect square.

(iv) 9468

A number ending with 8 is not a perfect square.

Thus, the given number is not a perfect square.

(v) 360

Any number ending with an odd number of zeroes is not a perfect square.

Hence, the given number is not a perfect square.

(vi) 64000

Any number ending with an odd number of zeroes is not a perfect square.

Hence, the given number is not a perfect square.

(vii) 2500000

Any number ending with an odd number of zeroes is not a perfect square.

Hence, the given number is not a perfect square.

Q2

**Answer :**

The square of an even number is always even.

Thus, even numbers in the given list of squares will be squares of even numbers.

(i) 196

This is an even number. Thus, it must be a square of an even number.

(ii) 441

This is an odd number. Thus, it is not a square of an even number.

(iii) 900

This is an even number. Thus, it must be a square of an even number.

(iv) 625

This is an odd number. Thus, it is not a square of an even number.

(v) 324

This is an even number. Thus, it is a square of an even number.

**Q3**

**Answer :**

According to the property of squares, the square of an odd number is also an odd number.

Using this property, we will determine which of the numbers in the given list of squares is a square of an odd number.

(i) 484.

This is an even number. Thus, it is not a square of an odd number.

(ii) 961

This is an odd number. Thus, it is a square of an odd number.

(iii) 7396

This is an even number. Thus, it is not a square of an odd number.

(iv) 8649

This is an odd number. Thus, it is a square of an odd number.

(v) 4225

This is an odd number. Thus, it is a square of an odd number.

**Q4**

**Answer :**

Sum of first  $n$  odd numbers =  $n^2$

$$(i) (1 + 3 + 5 + 7 + 9 + 11 + 13) = 7^2 = 49$$

$$(ii) (1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19) = 10^2 = 100$$

$$(iii) (1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23) = 12^2 = 144$$

**Q5**

**Answer :**

Sum of first  $n$  odd natural numbers =  $n^2$

(i) Expressing 81 as a sum of 9 odd numbers:

$$81 = (9)^2$$

$$n = 9$$

$$81 = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17$$

(ii) Expressing 100 as a sum of 10 odd numbers:

$$100 = (10)^2$$

$$n = 10$$

$$100 = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19$$

Q6

**Answer :**

For every number  $m > 1$ , the Pythagorean triplet is  $(2m, m^2 - 1, m^2 + 1)$ .

Using the above result:

(i)

$$2m = 6$$

$$m = 3, m^2 = 9$$

$$m^2 - 1 = 9 - 1 = 8$$

$$m^2 + 1 = 9 + 1 = 10$$

Thus, the Pythagorean triplet is  $[6, 8, 10]$ .

(ii)

$$2m = 14$$

$$m = 7, m^2 = 49$$

$$m^2 - 1 = 49 - 1 = 48$$

$$m^2 + 1 = 49 + 1 = 50$$

Thus, the Pythagorean triplet is  $[14, 48, 50]$ .

(iii)

$$2m = 16$$

$$m = 8, m^2 = 64$$

$$m^2 - 1 = 64 - 1 = 63$$

$$m^2 + 1 = 64 + 1 = 65$$

Thus, the Pythagorean triplet is:  $[16, 63, 65]$

(iv)

$$2m = 20$$

$$m = 10, m^2 = 100$$

$$m^2 - 1 = 100 - 1 = 99$$

$$m^2 + 1 = 100 + 1 = 101$$

Thus, the Pythagorean triplet is  $[20, 99, 101]$ .

Q7

**Answer :**

$$\text{Given: } [(n+1)^2 - n^2] = (n+1) + n$$

$$(i) (38)^2 - (37)^2 = 38 + 37 = 75$$

$$(ii) (75)^2 - (74)^2 = 75 + 74 = 149$$

$$(iii) (92)^2 - (91)^2 = 92 + 91 = 183$$

$$(iv) (105)^2 - (104)^2 = 105 + 104 = 209$$

$$(v) (141)^2 - (140)^2 = 141 + 140 = 281$$

$$(vi) (218)^2 - (217)^2 = 218 + 217 = 435$$

Q8

**Answer :**

$$(i) 310^2 = (300 + 10)^2 = (300^2 + 2(300 \times 10) + 10^2) = 90000 + 6000 + 100 = 96100$$

$$(ii) 508^2 = (500 + 8)^2 = (500^2 + 2(500 \times 8) + 8^2) = 250000 + 8000 + 64 = 258064$$

$$(iii) 630^2 = (600 + 30)^2 = (600^2 + 2(600 \times 30) + 30^2) = 360000 + 36000 + 900 = 396900$$

Q9

**Answer :**

$$(i) (196)^2 = (200 - 4)^2 = 200^2 - 2(200 \times 4) + 4^2 = 40000 - 1600 + 16 = 38416$$

$$(ii) (689)^2 = (700 - 11)^2 = 700^2 - 2(700 \times 11) + 11^2 = 490000 - 15400 + 121 = 474721$$

$$(iii) (891)^2 = (900 - 9)^2 = 900^2 - 2(900 \times 9) + 9^2 = 810000 - 16200 + 81 = 793881$$

Q10

**Answer :**

$$(i) 69 \times 71 = (70 - 1) \times (70 + 1) = (70^2 - 1^2) = 4900 - 1 = 4899$$

$$(ii) 94 \times 106 = (100 - 6) \times (100 + 6) = (100^2 - 6^2) = 10000 - 36 = 9964$$

Q11

**Answer :**

$$(i) 88 \times 92 = (90 - 2) \times (90 + 2) = (90^2 - 2^2) = 8100 - 4 = 8096$$

$$(ii) 78 \times 82 = (80 - 2) \times (80 + 2) = (80^2 - 2^2) = 6400 - 4 = 6396$$

Q12

**Answer :**

(i) The square of an even number is even.

(ii) The square of an odd number is odd.

(iii) The square of a proper fraction is smaller than the given fraction.

(iv)  $n^2$  = the sum of first  $n$  odd natural numbers.

Q13

**Answer :**

(i) F

The number of digits in a square can also be odd. For example: 121

(ii) F

A prime number is one that is not divisible by any other number, except by itself and 1. Thus, square of any number cannot be a prime number.

(iii) F

Example:  $4 + 9 = 13$

4 and 9 are perfect squares of 2 and 3, respectively. Their sum (13) is not a perfect square.

(iv) F

Example:  $36 - 25 = 11$

36 and 25 are perfect squares. Their difference is 11, which is not a perfect square.

(v) T