

Mathematics

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(Chapter – 1) (Real Numbers)(Exemplar Problems)
(Class – X)

Exercise 1.3

Question 7:

Prove that, if x and y are both odd positive integers, then $x^2 + y^2$ is even but not divisible by 4.

Answer 7:

Let $x = 2m + 1$ and $y = 2m + 3$ are odd positive integer m .

Then,

$$\begin{aligned}x^2 + y^2 &= (2m + 1)^2 + (2m + 3)^2 \\&= 4m^2 + 1 + 4m + 4m^2 + 9 + 12 \\&= 8m^2 + 16m + 10 \\&= 2(4m^2 + 8m + 5) \text{ which is even.}\end{aligned}$$

Now,

$$2(4m^2 + 8m + 5) = 4(2m^2 + 4m + 2) + 1 \text{ which is not divisible by 4.}$$

Hence, $x^2 + y^2$ is even for every odd positive integer but not divisible by 4.

