REAL NUMBERS

MULTIPLE CHOICE QUESTIONS AND OBJECTIVE QUESTIONS (1 MARK):
SECTION A

Q1. HCF of 8, 9, 25 is

a) 8
b) 9
c) 25
d) 1

Q2. Express 98 as a product of its primes

a) $2^2 \times 7$
b) $2^2 \times 7^2$
c) 2×7^2
d) $2^3 \times 7$

Q3. If the LCM of a and 18 is 36 and the HCF of a and 18 is 2, then a =?

a) 2 b) 3 c) 4 d) 1

Q4. If HCF (26, 169) = 13, then LCM (26, 169) is …

a) 26
b) 52
c) 338
d) 13

Q5. The product of a rational and irrational number is

a) Rational
b) Irrational
c) both of above
d) none of above

Q6. If HCF (16, y) = 8 and LCM (16, y) = 48, then the value of y is

a) 24
b) 16
c) 8
d) 48

Q7. The number 'π' is

a) natural number
b) rational number
c) irrational number
d) rational or irrational

Q8. The ratio between the LCM and HCF of 5, 15, 20 is:

a) 9 : 1
b) 4 : 3
c) 11 : 1
d) 12 : 1

Q9. The product of a non-zero number and an irrational number is:

a) always irrational
b) always rational
c) rational or irrational
d) one

Q10. L.C.M. of 23 × 32 and 22 × 33 is :

a) 23
b) 33
c) 23 × 33
d) 22 × 32

Q11. Find the LCM of smallest prime and the smallest odd composite natural number

Q12. If p and q are two coprime numbers, then find the HCF and LCM of p and q.

Q13. What is the greatest possible speed at which a man can walk 52 km and 91 km in an exact number of minutes?

Q14. Prime factorization of 120 is …

Q15. State fundamental theorem of arithmetic

Q16. Given that LCM (91, 26) = 182, then HCF (91, 26) is:

Q17. The values of x and y in the given figure are:

Q18. If the HCF of 65 and 117 is expressible in the form 65m – 117, then the valueof m is

a) 4
b) 2
c) 1
d) 3

Q19. If two positive integers a and b are written as a = p^3q^2 and b = pq^3; p, q are prime numbers, then HCF (a, b) is:

Q20. If two positive integers a, b are written as a = xy^2 and b = x^3y, where x, y are prime numbers, then find LCM (a, b).

Short Answer Type Questions (2 marks):

SECTION B

Q1. Find the prime factorization of 1152

Q2. Show that the product of two numbers 60 and 84 is equal to the product of their HCF and LCM

Q3. P and Q are two positive integers such that $P = p^3 q$ and $Q = (pq)^2$, where p and q are prime numbers. What is LCM (P, Q)?

Q4. The product of two numbers is 228096 and their LCM is 66. Find their HCF.

Q5. Prove that $\sqrt{5}$ is irrational

Q6. What is the LCM of smallest prime number and smallest composite number?

Q7. Prove that $\sqrt{3}$ is irrational

Q8. Find the sum of exponents of prime factors in the prime factorization of 216?

Q9. Prove that $\sqrt{2}$ is irrational

Q10. The difference of the irrational numbers $5 + \sqrt{2}$ and $5 - \sqrt{2}$?

Q11. If p and q are two coprime numbers, then p^3 and q^3 are?

Q12. Determine the prime factorisation of 2057?

Q13. Show that $5-\sqrt{3}$ is irrational

Q14. If $a=2^3\times3$, $b=2\times3\times5$, $c=3^n\times5$ and LCM [a,b,c] = $2^3\times3^2\times5$ then, n=?

Q15. Explain why $3 \times 5 \times 7 + 7$ is a composite number.

Q16. If n is an even prime number then, $2(7^n + 8^n)$ ends with?

Q17. Can the number 4n, n being a natural number, end with the digit 0? Give reasons.

Q18. If the HCF of 408 and 1032 is expressible in the form 1032 m -408x5 ,find m.

Q19. 144 cartons of coke cans and 90 cartons of Pepsi cans are to be stacked in a canteen. If each stack is of the same height and is to contain cartons of the same drink, what would be the greatest number of cartons each stack would have?

Q20. The length, breadth and height of a room are 825 cm, 675 cm and 450 cm respectively. Find the longest tape which can measure the three dimensions of the room exactly.

SHORT ANSWER QUESTIONS (3 MARKS):

SECTION C

Q1. Find the LCM and HCF of the following pairs of positive integers by applying the prime factorization method.

a) 225, 240 b) 52 ,63 ,162

Q2. Prove that $3\sqrt{2}$ is irrational

Q3. The LCM of two numbers is 64699, their HCF is 97 and one of the numbers is 2231.Find the other.

Q4. Two brands of chocolates are available in packs of 24 and 15 respectively. If I need to buy an equal number of chocolates of both kinds, what is the least number of boxes of each kind I would need to buy?

Q5. If the sum of LCM and HCF of two numbers is 1260 and their LCM is 900 more than their HCF then, find the product of two numbers.

Q6. Find HCF and LCM of 135 and 225 and verify the that HCF x LCM = Product of the two givennumbers.

Q7. Find HCF and LCM of 867 and 255 and verify the that HCF x LCM = Product of the two given numbers

Q8. Prove that $7 + 3\sqrt{2}$ is not a rational number.

Q9. Prove that $2 - 3\sqrt{5}$ is irrational number.

Q10. Is $(\sqrt{2} + \sqrt{3})^2$ and $(2- \sqrt{2})(2 + \sqrt{2})$ irrational? Justify your answer.

Q11. Prove that the difference and quotient of $(3 + 2\sqrt{3})$ and $(3 - 2\sqrt{3})$ are irrational.

Q12. Prove that $\sqrt{n}$ is not a rational number if n is not a perfect square.

Q13. Two bells toll at intervals of 24 minutes and 36 minutes respectively. If they toll together at 9am, after how many minutes do they toll together again, at the earliest?

Q14. There are 44 boys and 32 girls in a class. These students arranged in rows for a prayer in such a way that each row consists of only either boys or girls, and every row contains an equal number of students. Find the minimum number of rows in which all students can bearranged.

Q15. The LCM of two number is 14 times their HCF. The sum of LCM and HCF is 600.If one numberis 280, then find the other number.

Q16. 144 Cartons of coke can and 90 cartons of Pepsi can are to be stacked in a canteen. If eachstack is of the same height and is to contain cartons of the same drink. What would be thegreater number of cartons each stack would have?

Q17. Find the largest number that will divide 398 , 436 and 542 leaving reminders 7,11 and 15respectively.

Q18. Find the largest number which divides 70 and 125 leaving reminder 5 and 8 respectively.

Q19. Explain why 17 x 5 x 11 x 3 x 2 + 2 x11 is a composite number.

Q20. Can two numbers have 15 as their HCF and 175 as their LCM? Give reasons.

Long Answer Type Questions (4 marks):
SECTION D

Q1. Prove that $\sqrt{5}$ is an irrational number

Q2. Find HCF and LCM of 378, 180 and 420 by prime factorization method. Is HCF X LCM of these numbers equal to the product of given three numbers?

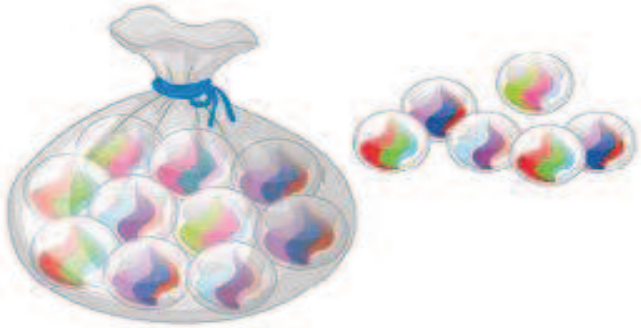
Q3. The sum of LCM and HCF of two numbers is 7380.If the LCM of these numbers is 7340 more than their HCF. Find the product of the two numbers

Q4. A charitable trust donates 28 different books of Maths,16 different books of science and 12 different books of Social Science to the poor students. Each student is given maximum number of books of only one subject of his interest and each student got equal number of books

i. Find the number of books each student got.

ii. Find the total number of students who got books.

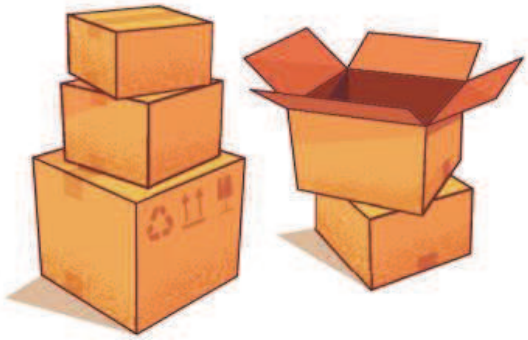
Q5. When the marbles in a bag are divided evenly between two friends, there is one marble left over When the same marbles are divided evenly among three friends, there is one marble left over .When the marbles are divided evenly among five friends, there is one marble left over.



i. What is the least possible number of marbles in the bag?

ii. What is another possible number of marbles in the bag?

Q6. Flipkart is an Indian e-commerce company , headquartered in Bangalore , Karnataka and incorporated in Singapore as a private limited company . The company initially focussed on online book sales before expanding into other product categories such as consumer electronics fashion, home essentials groceries and lifestyle products.



Flipkart sells 10 types of items which are packed into various sizes of cartons which are packed into various size of cartons which are given below

Carton type	Inner Dimension (l X b) cm^2
Small	6 x 8
Medium	12 x 24
Large	24 x 36
Extra Large	36 x 48
XXL	48 x 96

Flipkart places supporting thermocol sheets inside every package along the edges. The company thought of buying same sized sheets for all type of cartons

i. What should be the maximum size of the sheet that fits into all type of cartons?

ii. What should have been size of semi large (which is larger than medium carton but smaller than large carton) so that the maximum sized sheet remains same?

Q7. Kerosene, paraffin, or lamp oil is a combustible hydrocarbon liquid which is derivative from petroleum. Kerosen's uses vary from fuel for oil lamps to cleaning agents , jet fuel , heating oil or fuel for cooking

Two oil tankers contain 825 litres and 675 litres of kerosene oil respectively.

i. Find the maximum capacity of a container which can measure the Kerosene oil of both the tankers when used an exact number of times.

ii. How many times we have to use container for both the tanker to fill?

Q8. Amar, Akbar and Anthony are playing a game. Amar climbs 5 stairs and gets down

2 stairs in one turn .Akbar goes up by 7 stairs and comes down by 2 stairs every time. Anthony goes 10 stairs up and 3 stairs down each time.

During this they have to reach to the nearest point of 100^{th} stairs and they will stop once they find it impossible to go forward. They can not cross 100^{th} stair any way

i. Who reaches the nearest point?

ii. Who takes least number of steps to reach nearest hundred?

Q9. A woman wants to organise her birthday party. She was happy on her birthday but there was a problem that she does not want to serve fast food to her guests because she is very health conscious. She as 15 apples and 40 bananas at home and decided to serve them. She want to distribute fruits among guests. She does not want to discriminate among guests so she decided to distribute equally among all. So

i. How many guests she can invite?

ii. How many apples and banana will each guest get?

Q10. A hall has a certain number of chairs. Guests want to sit in different groups like in pairs, triplets, quadruplets, fives and sixes etc. When organiser arranges chairs in such pattern like 2's, 3's ,4's.5's and 6's then 1,2,3,4 and 5 chairs are left respectively. But when he arranges in 11's no chair will be left

i. In the hall how many chairs are available?

a) 407

b) 143

c) 539

d) 209

ii. If one chair is added to the total number of chairs, how many chairs will be left when arranged in 11's

ANSWER KEY

Q.I Multiple Choice Questions (1 mark):	
Q.No.	**Answer**
1	d) 1
2	c) 2×7^2
3	c) 4
4	c) 338
5	b) irrational
6	a) 24
7	c) Irrational number
8	d) 12 : 1
9	(a) Always irrational
10	*c*) $2^3 \times 3^3$
11	LCM of 2 and 4 is 4
12	HCF = 1 and LCM = pq
13	13m / min
14	2^3 x 3 x 5
15	Fundamental Theorem of Arithmetic states that every integer greater than 1 is either a prime number or can be expressed in the form of primes. In other words, all the natural numbers can be expressed in the form of the product of its prime factors. OR Refer textbook (Theorem 1.2 pg no. 8)
16	HCF = 13
17	x = 21 and y = 84
18	b) 2
19	HCF = pq^2
20	x^3y^2
Q.II Short Answer Type Questions (2 marks):	
1	1152= 2^7 x 3^2
2	LCM × HCF =420×12=5040 Also, 60×84=5040
3	$P^3 \times q^2$
4	36
5	Refer textbook
6	4
7	Refer textbook (Example – 9 pg no. 13)
8	15
9	Refer textbook (Theorem – 1.4 pg no. 12)
10	$2\sqrt{2}$
11	Coprime

12	$2 \times 5 \times 11^2 \times 17$
13	Refer textbook (Example – 10 pg no. 14)
14	2
15	112 is an even number and is therefore a composite number
16	6
17	No
18	2
19	18
20	75 cm
Q.III Long Answer Type Questions (3 marks):	
1	a)HCF (225, 240) = 15 LCM (225, 240) = 600 b)HCF (52, 6, 162) = 1 LCM (52, 63, 162) = 29484
2	Refer textbook
3	2813
4	5 of 1st kind, 8 of 2nd kind
5	194400
6	LCM (135, 225) = 675, HCF (135, 225) = 45. Verification by showing LHS = RHS i.e., 135 x 225 = 675 x 45
7	LCM (867, 255) = 4335, HCF (867, 255) = 51. Verification by showing LHS = RHS i.e., 867 x 255 = 4335 x 51
8	**Refer textbook**
9	**Refer textbook**
10	$(\sqrt{2} + \sqrt{3})^2$ is irrational as the result is $5 + \sqrt{6}$, which is irrational. $(2 - \sqrt{2})(2 + \sqrt{2})$ is rational as the result is 2, which is rational.
11	The difference of $(3 + 2\sqrt{3})$ and $(3 - 2\sqrt{3})$ is $4\sqrt{3}$ which is irrational. Dividing $(3 + 2\sqrt{3})$ by $(3 - 2\sqrt{3})$ we get $-7 - 4\sqrt{3}$ which is irrational.
12	Let on the contrary say it is rational . Then $\sqrt{n}=p/q$, $q\neq0$ where p and q are coprime integers. so $n=p2q2$ $p2=nq2$ This shows p divides q which is a contradiction. Hence $\sqrt{n}$ is irrational if n is not a perfect square.
13	$24 = 2^3 \times 3$ $36 = 2^2 \times 3^2$ LCM = $2^3 \times 3^2 = 8 \times 9 = 72$ After 72 minutes = 1 hr 12 minutes they toll together.
14	$44 = 2^2 \times 11$ $32 = 2^5$ HCF = $2^2 = 4$

	Therefore, minimum number of rows in which all srudents can be arranged = $\frac{44}{4} + \frac{32}{4}$ = 11 + 8 = 19 rows
15	HCF = x LCM = 14 x HCF = 14x LCM + HCF = 600 14x + x = 500 15x = 600 x = 40 HCF = 40 and LCM = 14 x 40 = 560 Since, LCM x HCF = product of the numbers 560 x 40 = 280 x second number Second number = 80
16	$144 = 2^4 \times 3^2$ $90 = 2 \times 3^2 \times 5$ HCF = 2×3^2 = 18 cartons
17	398 – 7 = 391 436 – 11 = 425 542 – 15 = 527 391 = 17 x 23 $425 = 5^2 \times 17$ 527 = 17 x 31 HCF = 17 i.e., 17 is the largest number that will divide 398, 436 and 542 leaving remainders 7, 11 and 15 respectively.
18	70 – 5 = 65 125 – 8 = 117 65 = 5 x 13 $117 = 3^2 \times 13$ HCF = 13 i.e., 13 is the largest number that will divide 65 and 117.
19	17 x 5 x 11 x 3 x 2 + 2 x 11 = 2 x 11 (17 x 5 x 3 + 1) = 2 x 11 (255 + 1) = 2 x 11 x 256 $= 2 \times 11 \times 2^8$ This number has more than 2 prime factors. Therefore, 17 x 5 x 11 x 3 x 2 + 2 x 11 is a composite number.
20	No, two numbers cannot have 15 as their HCF and 175 as LCM because, HCF of the numbers must be a factor of the LCM. Therefore, LCM = k x HCF $(k \in N)$ 175 = k x 15 $k = \frac{175}{15} = \frac{35}{3} \notin N$

Q.IV Very Long Answer Type Questions (4 marks):	
1	Assume that $\sqrt{5}$ is a rational number Therefore $\sqrt{5} = \frac{p}{q}$ p and q are co primes and q ≠ 0 (1) $p = \sqrt{5}\, q$ Squaring both the sides $p^2=5q^2$ Thus 5 is a factor of p^2 Therefore 5 is a factor of p (1) Let p=5c where c is some integer, then we have $p^2=25c^2$ Substituting $p^2=5q^2$ $5q^2 = 25c^2$ $q^2=5c^2$ (1) Thus 5 is a factor of q^2 and also 5 is also a factor of q Thus 5 is a factor of both p and q .But this is a contradiction to the fact that p and q are co primes (1) Thus our assumption is wrong that $\sqrt{5}$ is a rational number Hence $\sqrt{5}\ is$ an irrational number
2	$378= 3^3 \times 2 \times 7$ $180= 3^2 \times 2^2 \times 5$ (1) $420= 3 \times 2^2 \times 5 \times 7$ HCF = 3 X 2 =6 (1) LCM = $3^3 \times 2^2 \times 5 \times 7$ =3780 (1) HCF x LCM = 3780 x 6 = 22,680 Product of numbers = 378 x 180 x 420 = 28576800 No HCF x LCM is not equal to product of three numbers (1)
3	LCM + HCF = 7380 LCM – HCF = 7340 2LCM = 14720 LCM = 14720/2 **LCM = 7360** (2) LCM + HCF = 7380 7360+ HCF = 7380 HCF = 7380 – 7360 **HCF = 20** (1) HCF x LCM = product of numbers 20 x 7360= product of numbers 147200 = product of numbers (1)
4	(i) HCF of 28,16 and 12 is 4 Therefore maximum number of books each student get is 4 (2) (ii) Number of maths books 28/4 = 7 Number of science books 16/4 = 4 Number of social science = 12/4 = 3 Total books = 7 + 4 + 3 =14 (2)
5	(i) LCM of 2,3 and 5 = 30

	Thus 31 marbles are there in the bag (2) (ii) If we add 1 in multiple of 30 we will get another possible number of marble. These are 61,91,121,… (2)
6	(i) HCF of all length HCF(6,12,24,36,48) = 6 (ii) HCF of all width HCF(8,24,36,48,96) = 4 Thus maximum size of sheet is 6 by 4
7	(i) HCF of 825 and 625 825 = 3 x 5 x 5 x 11 675 = 3 x 3 x 3 x5 x 5 HCF = 3 x 5 x 5 = 75 (2) Maximum capacity reqired is 75 litres (ii) The first tanker will require 875/75 = 11 times to fill The second tanker will require 675/75 = 9 times to fill (2)
8	(i)Amar reaches 96 stairs Akbar reaches 95 stairs Anthony reaches 91 stairs Thus Amar will reach nearest point (2) (ii)Amar will take 100/3 = 33.3 Akbar will take 100/5 = 20 Anthony will take 100/7 = 14.22 Anthony will take least step (2)
9	(i)HCF of(15,40) =5 Fruits will be distributed equally among 5 guests (2) (ii)Out of 15 apples each guest will get 15 /5 = 3 apples Out of 40 banana each guest will get 40/5 =8 bananas (2)
10	(i) 539 chairs (2) (ii) if 1 chair is added as 539 is already divisible by 11 ,1 chair will be left (2)