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(Affiliated to CBSE up to +2 Level)

CLASS : X SUBJECT : MATHEMATICS DATE: 18.04.2021

Question 2.Show that any positive odd integer is of the form 6q + 1, or 6q + 3, or 6q + 5, where q is some integer.

Solution: let a be a positive integer when a is divided by 6 then quotient q and remainder r.

By Euclid's division lemma

a = b q + r where $0 \leq r < b$ Here b = 6 and $0 \leq r < 6$ Therefore r = 0, 1,2, 3, 4, & 5.

a = 6q + r , where r = 0, 1,2, 3, 4, & 5.

Case I where r = 0

a = 6q + 0 = 2 x 3q [even no.]

Case I where r = 1

a = 6q + 1 = 2 x 3q + 1 [even no.+ 1 = odd no.]

Case I where r = 2

a = 6q + 2 = 2 x 3q +2 = 2(3q + 1) [even no.]

Case I where r = 3

a = 6q + 3 = 2 x 3q + 2 + 1 = 2(3q + 1) + 1 [even no.+ 1 = odd no.]

Case I where r = 4

a = 6q + 4 = 2 x 3q + 4=2(3q +2) [even no.]

Case I where r = 5

a = 6q + 5 = 2 x 3q + 4 + 1 =2(3q +2) + 1 [even no.+ 1 = odd no.]

Question 4.Use Euclid's division lemma to show that the square of any positive integer is either of the form 3m or 3m + 1 for some integer m.

Solution: let a be a positive integer when a is divided by 3 then quotient q and remainder r.

By Euclid's division lemma

a = bq + r where $0 \leq r < b$ Here b = 3 and $0 \leq r < 3$ Therefore r = 0, 1 & 2.

a = 3q + r (S.B.S)

$a^2 = (3q + r)^2$

Case I where r = 0

$a^2 = (3q + 0)^2$

$a^2 = (3q)^2 = 9q^2 = 3 \times 3q^2 = 3m$ (where $m = 3q^2$)

Case II where r = 1

$a^2 = (3q + 1)^2 = 9q^2 + 6q + 1 = 3(3q^2 + 2q) + 1 = 3m + 1$(where $m = (3q^2 + 2q)$)

Case II where r = 2

$a^2 = (3q + 2)^2 = 9q^2 + 12q + 4 = 3(3q^2 + 4q + 1) + 1 = 3m + 1$(where $m = (3q^2 + 4q + 1)$)

Hence square of any positive integer in the form of 3m or 3m + 1 where $m = 3q^2, 3q^2 + 2q,$
$3q^2 + 4q + 1,$

Do Your Self

Question 5.Use Euclid's Division Lemma to show that the cube of any positive integer is either of the form 9m, 9m + 1 or 9m + 8.

Question 2.Show that any positive odd integer is of the form 4q + 1, or 4q + 3 where q is some integer.

Question 4.Use Euclid's division lemma to show that the square of any positive integer is either of the form 4m or 4m + 1 for some integer m.