BYJU'S The Learning App

# CBSE Class 10 Maths Chapter 1 – Real Numbers

## Objective Questions

**Introduction to Real Numbers**

**1.** What is the least number that must be added to 1056 so the number is divisible by 23?

(A) 0
(B) 3
(C) 2
(D) 1

**Answer:** (C) 2

**Solution:** We have,
23) 1056 (45
1035
––––
21
––––
On dividing 1056 by 23, we got 21 as remainder.
⇒ If we add 23 - 21 = 2 to the dividend 1056, we will get a number completely divisible by 23.
∴ Required number = (23 - 21) = 2

**2.** The difference of two numbers is 1365. On dividing the larger number by the smaller, we get 6 as quotient and the 15 as remainder. What is the smaller number?

(A) 360

(B) 295

(C) 270

(D) 240

**Answer:** (c) 270

**Solution:** Let the smaller number be x.
⇒ Larger number = (x+1365)

$\Rightarrow x+1365=6x+15$
$\Rightarrow 5x=1350$
$\Rightarrow x=270$

$\therefore$ Larger number is (270 + 1365) = 1635
and smaller number is 270.

**3.** Euclid's division lemma states "Given positive integers a and b, there exist unique integers q and r satisfying a=bq+r". Which of the following is true for r?

(A) $r>a$

(B) $r<0$

(C) $0\le r<b$

(D) $r>b$

**Answer:** (C) $0\le r<b$

**Solution:** Euclid's division lemma:
Given positive integers a and b, there exist unique integers q and r satisfying a = bq + r where $0\le r<b$
Basically, it can be observed that remainder can never be more than the divisor, and is a non-negative integer (could be zero).

**4.** a and b, when divided by 7 and 6 respectively, leave remainders p and q respectively. What is the maximum value of p + q?

(A) 5

(B) 6

(C) 12

(D) 11

**Answer:** (D) 11

**Solution:** There exist integers m and n such that a = 7m + p and b = 6n + q such that
$0<p<7 \Rightarrow$
Maximum value of p will be 6.
$0<q<6 \Rightarrow$
Maximum value of p will be 5.
Therefore, the maximum value of p + q will be 11.

**5.** If HCF (1008, 20) = HCF (20, a) = HCF (a, b) where $1008=20\times q+a$; $20=a\times m+b$ where (q, a) and (m, b) are positive integers satisfying Euclid's Division Lemma. What could be the values of a and b?

(A) 24, 8

(B) 20, 8

(C) 10, 4

(D) 8, 4

**Answer:** (D) 8, 4

**Solution:** If $p=d\times q+r$, $(p>q)$ where p, q, d, r are integers and for a given (p, d), there exist a unique (q, r), then HCF (p, d) = HCF (d, r). Because this relation holds true, the Euclid's Division Algorithm exists in a step by step manner. So, to find the HCF (1008, 20), we use Euclid's division lemma at every step.

Step 1: $1008=20\times 50+8 \Rightarrow$ HCF(1008, 20) = HCF(20,8) $\Rightarrow$ a could be 8
Step 2: $20=8\times 2+4 \Rightarrow$ HCF(20, 8) = HCF(8,4) $\Rightarrow$ b could be 4
Step 3: $8=4\times 2+0$

HCF = 4
Since $1008=20\times q+a$ where q and a are positive integers satisfy Euclid's Division Lemma, we must have $0\le a<20$. So a is surely 8 and b is 4.

**Revisiting Irrational Numbers**

**6.** Which one of the following can't be the square of a natural number?

(A) 42437

(B) 20164

(C) 81225

(D) 32761

**Answer:** (A) 42437

**Solutions:** We know that the square of a natural number never ends in 2, 3, 7 and 8.

∴ 42437 can't be the square of a natural number.

**7.** If the number 91876y2 is completely divisible by 8, then the smallest whole number in place of y will be:

(A) 2
(B) 4
(C) 3
(D) 1

**Answer:** (C) 3

**Solution:** For a number to be divisible by 8, the last three digits must be divisible by 8.

Here, 6y2 must be divisible by 8.

For y=3, 632 is divisible by 8.

**8.** If x and y are the two digits of the number 653xy such that this number is divisible by 80, then x + y =?

(A) 4 or 8
(B) 6
(C) 4
(D) 8

**Answer:** (B) 6

**Solution:** If the number is divisible by another number, it will be divisible by its factors too.

The factors of $80=2\times5\times8$

For the number to be divisible by both 2 and 5, the last digit should be 0

So, y=0

So we can rewrite the number as 653x0

Now For the number to be divisible by 8; last 3 digits should be divisible by 8

So 3x0 should be divisible by 8

So, x can be either 2 or 6 since 320 and 360 are divisible by 8

If x=2; then the number becomes 65320 which is not divisible by 80

If x=6; then the number becomes 65360 which is divisible by 80

Hence the value of x=6

So, x+y=6+0 = 6

**9.** Which among the following options is irrational?

(A) 3.1415926535... (non-repeating and non-terminating)
(B) 10.2
(C) $(0.2)^2$
(D) $0.2$

**Answer:** (A) 3.1415926535... (Non-repeating and non-terminating)

**Solution:** Non-terminating and non-repeating decimals are irrational.

If the denominator of a rational number is in the form of $2^n 5^m$ where n and m are non-negative integers, then the rational number is terminating.

$0.2=\frac{2}{10}=\frac{2}{2\times 5}$

∴ 0.2 has terminating decimal and is a rational number.

3.1415926535... is non-terminating and non-repeating.

∴ 3.1415926535... is irrational.

$\frac{1}{0.2} = \frac{10}{2}$

$\therefore \frac{1}{0.2}$ has terminating decimal and is a rational number.

$(0.2)^2 = (\frac{0.2}{10})^2 = (\frac{0.2}{2\times5})^2$

$(0.2)^2$ has terminating decimal and is a rational number.

**10.** 's' is called irrational if it cannot be written in the form of _____ where p and q are integers and ______

(A) $\frac{P}{Q}$, p = 0

(B) pq , p ≠ 0

(C) $\frac{P}{Q}$, q $\neq 0$

(D) $\frac{P}{Q}$, q $= 0$

**Answer:** (C) $\frac{P}{Q}$, q $\neq 0$

**Solution**: 's' is called irrational if it cannot be written in the form of pq, where p and q are integers and q ≠ 0

**Revisiting Rational Numbers and Their Decimal Expansions**

**11.** Write down the decimal expansions of : $\frac{13}{6250}$

(A) 0.0208

(B) 0.00208

(C) 0.00512

(D) 0.00416

**Answer:** (B) 0.00208

**Solution:** $\frac{13}{6250} = \frac{13}{2^1 . 5^5}$

To get the denominator in powers of 10, multiply both numerator and denominator by $2^4$.

$\Rightarrow \frac{13}{6250} = \frac{13 \times 2^4}{5^5 \times 2^5}$

$\frac{13}{6250} = 13 \text{ x } \frac{2^4}{10^5} = \frac{208}{10^5} = 0.00208$

**12.** Without actually performing the long division, state whether the following rational numbers will have a terminating decimal expansion or a non-terminating decimal expansion: $\frac{23}{8}$

(A) non-terminating non - repeating decimal

(B) non-terminating repeating decimal

(C) non-terminating decimal

(D) terminating decimal

**Answer:** (D) terminating decimal

**Solution:** The given number is $\frac{23}{8}$

We know a rational number is expressed in simplest form $\frac{p}{q}$ and if q can be expressed as

$2^m \times 5^n$, then it is a terminating decimal

Clearly, 2 and 5 are not the factors of 23

8 can be expressed in terms of its primes as 2×2×2

Or, 8 =$2^m.\ 5^n$, where m = 3 and n = 0

Since q can be expressed in the form of$2^m.\ 5^n$, we can say $\frac{23}{8}$ is a terminating decimal.

**13.** Without actually performing the long division, state whether the following rational number will have a terminating decimal expansion or a non-terminating decimal expansion:$\frac{7^3}{2^3 \times 5^2}$ and $\frac{3\times 7^3}{2^3 \times 3}$

(A) both have terminating decimal expansion

(B) $\frac{7^3}{2^3 \times 5^2} - \text{terminating}$ $\frac{3\times 7^3}{2^3 \times 3}$- non-terminating

(C) both have non-terminating decimal expansion

(D)$\frac{7^3}{2^3 \times 5^2} - \text{non} - \text{terminating}$ $\frac{3\times 7^3}{2^3 \times 3}$- terminating

**Answer:** (A) both have terminating decimal expansion

**Solution:** If the denominator of a rational number is in the form of $2^n.\ 5^m$, where m and n are non-negative integers, then the rational number has terminating decimal expansion.

$\frac{7^3}{2^3 \times 5^2}$ has terminating decimal expansion

$\frac{3\times 7^3}{2^3 \times 3}$= $\frac{7^3}{2^3 \times 5^0}$ has terminating decimal expansion.

**14.** Decide whether 52.123456789 is a rational number or not. If rational (in the form $\frac{P}{Q}$), what can you say about the prime factors of q?

(A) Rational Number, Prime factor of q will be only 2.
(B) Rational Number, Prime factor of q will have a factor other than 2 or 5.
(C) Not rational number
(D) Rational Number, Prime factors of q will have either 2 or 5 or both

**Answer:** (D) Rational Number, Prime factors of q will have either 2 or 5 or both

**Solution:** It is rational because decimal expansion is terminating. Therefore, it can be expressed in $\frac{P}{Q}$ form where factors of q are of the form $2^n.\ 5^m$ and n and m are non-negative integers.

**15.** Let x=$\frac{P}{Q}$ be a rational number, such that the prime factorization of q is not of the form $2^n 5^m$, where n, m are non-negative integers. Then, x has a decimal expansion which is _____________

**(A)** Terminating

**(B)** Non-terminating non-repeating

**(C)** Terminating non-repeating

**(D)** Non-terminating repeating (recurring)

**Answer:** (D) Non-terminating repeating (recurring)

**Solution**: Non-terminating repeating (recurring)

**The Fundamental Theorem of Arithmetic**

**16.** Find the HCF of 1848, 3058 and 1331.

(A) 9

(B) 14

(C) 13

(D) 11

**Answer:** (D) 11

**Solution:** Consider first two numbers 1848 and 3058, where 3058 > 1848.

$3058 = 1848 \times 1 + 1210$
$1848 = 1210 \times 1 + 638$
$1210 = 638 \times 1 + 572$
$638 = 572 \times 1 + 66$
$572 = 66 \times 8 + 44$
$66 = 44 \times 1 + 22$
$44 = 22 \times 2 + 0$
∴ HCF of 1848 and 3058 is 22.

Let us find the HCF of the numbers 1331 and 22.
$1331 = 22 \times 60 + 11$
$22 = 11 \times 2 + 0$
HCF of 1331 and 22 is 11

∴ HCF of the three given numbers 1848, 3058 and 1331 is 11.

**17.** 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?

(A) 8

(B) 7

(C) 6

(D) 9

**Answer:** (A) 8

**Solution:** Maximum number of columns = HCF of 616 and 32
$616=2^3\times7\times11$
$32= 2^5$
∴ HCF of 616 and 32 = $2^3$ =8

**18.** Find the biggest number which can divide both 324 and 144.

(A) 18

(B) 36

(C) 9

(D) 21

**Answer:** (B) 36

**Solution:** Finding the biggest number that will divide both 324 and 144 is same as finding the HCF of both.
Prime factorizing the two numbers we get,
$324=3\times3\times3\times3\times2\times2$
$144=3\times3\times2\times2\times2\times2$
Now, taking the common factors between them gives us the HCF.
Therefore, HCF $=2\times2\times3\times3=36$

**19.** Which of the following does not satisfy the following property?
A number which divides 542 and 128 and leaves a remainder 2 in both cases.

(A) 12

(B) 9

(C) 6

(D) 3

**Answer:** (A) 12

**Solution:** Suppose the number be x. Since it divides 542 and 128 leave a remainder 2, using the Euclid's division algorithm for 542 and x, $542 = ax + 2$, where a is an integer. So, $ax = 542 – 2 = 540$, i.e. x is a factor of 540. Similarly x is a factor of $(128 - 2)$.

The HCF of $542 – 2 = 540$, $128 – 2 = 126$:
Step 1: $540=126\times4+36$
Step 2: $126=36\times3+18$
Step 3: $36=18\times2+0$

HCF is 18
3, 6, 9 are factors of 18. 12 is the only number which isn't a factor and hence doesn't satisfy the above property.

**20.** p = $2^2.3^2.q^2$ (where q is a prime < 7) is the prime factorization representation of 'p'. What is the value of p?

(A) p = 700

(B) p = 900

(C) p = 36

(D) can't say

**Answer:** (B) p = 900

**Solution:** So p is 5 and the number is 900.