Real Numbers Ex 1.1 Q9

Answer :

To Prove: that the square of a positive integer of the form $5q + 1$ is of the same form

Proof: Since positive integer n is of the form $5q + 1$

If $n = 5q + 1$

Then n2=5q+12⇒n2=5q2+12+25q1⇒n2=25q2+1+10q⇒n2=25q2+10q+1⇒n2=55q2+2q+1

$\boxed{\Rightarrow n^2 = 5m+1}\left(\text{where } m = \left(5q^2 + 2q\right)\right)$

Hence n^2 integer is of the form $5m + 1$.

Real Numbers Ex 1.1 Q10

Answer :

To Prove: the product of three consecutive positive integers is divisible by 6.

Proof: Let n be any positive integer.

Since any positive integer is of the form $6q$ or $6q + 1$ or $6q + 2$ or $6q + 3$ or $6q + 4$, $6q + 5$

If $n = 6q$

$\Rightarrow n(n+1)(n+2) = 6q(6q+1)(6q+2)$, which is divisible by 6

If $n = 6q + 1$

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

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

Which is divisible by 6

If $n = 6q + 2$

$\Rightarrow n(n+1)(n+2) = (6q+2)(6q+3)(6q+4)$

$\Rightarrow n(n+1)(n+2) = 12(3q+1)(2q+1)(2q+3)$

Which is divisible by 6

Similarly we can prove others.

Hence it is proved that the product of three consecutive positive integers is divisible by 6.

Real Numbers Ex 1.1 Q11

Answer :

To Prove: For any positive integer n, $n^3 - n$ is divisible by 6.

Proof: Let n be any positive integer.

$\Rightarrow n^3 - n = (n-1)(n)(n+1)$

Since any positive integer is of the form $6q$ or $6q + 1$ or $6q + 2$ or $6q + 3$ or $6q + 4$, $6q + 5$

If $n = 6q$

Then, $(n-1)n(n+1) = (6q-1)6q(6q+1)$

which is divisble by 6

If $n = 6q + 1$

Then, $(n-1)n(n+1) = (6q)(6q+1)(6q+2)$

$\Rightarrow$ which is divisible by 6

If $n = 6q + 2$

Then, $(n-1)n(n+1) = (6q+1)(6q+2)(6q+3)$

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

which is divisble by 6

Similarly we can prove others.

Hence it is proved that for any positive integer n, $n^3 - n$ is divisible by 6.

*********** END **********