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## NCERT Class 10 Solutions: Real Numbers (Chapter 1) Exercise 1.4 – Part 1

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Q-1 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:

1.  $\frac{13}{3125}$

2.  $\frac{17}{8}$

3.  $\frac{64}{455}$

4.  $\frac{15}{1600}$

5.  $\frac{29}{343}$

6.  $\frac{23}{2^3 5^2}$

7.  $\frac{129}{2^2 5^7 7^5}$

8.  $\frac{6}{15}$

9.  $\frac{35}{50}$

10.  $\frac{77}{210}$

Solution:

- We know that if the denominator of a rational number has no prime factors other than 2 or 5
- Then it is expressible as a terminating, otherwise it has non-terminating repeating decimal representation
- Thus, we will have to check the prime factors of the denominators of each of the given rational numbers

**terminating  
decimal**

$$\frac{1}{4} = 0.25$$

$$\frac{1}{8} = 0.125$$

$$\frac{1}{5} = 0.2$$

$$\frac{1}{10} = 0.1$$

A decimal which has a finite number of digits.

**Non  
Terminating  
Decimal**

$$\frac{1}{3} = 0.\overline{3}$$

$$\frac{25}{26} = 0.961538 \dots$$

A decimal which has a infinite number of digits.

1.  $\frac{13}{3125}$

Is terminating if  $\frac{p}{q}$

- p and q are co-prime
- And q is of the form  $2^n 5^m$  Where n and m are non-negative integers

Checking Co-prime

13 and 3125 have no common factors,

So, 13 and 3125 are co-prime

For denominator 3125

5	3125
5	625
5	125
5	25
5	5
	1

Hence  $3125 = 5 \times 5 \times 5 \times 5 \times 5$

$= 5^5$

Denominator  $= 5^5$

$= 1 \times 5^5$

$= 2^0 \times 5^5$

So, denominator is of the form  $2^n 5^m$

Where  $n = 0, m = 5$

Thus  $\frac{13}{3125}$  is terminating decimal

1.  $\frac{17}{8}$

Is terminating if  $\frac{p}{q}$

- p and q are co-prime

- And  $q$  is of the form  $2^n 5^m$  Where  $n$  and  $m$  are non-negative integers

### Checking Co-prime

17 and 8 have no common factors,

So, 17 and 8 are co-prime

For denominator 8

$$\begin{array}{r|l}
 2 & 8 \\
 \hline
 2 & 4 \\
 \hline
 2 & 2 \\
 \hline
 & 1
 \end{array}$$

Hence  $8 = 2 \times 2 \times 2$

$$= 2^3$$

$$\text{Denominator} = 2^3$$

$$= 1 \times 2^3$$

$$= 5^0 \times 2^3$$

So, denominator is of the form  $2^n 5^m$

Where  $n = 3, m = 0$

Thus  $\frac{17}{8}$  is terminating decimal