REAL NUMBERS

PPT-6

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.
- A natural number which has exactly two factors, i.e. 1 and the number itself, is a prime number.
- Every non-prime number is a composite number. Composite numbers are those natural numbers which have more than two factors. Such numbers are divisible by other numbers as well.
- A number that cannot be expressed in the form p/q, where p and q are integers and q is not equal to 0,is called irrational number. (Example - $\sqrt{2}$)

Learning outcome

1. Students will be able to **find** the decimal expansions of Rational Numbers using different methods
2. Students will be able to **know** the decimal expansions of particular Rational Numbers is terminating or non-terminating.

- Define rational numbers with examples.
- https://www.youtube.com/watch?v=7Cx8U9YrgXo

- Theorem 1.5 : Let x be a rational number whose decimal expansion terminates. Then x can be expressed in the form , p /q where p and q are coprime, and the prime factorization of q is of the form 2^m5^n. , where n, m are non-negative integers.
- Theorem 1.6 : Let x = p/q be a rational number, such that the prime factorization of q is of the form 2^m5^n. , where n, m are non-negative integers. Then x has a decimal expansion which terminates.
- Let x = p/q be a rational number, such that the prime factorization of q is not of the form 2^m5^n. , where n, m are non-negative integers. Then, x has a decimal expansion which is non-terminating repeating (recurring).

TERMINATING AND NON-TERMINATING DECIMALS

https://youtu.be/dHkXAIEQkA0 (6.28)

Without actually performing the long division, state whether the following rational numbers will have a terminating decimal expansion or a non-terminating repeating decimal expansion:

(i) 13/3125	(ii) 17/8	(iii) 64/455
(iv) 15/1600	(v) 29/343	(vi) $23/2^3 5^2$

(i) $\frac{13}{3125} = \frac{13}{5^2}$

Here denominator = $5^5 = 2^0 \times 5^5$, which is of the form $2^m \times 5^n$ where m and n are non negative integers.

$\therefore \frac{13}{1325}$ will have a terminating decimal expansion.

(ii) $\frac{17}{8} = \frac{17}{2^3} = \frac{17}{2^3 \times 5^0}$

Here denominator = $2^3 \times 5^0$, which is of the form $2^m \times 5^n$ where m and n are non negative integers.

$\therefore \frac{17}{8}$ will have a terminating decimal expansion.

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(iii) $\frac{64}{455} = \frac{64}{5\times7\times13}$. Here denominator is not of the form $2^m \times 5^n$ where m and n are non negative integers.

$\therefore \frac{64}{455}$ will have a non terminating repeating decimal expansion.

(iv) $\frac{15}{1600} = \frac{15}{2^6\times5^2}$. Here denominator = $2^6 \times 5^2$, which is of the form $2^m \times 5^n$ where m and n are non negative integers.

$\therefore \frac{15}{1600}$ will have a terminating decimal expansion.

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(v) $\frac{29}{343} = \frac{29}{7^3}$. Here denominator is not of the form $2^m \times 5^n$ where m and n are non negative integers.

$\therefore \frac{29}{343}$ will have a non terminating repeating decimal expansion.

(vi) $\frac{23}{2^3 \times 5^2}$. Here denominator = $2^3 \times 5^5$, which is of the form $2^m \times 5^n$ where m and n are non negative integers.

$\therefore \frac{23}{2^3 \times 5^2}$ will have a terminating decimal expansion.

Home assignment

- HW- HW- Ex. 1.4 Q. No 1 to 3

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THANKING YOU

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