PRACTICE MCQs

CLASS 10 MATHS (TERM - I)

REAL NUMBERS

BY

learn-o-hub

learning simplified

Question 1:

If two positive integers a and b are written as $a = p^3q^2$ and $b = pq^3$ where p, q are prime numbers, then HCF (a, b) is:

(a) pq

(b) pq^2

(c) p^3q^3

(d) p^2q^2

Answer: (b) pq^2

$a = p^3q^2 = p * p * p * q * q$

$b = pq^3 = p * q * q * q$

Now, HCF(a, b) = $p * q * q = pq^2$

Question 2:

987/10500 will have

(a) Terminating decimal expansion

(b) Non-Terminating Non repeating decimal expansion

(c) Non-Terminating repeating decimal expansion

(d) None of these

Answer: (a) Terminating decimal expansion

$987/10500 = 47/500 = 47/(5^3 * 2^2)$

Since the denominator has factor $5^3 * 2^2$ and which is of the type $5^m * 2^n$,

So, this is a terminating decimal expansion.

Question 3:

The ratio of LCM and HCF of the least composite and the least prime numbers is

(a) 1 : 2

(b) 2 : 1

(c) 1 : 1

(d) 1 : 3

Answer: (b) 2 : 1

Least composite number = 4

And least prime number = 2

Now, 4 = 1 * 2 * 2

And 2 = 1 * 2

Now, LCM(2, 4) = 1 * 2 * 2 = 4

And HCF(2, 4) = 1 * 2 = 2

So, ratio = LCM(2, 4)/HCF(2, 4) = 4/2 = 2/1

=> LCM(2, 4) : HCF(2, 4) = 2 : 1

Question 4:

On a morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm, respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps?

(a) 2520 cm

(b) 2525 cm

(c) 2555 cm

(d) 2528 cm

Answer: (a) 2520 cm

We need to find the L.C.M of 40, 42 and 45 cm to get the required minimum distance.

40 = 2 * 2 * 2 * 5

42 = 2 * 3 * 7

45 = 3 * 3 * 5

LCM = 2 * 2 * 2 * 3 * 3 * 5 * 7 = 2520

So, the minimum distance is 2520 cm.

Question 5:

Express 98 as a product of its primes

(a) $2^2 * 7$

(b) $2^2 * 7^2$

(c) $2 * 7^2$

(d) $2^3 * 7$

Answer: (c) $2 * 7^2$

The product of prime of 98 can be calculated as

$98 = 2 * 7 * 7 = 2 * 7^2$

Question 6:

LCM of the given number ‘x’ and ‘y’ where y is a multiple of ‘x’ is given by

(a) x

(b) y

(c) xy

(d) x/y

Answer: (b) y

First number = x

Second number y is multiple of x

=> y = kx, where k is any constant.

Now, LCM(x, y) = LCM (x, kx) = kx = y

Question 7:

If HCF (306, 657) = 9, then LCM (306, 657) =

(a) 22388

(b) 22238

(c) 22383

(d) 22338

Answer: (d) 22338

We know that LCM * HCF = product of the two numbers

=> LCM (306, 657) * HCF (306, 657) = 306 * 657

=> LCM (306, 657) * 9 = 306 * 657

=> LCM (306, 657) = (306 * 657)/9

=> LCM (306, 657) = 306 * 73

=> LCM (306, 657) = 22338

Question 8:

Prime factors of the denominator of a rational number with the decimal expansion 44.123 are

(a) 2, 3

(b) 2, 3, 5

(c) 2, 5

(d) 3, 5

Answer: (c) 2, 5

44.123 = 44123/1000

Now, prime factors of denominator = Prime factor of 1000

$= (1000)^3$

$= (2 * 5)^3$

$= 2^3 * 5^3$

So, the prime factors are 2, 5.

Question 9:

The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is

(a) 10

(b) 100

(c) 504

(d) 2520

Answer: (d) 2520

The least number divisible by all the number from 1 to 10 will be the L.C.M of following number,

1=1

2=2 * 1

3=3 * 1

4=2 * 2

5=5 * 1

6=2 * 3

7 = 7 * 1

8 = 2 * 2 * 2

9 = 3 * 3

10 = 2 * 5

So, the L.C.M. of these numbers is 1 * 2 * 2 * 2 * 3 * 3 * 5 * 7 = 2520

Hence, the least number divisible by all the numbers from 1 to 10 is 2520.

Question 10:

If $a^2 = 23/25$, then a is

(a) rational

(b) irrational

(c) whole number

(d) integer

Answer: (b) irrational

Given, $a^2 = 23/25$

=> $a = \sqrt{(23/25)}$

=> $a = \sqrt{23}/\sqrt{25}$

=> $a = \sqrt{23}/5$

Since, $\sqrt{23}$ is irrational,

So, the given number is an irrational number.

Question11:

If the HCF of 65 and 117 is expressible in the form 65m – 117, then the value of m is

(a) 4

(b) 2

(c) 1

(d) 3

Answer: (b) 2

65 = 5 * 13

117 = 3 * 3 * 13

Therefore, HCF of 65 and 117 is 13.

So, 65m – 117 = 13

=> 65m = 130

=>m = 2

Question12:

4 Bells toll together at 9.00 am. They toll after 7, 8, 11 and 12 seconds respectively. How many times will they toll together again in the next 3 hours?

(a) 3

(b) 4

(c) 5

(d) 6

Answer: (c) 5

Given, bells toll after 7, 8, 11 and 12 seconds respectively.

Now, LCM(7,8,11,12)=1848

After every 1848 seconds, they will toll together.

In 3 hours, there are 3600 * 3 = 10800 seconds.

Number of times the bell would toll = 10800/1848 = 5

So, they will toll together 5 times in the next 3 hours.

Question13:

If LCM(x, 18) = 36 and HCF(x, 18) = 2, then x is

(a) 2

(b) 3

(c) 4

(d) 5

Answer: (c) 4

We know that

LCM * HCF = product of two numbers

=> 36 * 2 = x * 18

=> x = 72/18

=> x = 4

Question14:

The decimal expansion of the rational number 14587/1250 will terminate after

(a) One decimal place

(b) Two decimal places

(c) Three decimal places

(d) Four decimal places

Answer: (d) Four decimal places

We have 14587/1250 = 14587/(2^1 * 5^4)

Let x = p/q be a rational number such that the prime factorization of q is of the form 2^m * 5^n, where m and n are non-negative integers.

Then, x has a decimal expression which terminates after k places of decimals where k is the larger of m and n.

The denominator of given decimal number is of the form $2^m * 5^n$.

Hence, it has terminating decimal expansion which terminates after 4 places of decimal.

Question15:

The least positive integer divisible by 20 and 24 is

(a) 30

(b) 60

(c) 90

(d) 120

Answer: (d) 120

Given numbers are 20 and 24

Least positive integer divisible by 20 and 24 is LCM (20, 24).

Prime factorization of 20 = 2 * 2 * 5

Prime factorization of 24 = 2 * 2 * 2 * 3

Now, LCM(20, 24) = 2 * 2 * 2 * 3 * 5 = 120

Hence, 120 is the least positive integer divisible by 20 and 24.

Question 16:

HCF and LCM of two numbers is 9 and 459 respectively. If one of the numbers is 27, then the other number is

(a) 139

(b) 153

(c) 178

(d) 221

Answer: (b) 153

HCF * LCM= product of two numbers

Let the other number be x

=> 9 * 459 =27 * x

=> x = (9 * 459)/27

=> x =153

Question 17:

If sum of two numbers is 1215 and their HCF is 81, then the possible number of pairs of such numbers is

(a) 2

(b) 3

(c) 4

(d) 5

Answer: (c) 4

Given, HCF of two numbers is 81.

So, 81 is a factor of both numbers.

Let two numbers are 81x and 81y, where x and y are co-prime numbers.

Given, sum of numbers = 1215

=> 81x + 81y = 1215

=> 81(x + y) = 1215

=> x + y = 1215/81

=> x + y = 15

Now, possible pair of values of x and y are:

(1, 14), (2, 13), (4, 11) and (7, 8)   [Since x and y are co-prime numbers]

So, there are 4 such pairs are possible.

Question 18:

The HCF of two numbers is 23 and the other two factors of their LCM are 13 and 14. The larger of the two numbers is:

(a) 276

(b) 299

(c) 322

(d) 345

Answer: (c) 322

Given, HCF of two numbers is 23.

So, 23 is a factor of both numbers.

Again, other two factors of their LCM are 13 and 14.

So, the numbers are (13 * 23) and (14 * 23) i.e. 299 and 322

Hence, the larger number is 322.

Question 19:

Three number are in the ratio of 3 : 4 : 5 and their LCM is 2400. Their HCF is

(a) 40

(b) 80

(c) 120

(d) 200

Answer: (a) 40

Given, numbers are in the ratio 3 : 4 : 5

Let the numbers be 3x, 4x and 5x.

Then, their LCM = 60x

So, 60x = 2400

=> x = 40

The numbers are (3 * 40), (4 * 40) and (5 * 40).

Hence, required HCF = 40 [Since 40 is the factor of all numbers]

Question 20:

The product of two numbers is 4107. If the HCF of these numbers is 37, then the greater number is

(a) 101

(b) 107

(c) 111

(d) 185

Answer: (c) 111

Let the numbers be 37a and 37b.

Then, 37a * 37b = 4107

=> 37(a * b) = 4107

=> a * b = 3

Now, co-primes with product 3 are (1, 3).

So, the required numbers are (37 * 1, 37 * 3) i.e. (37, 111).

Hence, Greater number = 111

Question 21:

If A = 2n + 13, B = n + 7, where n is a natural number then HCF of A and B is:

(a) 2

(b) 1

(c) 3

(d) 4

Answer: (b) 1

Taking different values of n, we get

When n = 1, A = 15, B = 8

When n = 2, A = 17, B = 9

When n = 3, A = 19, B = 10 and so on....

Now for each value of n, A and B will have no common factor other than 1.

So, HCF = 1

Question 22:

The LCM of two prime numbers p and q ($p > q$) is 221. The value of $3p - q$ is

(a) 4

(b) 28

(c) 38

(d) 48

Answer: (c) 38

Given, p and q are prime numbers,

So, HCF(p, q) = 1

We know that,

Product of two numbers = LCM * HCF

=> $p * q = 221$

=> $p * q = 13 * 17$

Since $p > q$

So, $p = 17$ and $q = 13$

Now, $3p - q = 3 * 17 - 13 = 51 - 13 = 38$

Question 23:

The smallest number by which 1/13 should be multiplied so that its decimal expansion terminates after two decimal places is

(a) 13/100

(b) 13/10

(c) 10/13

(d) 100/13

Answer: (a) 13/100

We have to terminate the decimal after 2 decimal places.

So, we divide the number by 100.

Now, our number becomes (1/13) * (1/100)

Again, we have to eliminate 13 from the denominator.

So, we multiply by 13.

Now, (1/13) * (1/100) * 13 = 1/100 = 0.01

Hence, if we multiply 13/100, then the decimal expansion of the number 1/13terminates after two decimal places.

Case study based questions

Question 24:

Read the following text and answer the question the following questions.

"LCM and HCF are widely used in number system especially in real numbers to find relationship between different numbers and their general forms. Also, product of two positive integers is equal to the product of their LCM and HCF."

(i). HCF of the smallest prime number and the smallest composite number is

(a) 0

(b) 1

(c) 2

(d) Product of these numbers

(ii).Let $x = p^3q^2$ and $y = p^2q^3$ then HCF(x, y) =

(a) p^3q^3

(b) p^2q^2

(c) pq^2

(d) p^2q

(iii).If x = 24 and y = 36 and HCF(24, 36) = 12, then LCM(24, 36) =

(a) 24

(b) 36

(c) 48

(d) 72

(iv).If HCF of 408 and 1032 is expressible in the form of 1032 * 2 + 408 * p, then the value of p is

(a) -2

(b) -5

(c) -7

(d) -9

(v).If p = HCF(8, 12) and q = LCM(8, 12), then p^2q is

(a) 236

(b) 294

(c) 356

(d) 384

Answers:

(i). (c) 2

Smallest prime number = 2

And smallest composite number = 4

Now, 2 = 1 * 2

And 4 = 1 * 2 * 2

Now, HCF(2, 4) = 1 * 2 = 2

(ii). (b) p^2q^2

Given, x = p^3q^2 = p * p * p * q * q

And y = p^2q^3 = p * p * q * q * q

Now, HCF(x, y) = p * p * q * q = p^2q^2

(iii). (d) 72

Given, x = 24 and y = 36 then HCF (24, 36) = 12

We know that for two positive integers

LCM (a, b) * HCF(a, b) = a * b

=> LCM (24, 36) * HCF(24, 36) = 24 * 36

=> LCM (24, 36) * 12 = 24 * 36

=> LCM (24, 36) = (24 * 36)/12 = 72

(iv). (b) -5

HCF of 408 and 1032 is 24.

Now, 1032 * 2 + 408 *p = 24

=>408p = 24 – 2064

=> 408p = -2040

=>p = -5

(v). (d) 384

8 = 2 * 2 * 2

12 = 2 * 2 * 3

Now, p = HCF(8, 12) = 2 * 2 = 4

And q = LCM(8, 12) = 2 * 2 * 2 * 3 = 24

Now, p^2q = 4 * 4 * 24 = 384

Question 25:

Decimal form of rational numbers can be classified into two types:

1. 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 co-prime and the prime factorisation of q is of the form $2^n * 5^m$, where n, m are non-negative integers and vice-versa.

2. Let x = p/q be a rational number, such that the prime factorisation of q is not of the form $2^n * 5^m$, where n, m are non-negative integers. Then x has a non-terminating repeating decimal expansion.

(i). Which of the following is a terminating decimal expansion?

(a) 64/455

(b) 29/343

(c) 77/210

(d) 15/1600

(ii). $129/(2^2 * 5^7 * 7^5)$ is a/an __________ decimal.

(a) terminating

(b) non-terminating

(c) terminating and recurring

(d) None of these

(iii). $23/(2^3 * 5^2)$ =

(a) 0.115

(b) 0.125

(c) 0.135

(d) 0.145

(iv). $241/(2^5 * 5^3)$ is a ________ decimal.

(a) terminating

(b) recurring

(c) non-terminating and non-recurring

(d) None of these

(v). For which of the following value(s) of p, $251/(2^3 * p^2)$ is a non-terminating recurring decimal?

(a) 7

(b) 11

(c) 19

(d) All of the above

Answer:

(i). (d) 15/1600

Given, number is 64/455.

Factorize the denominator we get

455 = 5 * 7 * 13

There are 7 and 13 also in denominator.

Since the denominator is not in form of $2^n * 5^m$.

Hence, 64/455 is not terminating.

Given, number is 29/343

Factorize the denominator we get

343 = 7 * 7 * 7 = 7^3

There are 7 also in denominator so denominator is not in form of $2^n * 5^m$.

Hence it is non - terminating.

Simplify it by dividing nominator and denominator both by 7 we get 11/30

Given, number is 77/210

Now, 77/210 = 11/30

Factorize the denominator we get

30 = 2 * 3 * 5

Denominator has 3 also in denominator.

Since the denominator is not in form of $2^n * 5^m$.

Hence, it is non-terminating.

Given, number is 15/1600

Factorize the denominator we get

1600 = 2 * 2 * 2 * 2 * 2 * 2 * 5 * 5 = $2^6 * 5^2$

Since the denominator is in form of $2^n * 5^m$

Hence, 15/1600 is terminating.

(ii). (b) non-terminating

Given, number is $129/(2^2 * 5^7 * 7^5)$

Denominator has 7 in denominator so denominator is not in form of $2^n * 5^m$

Hence it is non-terminating.

(iii). (a) 0.115

$23/(2^3 * 5^2) = 23/200 = 0.115$

(iv). (a) terminating

Given, number is $241/(2^5 * 5^3)$

Since the denominator is in form of $2^n * 5^m$

Hence $241/(2^5 * 5^3)$ is terminating.

(v). (d) All of the above

The fraction form of a non-terminating recurring decimal will have at least one prime number other than 2 and 5 as its factors in denominator.

So, p can take either of 7, 11 and 19.

****