

Mathematics

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

Exercise 1.2

Question 4:

Write whether the square of any positive integer can be of the form $3m+2$, where m is a natural number. Justify your answer.

Answer 4:

No,

By Euclid's lemma, $b = aq + r$, $0 \leq r < a$

Here, b is any positive integer and $a = 3$,

$b = 3q + r$ for $0 \leq r < 3$.

So, any positive integer is of the form $3k$, $3k + 1$ or $3k + 2$.

Now, $(3k)^2 = 9k^2 = 3m$ [where, $m = 3k^2$]

and $(3k + 1)^2 = 9k^2 + 6k + 1$
 $= 3(3k^2 + 2k) + 1 = 3m + 1$ [where, $m = 3k^2 + 2k$]

Also, $(3k + 2)^2 = 9k^2 + 12k + 4$ [$\because (a + b)^2 = a^2 + 2ab + b^2$]

$= 9k^2 + 12k + 3 + 1$

$= 3(3k^2 + 4k + 1) + 1$

$= 3m + 1$ [where, $m = 3k^2 + 4k + 1$]

Which is in the form of $3m$ and $3m + 1$.

Hence, square of any positive number cannot be of the form $3m + 2$.

