REAL NUMBERS

PPT-3

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 01
CHAPTER NAME : REAL NUMBERS

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PREVIOUS KNOWLEDGE TEST :

- An algorithm is a series of well defined steps which gives a procedure for solving a type of problem
- A lemma is a proven statement used for proving another statement.
- Theorem 1.1 (Euclid's Division Lemma) : Given positive integers a and b, there exist unique integers q and r satisfying $a = bq + r, 0 \le r < b$.
- To obtain the HCF of two positive integers, say c and d, with $c > d$, follow the steps below:
- Step 1 : Apply Euclid's division lemma, to c and d. So, we find whole numbers, q and r such that $c = dq + r, 0 \le r < d$.
- Step 2 : If $r = 0$, d is the HCF of c and d. If $r \neq 0$, apply the division lemma to d and r.
- Step 3 : Continue the process till the remainder is zero. The divisor at this stage will be the required HCF.

LEARNING OUTCOME

1. Students will be able to **know and write** the solutions and way of presenting the additional questions given to solve.
2. Students will be able to **Explain** Euclid's division algorithm.

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Show that square of any positive integer is of the form 3m or 3m +1 for some integer m.

Let a be any positive integer.

Then it is of the form 3q or 3q + 1 or 3q +2.

$x = 3q$

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

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

$\Rightarrow x^2 = 3x3q^2$

$= 3m$, where $m = 3q^2$

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$x = 3q + 1$

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

$$= (3q)^2 + 2x3qx1 + (1)^2$$

$$= 9q^2 + 6q + 1$$

$$= 3(3q^2 + 2q) + 1$$

$$= 3m + 1, \text{ where } m = 3q^2 + 2q$$

$x = 3q + 2$

$$\Rightarrow (x)^2 = (3q+2)^2$$

$$= (3q)^2 + 2 \times 3q \times 2 + (2)^2$$

$$= 9q^2 + 12q + 4$$

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

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

$$= 3m + 1$$

$\therefore$ Square of any positive integer is of the form 3m or 3m +1.

- show that one and only one out of n,n+2,n+4 is divisible by 3
- https://www.topperlearning.com/answer/show-that-one-and-only-one-out-of-n-n-2-and-n-4-is-divisible-by-3-where-n-is-any-positive-integer/q0ltvo
- n2-1 is divisible by 8 for an odd positive integer
- https://www.toppr.com/ask/en-in/question/show-that-n2-1-is-divisible-by-8-if-n-is-an-odd-positive/

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Prove that one of every three consecutive positive integers is divisible by 3.

Let n, $n+1, n+2$ be three consecutive positive integers. n is of the form 3q, 3q + 1 or 3q + 2

We have the following three cases.

Case – I

$n=3q$	Divisible by 3.
$n+1=3q+1$	Not divisible by 3
$n+2=3q+2$	Not divisible by 3.

Case – II

$n=3q+1$	Not divisible by 3.
$n+1=3q+2$	Not divisible by 3.
$n+2=3q+3$	Divisible by 3.

Case – III

$n = 3q + 2$ Not divisible by 3

$n + 1 = 3q + 3$ Divisible by 3

$n + 2 = 3q + 4$ Not divisible by 3.

Hence one of n, n + 1, and n + 2 is divisible by 3.

Prove that product of two consecutive positive integers is divisible by 2.

Let n and n + 1 be two consecutive positive integers n is in the form 2q and 2q + 1.

When $n = 2q$

$$n(n+1) = 2q(2q+1) \text{ divisible, by 2.}$$

When n = 2q + 1

$$n(n+1) = (2q+1)(2q+2)$$

$$= (2q+1)2(q+1)$$

$$= 2(2q+1)(q+1) \qquad \text{Divisible by 2.}$$

∴ Product of two consecutive positive integer is divisible by 2.

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Home assignment

- Ex. 1.1 Q. No 4 & 5

THANKING YOU

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