



Real Numbers Ex 1.1 Q4

Answer :

To Show: That any positive odd integer is of the form $6q + 1$ or $6q + 3$ or $6q + 5$ where q is any some integer.

Proof: Let a be any odd positive integer and $b = 6$.

Then, there exists integers q and r such that

$a = 6q + r$, $0 \leq r < 6$ (by division algorithm)

$\Rightarrow a = 6q$ or $6q + 1$ or $6q + 2$ or $6q + 3$ or $6q + 4$

But $6q$ or $6q + 2$ or $6q + 4$ are even positive integers.

So, $a = 6q + 1$ or $6q + 3$ or $6q + 5$

Hence it is proved that any positive odd integer is of the form $6q + 1$ or $6q + 3$ or $6q + 5$, where q is any some integer.

Real Numbers Ex 1.1 Q5

Answer :

To Prove: that the square of an positive integer is of the form $3m$ or $3m + 1$ but not of the form $3m + 2$.

Proof: Since positive integer n is of the form of $3q$, $3q + 1$ and $3q + 2$

If $n = 3q$

$$\Rightarrow n^2 = (3q)^2$$

$$\Rightarrow n^2 = 9q^2$$

$$\Rightarrow n^2 = 3(3q^2)$$

$$\Rightarrow n^2 = 3m \quad (m = 3q^2)$$

If $n = 3q + 1$

Then, $n^2 = (3q + 1)^2$

$$\Rightarrow n^2 = (3q^2) + 6q + 1$$

$$\Rightarrow n^2 = 9q^2 + 6q + 1$$

$$\Rightarrow n^2 = 3q(3q + 1) + 1$$

$$\Rightarrow n^2 = 3m + 1 \quad (\text{where } m = (3q + 1))$$

If $n = 3q + 2$

Then, $n^2 = (3q + 2)^2$

$$\Rightarrow n^2 = (3q^2) + 12q + 4$$

$$\Rightarrow n^2 = 9q^2 + 12q + 4$$

$$\Rightarrow n^2 = 3(3q + 4q + 1) + 1$$

$$\Rightarrow n^2 = 3m + 1 \quad (\text{where } q = (3q + 4q + 1))$$

Hence n^2 integer is of the form $3m$, $3m + 1$ but not of the form $3m + 2$.

Real Numbers Ex 1.1 Q6

Answer :

To Prove: that the square of any positive integer is of the form $4q$ or $4q + 1$ for some integer q .

Proof: Since positive integer n is of the form of $2q$ or $2q + 1$

If $n = 2q$

$$\text{Then, } n^2 = (2q)^2$$

$$\Rightarrow n^2 = 4q^2$$

$$\Rightarrow n^2 = 4m \text{ (where } m = q^2 \text{)}$$

If $n = 2q + 1$

$$\text{Then, } n^2 = (2q + 1)^2$$

$$\Rightarrow n^2 = (2q)^2 + 4q + 1$$

$$\Rightarrow n^2 = 4q^2 + 4q + 1$$

$$\Rightarrow n^2 = 4q(q + 1) + 1$$

$$\Rightarrow n^2 = 4q + 1 \text{ (where } m = q(q + 1) \text{)}$$

Hence it is proved that the square of any positive integer is of the form $4q$ or $4q + 1$, for some integer q .

***** END *****