

Chapter 1 Real Numbers

Exercise: 1.1

Question 1: Use Euclid's division algorithm to find the HCF of:

Solution:

(i) 135 and 225
225 > 135,



 $225 = 135 \times 1 + 90$

Also,

 $135 = 90 \times 1 + 45$

 $90 = 2 \times 45 + 0$

Therefore, the HCF of 135 and 225 is 45.

(ii) 196 and 38220

38220 > 196,

 $38220 = 196 \times 195 + 0$

Therefore, HCF of 196 and 38220 is 196.

(iii) 867 and 255

Since 867 > 255,

$$867 = 255 \times 3 + 102$$

 $255 = 102 \times 2 + 51$



 $102 = 51 \times 2 + 0$

Therefore, HCF of 867 and 255 is 51.

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:

By Euclid's algorithm,

a = 6q + r, and r = 0, 1, 2, 3, 4, 5

Hence, a = 6q or 6q + 1 or 6q + 2 or 6q + 3 or 6q + 4 or 6q + 5

Clearly, 6q + 1, 6q + 3, 6q + 5 are of the form 2k + 1, where k is an integer.

Therefore, 6q + 1, 6q + 3, 6q + 5 are not exactly divisible by 2.

Hence, these numbers are odd numbers.

Question 3: An army contingent of 616 members is to march behind an army band of 32 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?

Solution:

Euclid's algorithm

 $616 = 32 \times 19 + 8$

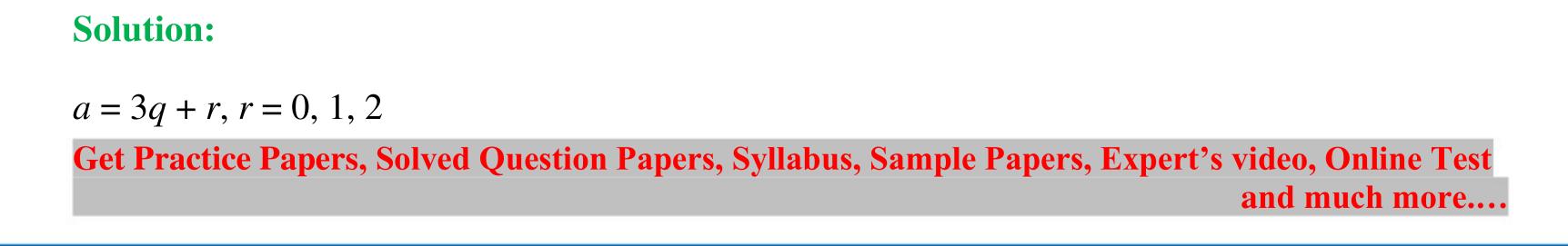
 $32 = 8 \times 4 + 0$

The HCF (616, 32) is 8.

Therefore, they can march in 8 columns each.

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





Therefore, a = 3q or 3q + 1 or 3q + 2

Hence, it can be said that the square of any positive integer is either of the form 3m or 3m + 1.

Question 5: Use Euclid's division lemma to show that the cube of any positive integer is of the form 9m, 9m + 1 or 9m + 8

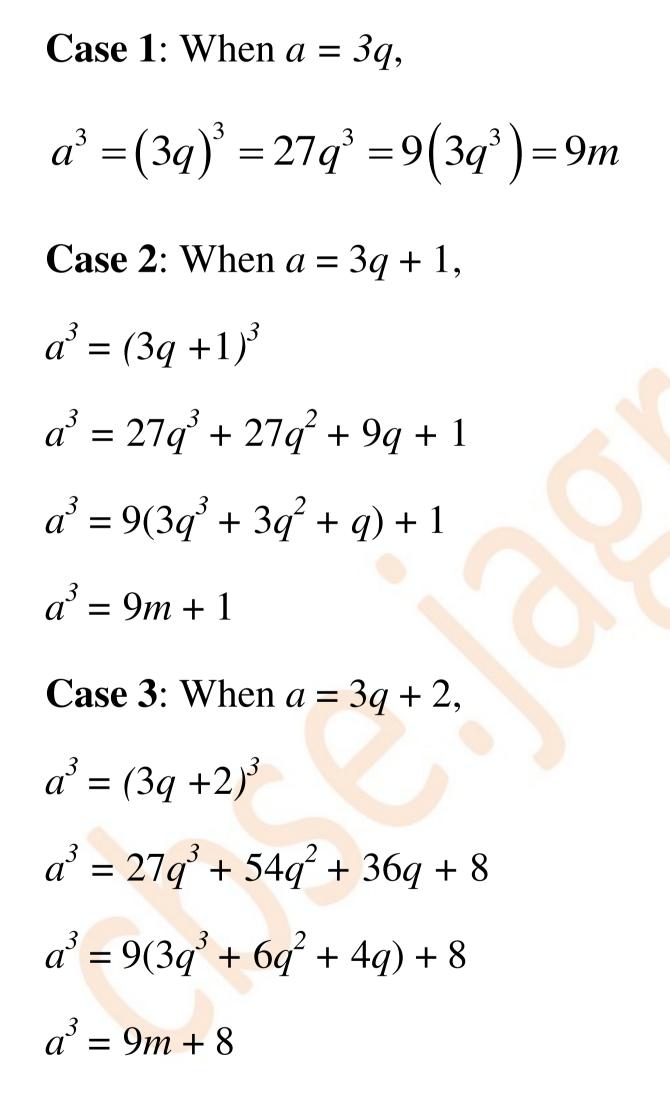
Solution:

$$a = 3q + r, 0 \le r < 3$$

a = 3q, 3q + 1, 3q + 2

There are three cases.





Therefore, the cube of any positive integer is of the form 9m, 9m + 1, or 9m + 8.



Exercise: 1.2

Question 1: Express each number as a product of its prime factors:

Solution:

(*i*)
$$140 = 2^2 \times 5 \times 7$$

(*ii*) $156 = 2^3 \times 7$
(*iii*) $3825 = 3^2 \times 5^2 \times 17$
(*iv*) $5005 = 5 \times 7 \times 11 \times 1$
(*v*) $7429 = 17 \times 19 \times 23$

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Question 2: Find the LCM and HCF of the following pairs of integers and veriry that LCM x HCF = product of the two numbers.

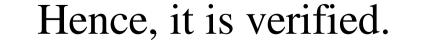
Solution:

(i) 26 and 91

 $26 = 2 \times 13$ $91 = 7 \times 13$ HCF = 13 $LCM = 14 \times 13 = 182$ Product of two numbers = $26 \times 91 = 2366$ $HCF \times LCM = 13 \times 182 = 2366$ Hence, it is verified.

(ii) 510 and 92

 $510 = 2 \times 3 \times 5 \times 17$ $92 = 2 \times 2 \times 23$ HCF = 2 $LCM = 4 \times 15 \times 17 \times 23 = 23460$ Product of two numbers = $510 \times 92 = 46920$ $HCF \times LCM = 2 \times 23460 = 46920$





(iii) 336 and 54

 $336 = 2 \times 2 \times 2 \times 2 \times 3 \times 7$ $54 = 2 \times 3 \times 3 \times 3$ HCF = 6 $LCM = 8 \times 81 \times 7 = 3024$ Product of two numbers = $336 \times 54 = 18144$ $HCF \times LCM = 6 \times 3024 = 18144$ Hence, it is verified.

Question 3: Find the LCM and HCF of the following integers by applying the prime factorisation method.

Solution:

(i) 12,15 and 21

 $12 = 2 \times 2 \times 3$ $15 = 3 \times 5$ $21 = 3 \times 7$ HCF = 3 $LCM = 4 \times 15 \times 7 = 420$

(ii) 17,23 and 29 $17 = 17 \times 1$ $23 = 23 \times 1$ $29 = 29 \times 1$ HCF = 1

 $LCM = 17 \times 23 \times 29 = 11339$



 $8 = 2 \times 2 \times 2$ $9 = 3 \times 3$ $25 = 5 \times 5$ HCF = 1 $LCM = 8 \times 9 \times 25 = 1800$

Question 4: Given that HCF (306, 657) = 9, find LCM (306, 657).

Solution:

 $306 = 2 \times 3 \times 3 \times 17$ $657 = 3 \times 3 \times 73$ HCF = 9



 $LCM = 9 \times 34 \times 73 = 22338$

Question 5: Check whether 6ⁿ can end with the digit 0 for any natural number n

Solution:

Prime factorisation of $6^n = (2 \times 3)^n$ It can be observed that 5 is not in the prime factorisation of 6^n Hence, for any value of *n*, 6^n will not be divisible by 5.

Exercise: 1.3

Question 1: Prove that $\sqrt{5}$ is irrational

Solution:

Let a = 5k

 $\left(5k\right)^2 = 5b^2$

Thus, a and b have 5 as a common factor. Hence, $\sqrt{5}$ is a irrational no.

Question 2: Prove that $3 + 2\sqrt{5}$ is irrational

Solution:

Let $3+2\sqrt{5}$ is a rational number. Thus,

$$3+2\sqrt{5} = \frac{a}{b}$$
$$\sqrt{5} = \frac{1}{2} \left(\frac{a}{b} - 3\right)$$



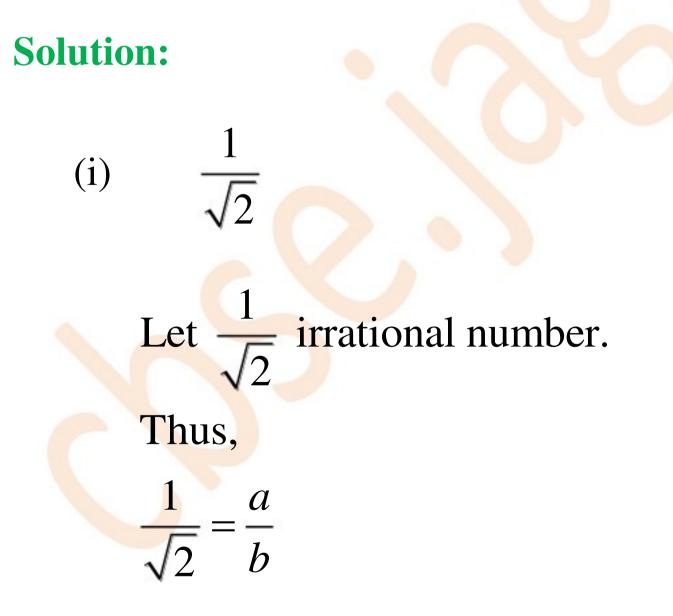




$$\frac{1}{2}\left(\frac{a}{b}-3\right)$$
 is rational

Hence, $3+2\sqrt{5}$ is a irrational no.

Question 3: Prove that the following are irrational:





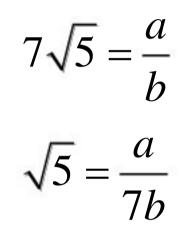
$$\sqrt{2} = \frac{b}{a}$$

 $\frac{b}{a}$ is rational

- Is rational a Hence, $\frac{1}{\sqrt{2}}$ is a irrational no.

(ii) $7\sqrt{5}$ Let $7\sqrt{5}$ irrational number. Thus,





 $\frac{a}{7b}$ is rational Hence, $7\sqrt{5}$ is a irrational no.

(iii) $6 + \sqrt{2}$

Let $6 + \sqrt{2}$ irrational number.

Thus,

$$6 + \sqrt{2} = \frac{a}{b}$$
$$\sqrt{2} = \frac{a}{b} - 6$$

 $\left(\frac{a}{b}-6\right)$ is rational Hence, $6 + \sqrt{2}$ is a irrational no. Get Practice Papers, Solved Question Papers, Syllabus, Sample Papers, Expert's video, Online Test and much more....



Exercise: 1.4

Question 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:

Solution:

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

The denominator is in the form 5^n .



Thus, decimal expression is terminating

(ii)

 $\frac{17}{8}$ $8 = 2^{3}$

The denominator is in the form 2^n . Thus, decimal expression is terminating

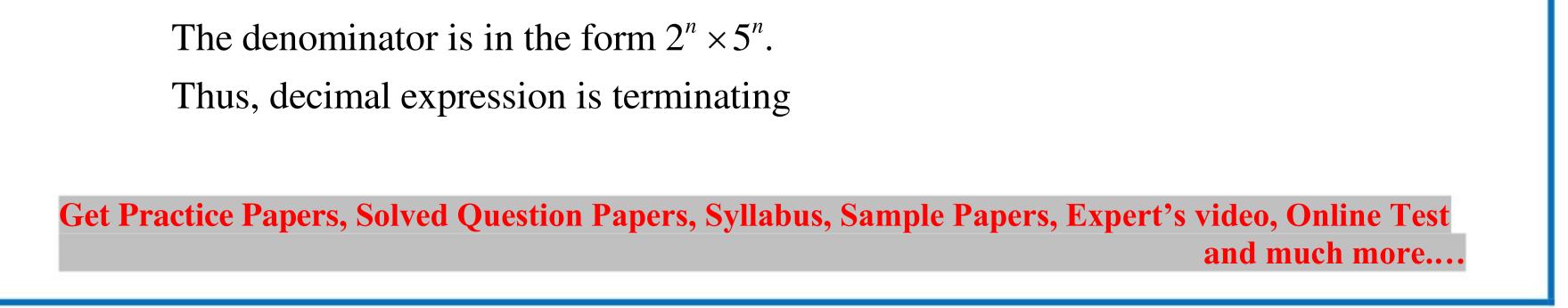
(iii)

 $\frac{64}{455}$ $455 = 5 \times 7 \times 13$

Thus, decimal expression is non-terminating

(iv)

 $\frac{15}{1600}$ $1600 = 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5$





 (\mathbf{v})

 $\frac{29}{343}$ $343 = 7 \times 7 \times 7$

The denominator is in the form 7^n .

Thus, decimal expression is non-terminating repeating

(vi)

 $\frac{23}{2^3 \times 5^2}$ The denominator is in the form $2^n \times 5^n$



Thus, decimal expression is terminating

(vii)

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

The denominator is in the form $2^n \times 5^m \times 7^p$

Thus, decimal expression is non-terminating repeating

(viii)

 $\frac{6}{15} = \frac{2}{5}$ The denominator is in the form 5ⁿ Thus, decimal expression is terminating

(ix)

$$\frac{35}{50} = \frac{7}{10}$$

50 10

The denominator is in the form $2^m \times 5^n$

Thus, decimal expression is terminating



(X)

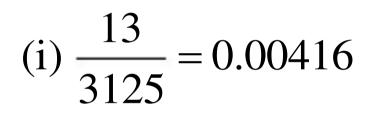
 $\frac{77}{210} = \frac{11}{30}$ $30 = 2 \times 3 \times 5$

The denominator is in the form $2^m \times 5^n \times 3^p$

Thus, decimal expression is non-terminating repeating

Question 2: Write down the decimal expansions of those rational numbers in Question 1 above which have terminating decimal expansions.

Solution:



(ii)
$$\frac{17}{8} = 2.125$$

(iv)
$$\frac{15}{1600} = 0.009375$$

(vi)
$$\frac{23}{200} = 0.115$$

(viii) $\frac{6}{15} = 0.4$

(ix) $\frac{35}{50} = 0.7$

Question 3: The following real numbers have decimal expansions as given below. In each case, decide whether they are rational or not, If they are rational, and of the form $\frac{p}{2}$, what

can you say about the prime factor of g?

Solution:

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 \boldsymbol{q}



(i)

43.123456789 q is the form of $2^m \times 5^n$

(ii)

0.120120012000.....

The decimal expression is neither terminating nor recurring

(iii)



The decimal expression is non terminating recuring

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