Chapter - 1
Real Numbers

Q: 1 **Let p be a prime number and k be a positive integer.**

If p divides k^2, then which of these is DEFINITELY divisible by p ?

$\frac{k}{2}$	k	$7k$	k^3

1. only k
2. only k and $7k$
3. only k, $7k$ and k^3
4. all - $\frac{k}{2}$, k, $7k$ and k^3

Q: 2 **$\sqrt{n}$ is a natural number such that $n > 1$.**

Which of these can DEFINITELY be expressed as a product of primes?

i) $\sqrt{n}$
ii) n
iii) $\frac{\sqrt{n}}{2}$

1. only ii)
2. only i) and ii)
3. all - i), ii) and iii)
4. (cannot be determined without knowing n)

Q: 3 **The HCF of k and 93 is 31, where k is a natural number.**

Which of these CAN be true for SOME VALUES of k ?

i) k is a multiple of 31.
ii) k is a multiple of 93.
iii) k is an even number.
iv) k is an odd number.

1. only ii) and iii)
2. only i), ii) and iii)
3. only i), iii) and iv)
4. all - i), ii), iii) and iv)

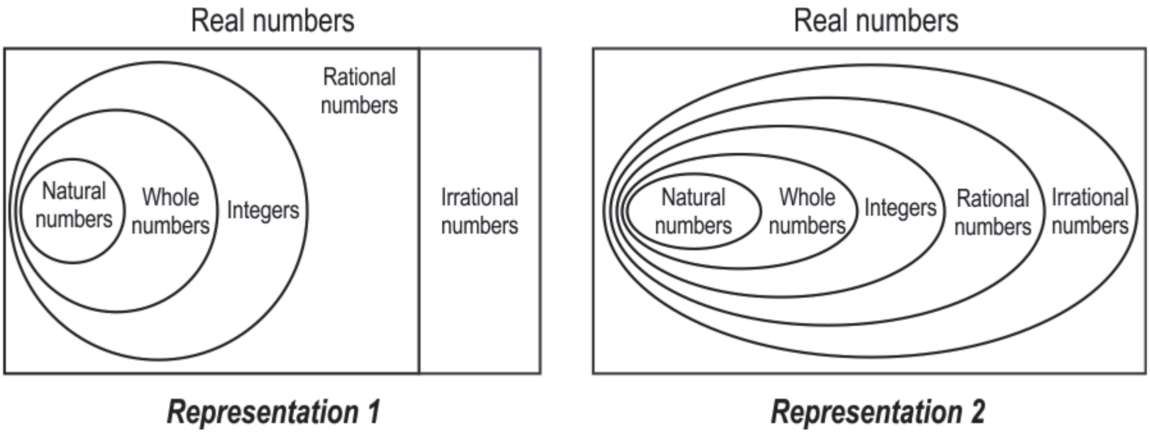
Q: 4 **Let p and q be two natural numbes such that $p > q$. When p is divided by q, the remainder is r.**

i) r CANNOT be ($p - q$).
ii) r CAN either be q or ($p - q$).
iii) r is DEFINITELY less than q.

Which of the above statements is/are true?

1. only ii)
2. only iii)
3. only i) and iii)
4. (cannot be determined without knowing the values of p, q and r)

Q: 5 **Two representations of real numbers are shown below.** **[1]**



Which one is correct?

Q: 6 **β and δ are positive integers. HCF of β and 630 is 210. HCF of δ and 110 is 55.** **[2]**

Find the HCF of β, 630, δ and 110 using Euclid's division algorithm. Show your steps.

Q: 7 **A dining hall has a length of 8.25 m, breadth of 6.75 m, and height of 4.50 m. What is the length of the longest unmarked ruler that can exactly measure the three dimensions of the hall? Show your steps and give valid reasons.** **[2]**

Q: 8 **GrowMore Plantations have two rectangular fields of the same width but different lengths. They are required to plant 84 trees in the smaller field and 231 trees in the larger field. In both fields, the trees will be planted in the same number of rows but in different numbers of columns.** **[2]**

i) What is the most number of rows that can be planted in this arrangement? Show your work.
ii) If the trees are planted in the number of rows obtained in part (i), how many columns will each field have?

Q: 9 **M and N are positive integers such that M =** $p^2 q^3 r$ **and N =** $p^3 q^2$**, where** p, q, r **are prime numbers.** **[2]**

Find LCM(M, N) and HCF(M, N).

Q: 10 **Find all pairs of positive integers whose sum is 91 and HCF is 13. Show your work.** **[3]**

Q: 11 **The number 58732045 is divided by a number between 3256 and 3701.** **[3]**

State true or false for the below statements about the remainder and justify your answer.

i) The remainder is always less than 3701.
ii) The remainder is always more than 3256.
iii) The remainder can be any number less than 58732045.

Q: 12 **Hemant claimed that any positive integer can be expressed either as 3 n, (3 n - 2) or (3 n - 1).** **[3]**

Prove or disprove Hemant's claim.

Q: 13 **(n^2 + 3 n - 4) can be expressed as a product of only 2 prime factors where n is a natural number.** **[1]**

Find the value(s) of n for which the given expression is an even composite number. Show your work and give valid reasons.

Q: 14 **The prime factorisation of a prime number is the number itself.** **[1]**

How many factors and prime factors does the square of a prime number have?

The table below gives the correct answer for each multiple-choice question in this test.

Q.No	Correct Answers
1	3
2	2
3	3
4	2

Q.No	Teacher should award marks if students have done the following:	Marks
5	Writes that Representation 1 is correct.	1
6	Finds the HCF of 210 and 55 using Euclid's division algorithm as: 210 = (55 × 3) + 45 55 = (45 × 1) + 10 45 = (10 × 4) + 5 10 = (5 × 2) + 0	1
	Concludes that HCF of β, 630, δ and 110 is 5.	1
7	Identifies and reasons that the length of the longest ruler should be equal to the HCF of the three lengths.	1
	Finds the HCF of the three numbers as Prime factorization of 825 = $3 \times 5^2 \times 11$ Prime factorization of 675 = $3^3 \times 5^2$ Prime factorization of 450 = $2 \times 3^2 \times 5^2$ Highest Common factor, HCF = $3 \times 5^2 = 75$ Mentions the length of the longest ruler as 75 cm or 0.75 m. (Award 0.5 marks if the length is correct but the unit is incorrect).	1
8	i) Identifies that the number of rows for the two fields must be HCF of 84 & 231, and applies an appropriate method to find the HCF as 21.	1
	ii) Finds the number of columns in the smaller field as $\frac{84}{21} = 4$.	0.5
	Finds the number of columns in the larger field as $\frac{231}{21} = 11$.	0.5
9	Finds LCM(M, N) as p^3q^3r.	1
	Finds HCF(M, N) as p^2q^2.	1

Q.No	Teacher should award marks if students have done the following:	Marks
10	Assumes the pair of numbers to be x and y. Writes that, since HCF(x , y) = 13, x and y will be of the form, $x = 13p$ $y = 13q$ where, p and q are co-primes.	0.5
	Uses the given information and writes, $x + y = 91$ $\Rightarrow 13p + 13q = 91$ $\Rightarrow p + q = 7$	0.5
	Finds all possible values of p and q as: 1 and 6 2 and 5 3 and 4	1
	Finds all possible values of x and y as: 13 and 78 26 and 65 39 and 52	1
11	i) Writes true and justifies the answer. For example, writes that Euclid's Division Lemma states that the remainder is always less than the divisor and all the divisors are less than 3701.	1
	ii) Writes false and justifies the answer. For example, the remainder is always less than the divisor and the numbers from 0 to the divisor are all possible remainders.	1
	iii) Writes false and justifies the answer. For example, writes that Euclid's Division Lemma states that the remainder is always less than the divisor but cannot be any number less than the dividend.	1
12	Assumes the positive integer to be m and uses Euclid's division lemma with divisor as 3 to write the equation: $m = 3k + r$ where k is the quotient and r is the remainder.	0.5

Q.No	Teacher should award marks if students have done the following:	Marks
	Writes that, since the positive integer *m* is being divided by 3, the possible values of the remainder are 0, 1 or 2.	1
	Uses steps 1 and 2 to write that any positive integer *m* can be represented as: 3 *k*, 3 *k* + 1 or 3 *k* + 2	0.5
	Replaces 3 *k* with 3 *t* + 3 since these are equivalent by Euclid's division lemma to get: 3 *t* + 3, 3 *t* + 3 - 2 or 3 *t* + 3 - 1	0.5
	Rewrites the above expressions by using *n* = (*t* + 1) where *n* is an integer as: 3 *n*, 3 *n* - 2 or 3 *n* - 1 Hence, proves that Hemant's claim is correct.	0.5
13	Factorises the given expression as: (*n* - 1)(*n* + 4)	0.5
	Writes that, for the above to be an even composite number, one of the factors has to be 2 and hence: (*n* - 1) = 2 => *n* = 3	0.5
14	For the square of a prime number: number of factors = 3 number of prime factors = 1 (Award 0.5 marks for each correct number)	1