

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

$$\Rightarrow n^2 = 5m + 1$$
 (where $m = (5q^2 + 2q)$)

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

⇒ which is divisble 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 *******