

RD SHARMA
Solutions
Class 10 Maths
Chapter 1
Ex 1.6

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.

(i) $238 \frac{23}{8}$

(ii) $125441 \frac{125}{441}$

(iii) $3550 \frac{35}{50}$

(iv) $77210 \frac{77}{210}$

(v) $1292^2 \times 5^7 \times 7^{17} \frac{129}{2^2 \times 5^7 \times 7^{17}}$

Sol:

(i) The given number is $238 \frac{23}{8}$

Here, $8 = 2^3$ and 2 is not a factor of 23.

So, the given number is in its simplest form.

Now, $8 = 2^3$ is of the form $2^m \times 5^n$, where $m = 3$ and $n = 0$.

So, the given number has a terminating decimal expansion.

(ii) The given number is $125441 \frac{125}{441}$

Here, $441 = 3^2 \times 7^2$ and none of 3 and 7 is a factor of 125.

So, the given number is in its simplest form.

Now, $441 = 3^2 \times 7^2$ is not of the form $2^m \times 5^n$

So, the given number has a non-terminating repeating decimal expansion.

(iii) The given number is $3550 \frac{35}{50}$ and $\text{HCF}(35, 50) = 5$.

$$\therefore 3560 = 35/550/5 = 710 \therefore \frac{35}{60} = \frac{35/5}{50/5} = \frac{7}{10}$$

Here, $710\frac{7}{10}$ is in its simplest form.

Now, $10 = 2 \times 5$ is of the form $2^m \times 5^n$, where $m = 1$ and $n = 1$.

So, the given number has a terminating decimal expansion.

(iv) The given number is $77210\frac{77}{210}$ and $\text{HCF}(77, 210) = 7$.

$$\therefore 77:7210:7 = 1130 \therefore \frac{77:7}{210:7} = \frac{11}{30}$$

Here, $1130\frac{11}{30}$ is in its simplest form. 30

Now, $30 = 2 \times 3 \times 5$ is not of the form $2^m \times 5^n$.

So, the given number has a non-terminating repeating decimal expansion.

(v) The given number is $1292^2 \times 5^7 \times 7^{17} \frac{129}{2^2 \times 5^7 \times 7^{17}}$

Clearly, none of 2, 5 and 7 is a factor of 129.

So, the given number is in its simplest form.

Q.2: Write down the decimal expansions of the following rational numbers by writing their denominators in the form of $2^m \times 5^n$, where m , and n , are the non- negative integers.

(i) $38\frac{3}{8}$

(ii) $13125\frac{13}{125}$

(iii) $780\frac{7}{80}$

(iv) $14588625\frac{14588}{625}$

(v) $1292^4 \times 5^7 \frac{129}{2^4 \times 5^7}$

Sol:

(i) The given number is $38\frac{3}{8}$

Clearly, $8 = 2^3$ is of the form $2^m \times 5^n$, where $m = 3$ and $n = 0$.

So, the given number has terminating decimal expansion.

$$\therefore 3 \times 5^3 2^3 \times 5^3 = 3 \times 125 (2 \times 5)^3 = 375 (10)^3 = 3751000 = 0.375 \therefore \frac{3 \times 5^3}{2^3 \times 5^3} = \frac{3 \times 125}{(2 \times 5)^3} = \frac{375}{(10)^3} = \frac{375}{1000} = 0.375$$

(ii) The given number is $13125\frac{13}{125}$.

Clearly, $125 = 5^3$ is of the form $2^m \times 5^n$, where $m = 0$ and $n = 3$.

So, the given number has terminating decimal expansion.

$$38 = 3 \times 5^3 (2 \times 5)^3 = 3751000 \frac{3}{8} = \frac{3 \times 5^3}{(2 \times 5)^3} = \frac{375}{1000}$$

(iii) The given number is $780\frac{7}{80}$.

Clearly, $80 = 2^4 \times 5$ is of the form $2^m \times 5^n$, where $m = 4$ and $n = 1$.

So, the given number has terminating decimal expansion.

$$\therefore 780 = 7 \times 5^3 2^4 \times 5 \times 5^3 = 7 \times 125 (2 \times 5)^4 = 87510^4 = 87510000 = 0.0875$$
$$\therefore \frac{7}{80} = \frac{7 \times 5^3}{2^4 \times 5 \times 5^3} = \frac{7 \times 125}{(2 \times 5)^4} = \frac{875}{10^4} = \frac{875}{10000} = 0.0875$$

(iv) The given number is $14588625\frac{14588}{625}$

Clearly, $625 = 5^4$ is of the form $2^m \times 5^n$, where $m = 0$ and $n = 4$.

So, the given number has terminating decimal expansion.

$$\therefore 14588625 \therefore \frac{14588}{625} = 14588 \times 2^4 2^4 \times 5^4 \frac{14588 \times 2^4}{2^4 \times 5^4} = 23340810^4 \frac{233408}{10^4} = 23340810000 \frac{233408}{10000} = 23.3408$$

23.3408

(v) The given number is $1292^4 \times 5^7 \frac{129}{2^4 \times 5^7}$

Clearly, $2^2 \times 5^7$ is of the form $2^m \times 5^n$, where $m = 2$ and $n = 7$.

So, the given number has terminating decimal expansion.

$$\therefore 1292^2 \times 5^7 \therefore \frac{129}{2^2 \times 5^7} = 129 \times 2^5 2^2 \times 5^7 \times 2^5 \frac{129 \times 2^5}{2^2 \times 5^7 \times 2^5} = 129 \times 32 (2 \times 5)^7 \frac{129 \times 32}{(2 \times 5)^7} = 418210^7 \frac{4182}{10^7} = 412810000000$$

$$\frac{4128}{10000000} = 0.00041820.0004182$$

Q.4: what can you say about the prime factorization of the denominators of the following rational:

(i) 43.123456789

(ii) 43. 12345678943. 123456789

(iii) 27. 14285727. 142857

(iv) 0.120120012000120000

Sol:

(i) Since 43.123456789 has terminating decimal expansion. So, its denominator is of the form $2^m \times 5^n$, where m, n are non-negative integers.

(ii) Since 43. 12345678943. 123456789 has non-terminating decimal expansion. So, its denominator has factors other than 2 or 5.

(iii) Since 27. 14285727. 142857 has non-terminating decimal expansion. So, its denominator has factors other than 2 or 5.

(iv) Since 0.120120012000120000 ... has non-terminating decimal expansion. So, its denominator has factors other than 2 or 5.