Grade X

Lesson : 1 REAL NUMBER

Objective Type Questions

I. Multiple choice questions

1. If two positive integers a and b are written as a $=x^3y^2$ and b = xy^3 , where x, y are prime numbers then HCF (a, b) is

a) xy b) xy^3 **c) x^3y^3** d) x^3y^2

2. If two positive integers p and q can be expressed as p = ab^2 and q = ab and q = a^3b; where a, b being prime numbers, then LCM (p, q) is equal to

a) ab b) a^2b^2 **c) a^3b^2** d) a^2b^3

3. The HCF and the LXM of 12,21, 15 respectively are

a) 3, 140 **b. 12,420** c) $3, 420$ d) $420, 3$

4. Two alarm clocks ring their alarms at regular intervals of 50 seconds and 48 seconds. If they First beep together at 12 noon at what time will they first beep again for the time?

a) 12.20 pm b.12.12 pm c. 12.11 pm d) none of these

5. 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

6. There are 576 boys and 448 girls in a school that are to be divided into equal sections of either boys or girls alone. The total number of sections thus formed are:

a) 22 **b) 16** c) 36 d) 21

7. The HCF of 2472, 1284 and a third number N is 12. If their LCM is 2^3 x 3^2 x 5 x 103 x 107, then the number N is.

a) 22 x 32 x 7 b) 22 x 33 x 103 c. 22 x 32 x 5 d. 24 x 32 x 11

8. Two natural numbers whose difference is 66 and the least common multiple is 360, are:

a. 120 and 54 **b) 90 and 24** c. 180 and 114 d. 130 and 64

III. Multiple choice questions

1. H.C.F. of two or more co-primes (relatively primes) is

a. 1 b) -1
c. 0 d. product of given numbers

2. L.C.M. of a number 'p' and 1 is.
a) 1 **b) p** c) $\frac{1}{p}$ d) zero

3. H.C.F. of a and b is 1 then their L.C.M will be
a) a b) b **c) ab** d) $\frac{a}{b}$

4. H.C.F. of p and 1 is
a) 0 b) p c) $\frac{1}{p}$ **d) 1**

5. If x and y are relatively prime numbers then x^2 and y^2 are

a) relatively prime numbers b. composite numbers

c) even numbers d. odd numbers

6. Least value of H.C.F. of two even numbers will be:

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

7. If L.C.M. of 91 and 26 is 182 then their H.C.F. will be

a) 26 **b) 13** c) 6 d) 3

8. Decimal expansion of rational number $\frac{1}{125}$ will terminate after _________decimal places.

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

9. Rational number $\frac{3}{600}$ has

a) terminating decimal expansion b) non – terminating and repeating

c) non – terminating and non – repeating d) None of these

10. H.C. F. of a and b is 'a' then their L.C.M. will be

a) a **b) b** c) a x b d) 1

11. Least prime factor of x is 3 and least prime factor of y is 7 then find least prime factor of (a + b)

a) 10 b) 7 c) 5 **d) 2**

12. Which of the following is irrational?

a) $\frac{\sqrt{14}}{\sqrt{7}}$ b) $\frac{\sqrt{8}}{\sqrt{3}}$ c) $\frac{\sqrt{9}}{\sqrt{5}}$ **d) All of these**

13. Which of the following is non – terminating repeating?

a) $\frac{1}{2}$ b) $\frac{3}{6}$ **c) $\frac{3}{27}$** d) $\frac{1}{8}$

14. Which of the following is terminating ?

a) $\frac{7}{14}$ b) $\frac{3}{150}$ c) $\frac{5}{50}$ **d) All of these**

15. Which of the following cannot be the unit place digit in expansion of (5678.3) $n \in N$?

a) 3 b) 9 c) 7 **d) 4**

16. H.C.F. of 135 and 225 is

a) 3 b) 15 c) 30 **d) 45**

17. Find L.C.M. of 135 and 225 is

a) 765 b) 225 c) 135 d) None of the above

18. Which of given result is not rational?

a) $(3 + \sqrt{5})\ (3 - \sqrt{5})$ b) $\sqrt{3} \times \sqrt{12}$ **c)** $\frac{\sqrt{5}}{\sqrt{625}}$ d) None of the above

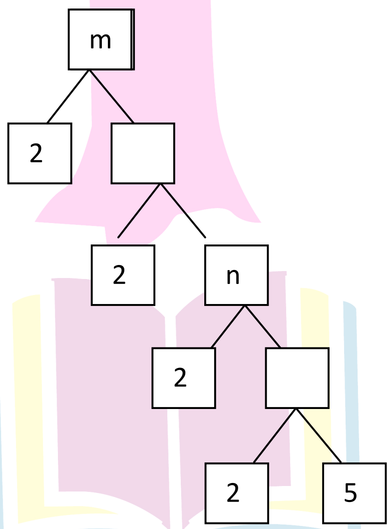
19. Number of prime factors of 5005 is

a) 6 **b) 4** c) 3 d)2

20. Which of the following is not even ($q \in N$)?

a) $2q + 1$ b) $4q + 2$ c) $6q + 4$ **d) All of these**

21. From given factor free find value of (m – n)



a) 160 b) 40 **c) 60** d) 320

22. Value of $(5 - \sqrt{2})\ (5 + \sqrt{2})$ is

a) natural number b) whole number c) rational number **d) All of these**

23. Decimal representation of $\frac{2}{3}$ is

a) $0.\bar{3}$ b) $0.\bar{4}$ **c) $0.\bar{6}$** d) $0.\bar{7}$

24. Which of the following number cannot be as part of prime factorisation of denominator of rational number (Which is non-terminating)?

a) 2 b) 5 **c) 3** d) None of these

25. Units place digit in the expansion of $(576895)^{201}$ is

a) 0 b) 1 c) 3 **d) 5**

26. L.C.M. of 336 and 54 is

a) 324 **b) 3024** c) 3124 d) 3224

27. Decimal expansion of $\frac{1}{3}$ is

a) 0.3 b) 0.33 c) 0.333 **d) $0.\bar{3}$**

28. Number 12673 is divisible by

a) 19 b) 23 c) 29 **d) All of these**

29. If x and y both are odd numbers, then $(x^2 + y^2)$ is divisible by

a) 2 b) 4 c) 12 d) All are possible

30. For two positive integers a and b ($a > b$) if a = b x q + r, then value of r may be

a) zero b) always less than b c) $0 \leq r < b$) **d) None of these**

31. Euclid's Division Lemma is used to calculate

a) H.C.F. b) L.C.M. c) Both (a) and (b) d) None of these

32. L.C.M. of smallest prime and smallest composite number is

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

33. Length, breadth and height of a cuboidal room are 8.50 m 6.25 m and 4.75m respectively. The length of largest rod which can be used to measure all the three dimensions is.

a) 5 cm b) 10cm c) 15 cm **d) 25 cm**

34. If n ϵ N and $(n^2 - 1)$ is always divisible by 8 for n to be

a) even number **b) odd number** c) zero d) None of these

35. Number 429 is divisible by

a) 3 b) 11 c) 13 **d) All of these**

36. Two containers has capacity of 850 l and 680 l. Capacity of biggest container which can measure the liquid of both containers?

a) 17 l **b) 85 l** c) 170 l d) None of these

37. Number of decimal places for division of $\frac{15}{1600}$ is

a) 4 b) 5 **c) 6** d) 8

38. Convert $3.2\overline{3}$ into form of $\frac{p}{q}$

a) $\frac{97}{30}$ b) $\frac{291}{90}$ c) $\frac{582}{180}$ **d) All of these**

39. Which of the following is non-terminating decimal?

a) $\sqrt{2}$ b) $\frac{1}{\sqrt{2}}$ c) $\sqrt{\frac{1}{9}}$ **d) All of these**

40. Which of the given is non-terminating repeating decimal?

a) $\sqrt{\frac{1}{4}}$ b) $\sqrt{\frac{1}{25}}$ **c) $\sqrt{\frac{1}{225}}$** d) $\sqrt{\frac{1}{100}}$

41. π is

a) irrational b) rational c) $\frac{22}{7}$ d) None of these

42. Product of a rational number with an irrational number is always

a) rational number

b) irrational number

c) may be any rational or irrational number

d) None of these

43. If n ϵ N, then $11^n - 6^n$ is always divisible by

a) 11 b) 6 **c) 15** d) 17

44. Find L.C.M. of a and b if a = x^3y^2z and b $x^2\ y^3\ z^4$

a) $x$yz **b) x^2y^2z** c) $x^3y^2z^4$ d) None of these

45. Larges positive number, which can divide 398, 436 542 leaving remainder 7, 11 and 15 respectively.

a) 10 b) 12 c) 15 **d) 17**

46. L.C.M. of 6, 72 and 120 is

a) 120 b) 240 **c) 360** d) 720

47. $(4)^n$ n ϵ N cannot end with digit

a) 0 b) 1 c) 5 **d) 17**

48. $\frac{p}{q}$ form of $43.\overline{123456789}$ is

a) 1 b) 0 c) 43 **d)** $\frac{9431234567897}{999999999}$

III. Multiple choice questions

1. For some integer m, every even integer is of the form

a) m b) m + 1 **c) 2m** d) 2m + 1

2. If n is an even natural number then the largest natural number by which n (n + 1) (n + 2) is divisible, is

a) 6 b) 8 c) 12 **d) 24**

3. The product of two consecutive positive integers is divisible by 2'.

a) True b) false

c) Can't say d) Partially True / False

4. The number 4", where n is a natural number, ends with the digit 0 for any natural number n.

a) True **b) False**

c) Can't say d) Partially

5. 12" ends with the digit 0 or 5 for natural number n.

a) 2 b) 3 **c) No value** d) 4

6. (3 x 5 x 7) + 7 is a

a) Prime number **b) Composite number**

c) Can't say d) None of these

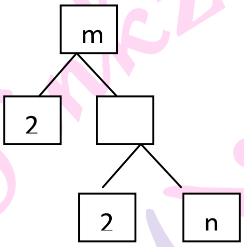
7. The number (7 x 6 x 5 x 4 x 3 x 2 x 1) + 5 is ___________number.

a) Prime **b) Composite** c) Can't say d. None of these

8. The total number of factors of a prime number is.

a) 1 **b) 2** c) 0 d. 3

9. The values of x and y is the given figure are



a) 7, 13 b) 13, 7 c) 9, 12 d) 12,9

10. HCF of 96 and 404 is equal to ______________

a) 2 b) 3 **c) 4** d) 5

11. Total number of distinct primes in the prime factorization of number 27300.

a) 5 b) 7 c) 13 d) 21

12. The unit place digit of HCF of

$2^3 \times 3^2 \times 5^3 \times 7$, $2^3 \times 3^3 \times 5^2 \times 7^2$ and 3 x 5x 7 x 11 is

a) 70 **b) 105** c) 175 d) 225

13. If two positive integers a and b are written as a = $x^3 y^2$ and b = xy^3, where x, y are prime numbers, then HCF (a, b) is

a) xy **b) $x y^2$** c) $x^3 y^3$ d) $x^2 y^2$

14. Write the HCF of the smallest composite number and the smallest prime number

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

15. Two numbers are in the ratio of 15: 11 . If their HCF is 13, then numbers will be

a) 195 and 143 b) 190 and 140

c) 185 and 163 d) 185 and 143

16. Product of two coprime numbers is 117 their LCM should be ________.

a) 1 **b) 117**

c) equal to their HCF
d) lies between 100- 110

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

a) 10 b) 100 c) 604 **d) 2520**

18. If the HCF of 65 and 117is expressible in the form 65m – 117 then find the value of m

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

19. If LCM of 12 and 42 is 10 m + 4, the value of m is equal to

a) 7 **b) 8** c) 6 d) 9

20. There are 23 peaches 36 apricots and 60 bananas and they have to arranged in several rows in such a way that every rows in such a way that every rows contains the same member of fruits of only one type. What is the minimum number of rows required for this to happen?

a) 12 b) 9 **c) 10** d) 14

21. Four bells toll at intervals of 10 s 15s, 20s and 30 s respectively. If they toll together at 10:00 am at what time will they toll together for the first time after 10 am?

a) 10:01 am b) 10:02 am c) 10:00:30 am d) 10:00:45 am

22. P is the LCM of 2,4,6,8,10: Q is the LCM of 1,3,5,7,9 and L is the LCM of P and Q. Then which of the following is true?

a) L – 21P b) L = 40 c) L = 63 P d) L = 16P

23. The LCM and HCF of 120 and 144 by fundamental theorem of arithmetic is

a) 720, 22 **b) 720, 24** c) 640, 24 e) 640, 22

24. If HCF of two numbers is 2 and their product is 120, find their LCM

a) 120 **b) 60** c) 240 d) 80

25. If the HCF of 65 and 117 is 13 LCM of 65 and 117 is 45 a, then the value of a is

a) 9 b) 11 **c) 13** d) 17

26. If the HCF (a, b) = 12 and a x b =1800, then LCM (a, b) = _______.

a) 3600 b) 2900 **c) 150** d) 90

27. If HCF of 306 and 657 is 9, then their LCM is _______.

a) 22338 b) 23328 c) 22833 d) 33228

28. The LCM and the HCF of two numbers are 1001 and 7 respectively. How many such pairs are possible?

a) 0 b) 1 **c) 2** d) 7

29. If p is prime, then HCF and LCM of p and p + 1 would be

a) HCF = p, LCM = P + 1 b) HCF = p (p + 1) LCM = 1

c) HCF = 1, LCM = p (p + 1) d) None of the above

30. The HCF and LCM of 12, 21 and 15 respectively, are

a) 3, 140 b) 12, 420 **c) 3,420** d) 420, 3

31. In which of the following is a irrational number?

a) $\frac{22}{7}$ b) 3.1416 c) $3.\overline{1416}$ **d) 3. 141441444…**

32. The number of irrational numbers between 15 and 18 is infinite.

a) True b) False c) Can't say d) Partially True / False

33. The product of a non-zero rational and an irrational number is

a) always irrational b) always rational

b) rational of irrational d) one

34. $3.\overline{27}$ is

a) an integer number **b) a rational number**

c) an irrational number d) None of these

35. A rational number p/q has a terminating decimal expansion of prime factorization of q have

a) 3 b) 2 c) 5 **d) Both (b) and (c)**

36. If $\frac{13}{125}$ is a rational number, then decimal expansion of it, which terminates

a) 0. 104 b) 1. 01 c) 0. 0104 d) 0. 140

37. On the basis of form $2^m \times 5^n$ of denominator that $\frac{1458}{1250}$ will be expanded in decimal up to places will be

a) one b) two **c) three** d) four

38. After how many places, the decimal form of $\frac{125}{2^4 . 5^3}$ will terminate?

a) three places
b) Four places
c) two places
d) None of these

39. Without actually performing the long division the terminating decimal expansion of $\frac{51}{1500}$ is in the form of $\frac{17}{12^n \times 5^m}$, then (m + n) is equal to

a) 2
b) 3
c) 5
d) 8

40. The rational number which can be expressed as a terminating decimal number will be

a) $\frac{77}{210}$
b) $\frac{129}{2^2 \times 5^7 \times 7^5}$
c) $\frac{13}{3125}$
d) $\frac{8}{7}$

41. Which of the following rational numbers have non-terminating repeating decimal expansion?

a) $\frac{31}{3125}$
b) $\frac{71}{512}$
c) $\frac{23}{200}$
d) none of these

42. The rational number $\frac{124}{164}$ can be expressed as a _________ decimal number.

a) non – terminating
b) can't say
c) terminating
d) None of these

43. The rational form of $0.\overline{254}$ is in the form of $\frac{p}{q}$, then (p + q) is equal to 69

a) True
b) False
c) Can't say
d) Partially True/False

44. Column I denoted the number and Column – II denotes the prime factors of the numbers given in Column-I Match them correctly.

Column I		Column – II	
P.	945	1.	$2 \times 5 \times 11^2 \times 17$
Q.	20570	2.	$7^2 \times 13 \times 17 \times 19$
R.	20571	3.	$3^3 \times 5 \times 7$

	P	O	R
a)	**3**	**1**	**2**
b)	1	3	2
c)	2	1	3
d)	1	2	3

45. Match the Column

Column I		Column – II	
P.	13/125	1.	Irrational
Q.	$\sqrt{2}$	2.	Terminating decimal expansion
R.	200/25	3.	Non-terminating repeating decimal expansion
S.	61/455	4.	Rational number

	P	Q	R	S		P	Q	R	S
a)	2	4	1	3	**b)**	**2**	**1**	**4**	**3**
c)	1	2	3	4	d)	1	2	3	4

Fill in the blanks

1. If a number can't be expressed in the form p / where p and q are integers and 4 + 0, then it is known as _______number

   Irrational

2. If a rational number p/q, where q 0and p, 4 are coprimes, has a terminating decimal expansion then g has prime factors_____and _____.

   2 and 5

3. If a rational number p/q (in lowest form) has a non-terminating and repeating decimal expansion, then prime factorisation of q is of the form ______.

   2" x 5" where m, n are non-negative integers

4. Euclid's division algorithm is a technique to Compute _______the integers.

   H.C.F.

5. H.C.F. of two or more prime numbers is always _________.

   1

6. 7x 11x 13 +3 is a ________ number. (Prime / composite/irrational)

   Composite

7. If product of two coprimes is 765, then their number L.C.M. _________.

   765

8. Sum of a rational and irrational number is always number________ number.

   irrational

9. Product of any irrational number with a rational number 'x ' is always rational. Then, x is 2._________.

   0

10. Any number ending with '0 must have __________ and _________as its prime factors.

2, 5

I Very Short Answer Type Questions

1. If two positive integers a and b are written a = x^3y^2 and b = xy^3 , where x, y are prime numbers, then HCF (a, b) is

a) xy b) xy^2 c) x^3y^3 d) x^2y^2

Also find LCM of (a, b)

a =x^3y^2 and b = xy^3

⇒ a = x x x x x x y x y

and b = xy x y x y

∴ HCF (a, b) = x x y x y = x x y^2= xy^2

LCM = x^3y^3

2. If two positive integers p and q can be expressed as p = ab^2 and q = a^2b; where a,b being prime numbers then LCM (p, q) is equal to

a. ab b. a^2b^2 c. a^3b^2 d) a^2b^3

3. The HCF and LCM of two numbers are 33 and 264 respectively. When the first number is completely divided by 2 the quotient is 33. The other number is _______________.

First number = 2 x 33 = 66

∴ other number = $\frac{HCF\ X\ LCM}{Ist\ \ number}$ = $\frac{33\ X\ 264}{66}$ = 132

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

Smallest prime number = 2
Smallest composite odd number = 9
LCM of 2 and 9 = 2 x 9 = 18

5. Decompose 32760 into prime factors
32760 = 2x2x2x3x3x5x7x13

= 2^3 x 3^2x5x7x13

6. Write the sum of exponents of prime factors in the prime factorisation of 250.

250 = 2 x 5^3

∴ Sum of exponents = 1 + 3 = 4

7. What is the HCF of smallest prime number and the smallest composite number?

The smallest prime number = 2

The smallest composite number = 4

∴ HCF of 2 and 4 = 2

8. If the prime factorisation of a natural number N is 2^4 x $3^4 \times 5^3$x7, write the number of consecutive zeroes in N.

Number of consecutive zeroes = zeroes in $2^3 \times 5^3$ = Zeroes in $(10)^3$ = 3

9. If product of two numbers is 3691 and their LCM is 3691, find their HCF.

HCF = $\frac{Product\ of\ two\ numbers}{LCM}$ = $\frac{3681}{3691}$= 1

10. After how many places of decimal, the decimal expansion of $\frac{43}{2^4 \times 5^3}$ will terminate?

Given $\frac{43}{2^4 \times 5^3}$ is in the lowest form and power of 2 = 4, Power of 5 = 3, Max, $[4, 3]$ = 4

∴ $\frac{43}{2^4 \times 5^3}$ will terminate after 4 places of decimal.

11. What is the exponent of 3 in the prime factorisation of 864.

Making prime factors of 864.

⇒ 864 = 3x3x3x2x2x2x2x2

= $3^3 \times 2^5$

∴ Exponent of 3 in prime factorisation of 864 = 3.

12. Express 10010 and 140 as prime factors.

Prime factors of 10010= 2x 5 x 7x 11 x 13

Prime factors of 140= 2 x 2x 5x 7

13. What is the H.C.F of smallest prime and the smallest composite number ?

Smallest prime number = 2 = 2^1

Smallest composite number=4 = 2^2

H.C.F. (2 4)= 2^1- 2

14. Write a rational number between $\sqrt{5}$ and $\sqrt{6}$

$\sqrt{5}$ = 2.236...... $\sqrt{6}$ = 2.449

∴ A rational no between 2.24 an2.44

tc. Sol V5-2.236.. and v6 = 2.449 (approximately) is 2.3 or 2.31 or 2.32 etc

Note: Take the lower limit slightly greater than $\sqrt{5}$ and upper limit slightly lesser than $\sqrt{6}$

⇒ One number between $\sqrt{5}$ and $\sqrt{6}$ = 23

15. If p, q are two prime numbers then what is the HCF and LCM of p and q?

HCF (p, q) = 1

and LCM (p, q) = pq

16. A rational number in its decimal expansion is 623.6051. What can you say about the prime factors of q, when this number is expressed in the form $\frac{p}{q}$? Give reasons.

Since 623.6051 is a terminating decimal number. so q must be of the form $2^m\ 5^n$ where m, n are natural numbers.

17. 'Product of two irrational numbers is always an irrational number'. Negate the statement by giving counter example.

Take 2- $\sqrt{5}$ 2+$\sqrt{5}$ both are irrational. Their product

(2-$\sqrt{5}$) (2+$\sqrt{5}$)

$2^2 - (\sqrt{5})^2$ = 4-5 = -1

Which is a rational number.

18. Can two numbers have 24 as their HCF and 7290 as their LCM? Give reasons.

No, because HCF always divide LCM but here24 does not divide 7290.

Note: If b is a factor of a then HCF (a, b)=b for instance in Question 8, Pg-14; 63 is a factors of 693.

I Short Answer Type Questions

1. Two numbers are in the ratio 21: 17. If their HCF is 5, find the numbers

Let numbers are $21x$ and $17x$

Now common factor of $21x$ and $17x$ = x

Also HCF = 5

$\Rightarrow$ x = 5

$\therefore$ numbers are 21 x 5 and 17 x 5 i.e. 105 and 85

2. The HCF of two numbers is 29 and other two factors of their LCM are 16 and 19. Find the larger of the two numbers.

HCF of the two numbers is 29

$\therefore$ Numbers are 29 x a and 29 x b where a and b are co-prime.

Now other two factors of the LCM are 16 and 19.

$\Rightarrow$ 29 x 16 x 19 = 29 x a x b

$\Rightarrow$ a = 16 and b = 19

So, larger of the two number is 29 x 19 = 551

3. Three numbers are in the ratio 2:5:7. Their LCM is 490. Find the square root of the largest number.

Let numbers are $2x$, $5x$ and $7x$

$\therefore$ LCM of $2x$, $5x$ and $7x$ = 2x 5 x 7 x x

Also LCM = 490

$\Rightarrow$ 2x 5 x 7 x x = 490

$\Rightarrow$ x = 7

So numbers are 2x 7.5 x 7.7 x 7 = 14, 35 and 49

Largest number = 49

$\therefore$ The square root of largest number = $\sqrt{49}$ = 7

4. If least prime factor of a is 5 and least prime factor of b is 13, then what is the least prime factor of a + b?

Least prime factor of a = 5

∴ a is odd

Also least prime factor of b = 11

∴ b is also odd

Now a+ b = sum of two odd numbers = even number

∴ Least prime factor of a + b is 2

5. Can we have any n ∈ N, where 7^n ends with the digit zero?

For units digit to be 0, 7^n should have 2 and 5 as its prime factors, but 7^n does not contain 2 and 5 as its prime factors. Hence 7^n will not end with digit 0 for $n \epsilon N$

6. Given that $\sqrt{2}$ is irrational, prove that (5 + 3 $\sqrt{2}$) = $\frac{p}{q}$ be a rational number where p and q have no common factor other than $q \neq 0$.

$\Rightarrow 3\sqrt{2} = \frac{p}{q} - 5 \quad \Rightarrow \quad \sqrt{2} = \frac{p-5q}{q}$

For any values of p and q ($q \neq 0$), RHS $\frac{p-5q}{3q}$ *is rational,*

This contradicts the fact, So our assumption is wrong

∴ 5 + 3 $\sqrt{2}$ is an irrational number.

7. **3 bells ring at an interval of 4, 7 and 14 minutes. All three bells rang at 6 am, when the three bells will be ring together next?**

We know that, the three bells again ring together on that time which is the LCM of individual time of each bell

4 = 2 × 2

7 = 7 × 1

14 = 2 × 7

LCM = 2 × 2 × 7 = 28

The three bells will ring together again at 6: 2

8. **Find the HCF of 1260 and 7344 using Euclid's algorithm.** **Or** Using Euclid's Algorithm

$7344 = 1260 \times 5 + 1044$

$1260 = 1044 \times 1 + 216$

$1044 = 216 \times 4 + 180$

$216 = 180 \times 1 + 36$

$180 = 36 \times 5 + 0$

∴ HCF of 1260 and 7344 is 36.

9. **Show that every positive odd integer is of the form $(4q + 1)$ or $(4q + 3)$, where q is some integer.**

Using Euclid's Algorithm

$a = 4q + r, 0 \leq r < 4$

$\Rightarrow a = 4q, a = 4q + 1, a = 4q + 2$ and $a = 4q + 3$.

Now $a = 4q$ and $a = 4q + 2$ are even numbers.

Therefore when a is odd, it is of the form

$a = 4q + 1$ or $a = 4q + 3$ for some integer q.

10. **Write the smallest number which is divisible by both 306 and 657.**

Smallest number divisible by 306 and 657

= LCM (306, 657)

LCM (306, 657) = 22338

The smallest number that is divisible by two numbers is obtained by finding the LCM of these numbers Using Euclid's Algorithm

$657 = 306 \times 2 + 45$

$306 = 45 \times 6 + 36$

$45 = 36 \times 1 + 9$

$36 = 9 \times 4 + 0$

∴ HCF (657,306) = 9

$$\text{LCM} = \frac{\text{Product of two numbers}}{\text{HCF }(657,306)}$$

$\frac{657 \times 3}{9}$ = 657 × 34

LCM (657, 306) = 22338

Hence, the smallest number which is divisible by 306 and 657 is 22338

11. The HCF and LCM of two numbers are 9 and 360 respectively. If one number is 45, find the other number.

Since, HCF × LCM = Product of two numbers

Then, 9 × 360 = 45 × 2nd number

2nd number = $\frac{(9\times 360)}{45}$

Thus, 2nd number = 72

12. If two positive integers *p* and *q* are written as $p = a^2 b$ and $q = a^3 b$, where a and *b* are prime numbers then verify.

LCM (*p, q*) × HCF (*p, q*) = *p. q.*

Since LCM (p, q) = $a^3 b^3$

and HCF (p, q) = $a^2 b$

Hence LCM (*p, q*) × HCF (*p, q*) = $a^3 b^3 \times a^2 b$

= pq Hence Verified

13. Explain whether 3× 12 × 101 + 4 is a prime number or a composite number.

3 × 12 × 101 + 4 = 4(3 × 3 × 101 + 1)

= 4(909 + 1)

= 4(910)

= 2 × 2 × 2 × 5 × 7 × 13

= a composite number

[Product of more than two prime factors]

14. Find the HCF and LCM of 90 and 144 by the method of prime factorization.

Since = 90 = 2 × 3^2 × 5

and = 144 = 2^4 x 3^2

Hence = HCF 2x 3^2 = 18

and LCM = 2^4 x 3^2× 5= 720

15. Find the HCF of 1260 and 7344 using Euclid's algorithm.

Or

Show that every positive odd integer is of the form (4q + 1) or (4q+ 3), where q is some Integer

Taking a = 7344 and b = 1260

Applying Euclid's Division Algorithm

7344 = 1260 x 5+1044

1260 =1044 x 1 + 216

1044 =216 x 4+ 180

216= 180 x 1 + 36

180 = 36 x 5 + 0 ← Stop!

HCF of 1260 and 7344 is 36.

Or

Apply Euclid's Division Lemma to a and b = 4.

a = 4q + r, $0 \leq r<4$

⇒ a = 4q, a = 4q + 1, a = 4q +2 and a = 4q +3.

Now, a = 4q a = 4q + 2 and a = 4q+3 are even numbers as both are divisible by 2.

But, 4q + 1 and 4q +3 are not divisible by 2.

Therefore, when a is odd, it is of the form a = 4q + 1 or a = 4q + 3 for some integer q.

16. Show that $\frac{3+\sqrt{7}}{5}$ is an irrational number, given 5 that $\sqrt{7}$ is irrational.

Or Prove that n^2 +n is divisible by 2 for any positive integer n.

Let, if possible $\frac{3+\sqrt{7}}{5}$ is rational.

Thus, $\frac{3+\sqrt{7}}{5} = \frac{p}{q}$ where p and q are integers and $q \neq 0$

$\Rightarrow \quad 3q + \sqrt{7}\,q = 5p$

$\Rightarrow \sqrt{7}\,q = 5p - 3q$

$\Rightarrow \sqrt{7} = \frac{5p-3q}{q}$

Since, difference of integers is also an integer.

∴ 5p - 3q is an integer.

$\Rightarrow \frac{5p-3q}{q}$ is rational number.

But LHS is $\sqrt{7}$, which is irrational.

Thus, irrational number = Rational number which is a contradiction.

Thus, our supposition is wrong.

Hence, $\frac{3+\sqrt{7}}{5}$ is an irrational number.

Or

n^2 + n = n(n + 1)

There arise two cases.

Case I: When n is even.

Then (n + 1) is odd.

Since, even x odd even

∴ Product n(n + 1) is even i.e. divisible by 2.

Case II: When n is odd.

Then (n + 1) is even.

Since, odd x even = even.

∴ n(n + 1) is even i.e. divisible by 2.

So, for any positive integer, (n^2 + n) is always divisible by 2.

17. A positive integer n when divided by 9, gives 7 as remainder. Find the remainder when (3n-1) is divided by 9.

Here n can be written as 9k + 7, where k ∈ N

Now 3n-1 = 3(9k + 7) -1 = 27k + 20

Applying Euclid's division lemma on (27k + 20) and 9, we have

27k+20 = 9x (3k +2) + 2;
where k ∈ N

Thus, 2 is the remainder.

18. Show that any positive even integer can be written in the form 6q, 6q + 2 or 6q +4, where q is an integer?

Let take a' as any positive even integer and b = 6 Then using Euclid algorithm we get

a = 6q +r

Here r is remainder and value of q is more than or equal to 0 and r = 0, 1, 2, 3, 4, 5 because 0 <r<b and the value of b is 6.

So total possible forms will be 6q + 0, 6q+ 2, 6q + 4 6q +0

6 is divisible by 2 so, it is an even number. 6q + 2

6 is divisible by 2 and 4 is also divisible by 2

So, it is an even number.

Hence, any positive even integer can be written in the form 6g, 6q + 2 or 6q t 4 and so on.

19. In a school, the duration of a period in junior section is 40 minutes and in senior section is 1 hour. If the first bell for each section rings at 9:00 a.m., when will the two bells ring together again?

1 hour = 60 minutes

40 2 x 2 x2x 5 =2^3 x 5

60 2 x 2 x3x 5 =2^3 x 3x 5

∴ LCM (40, 60) = 2^3 x 3 x 5 = 120

120 minutes = 2 hours

Hence, the two bells will ring together again at 9:00 + 2:00 = 11:00 a.m.

20. Explain why (17 x 11x 2+17 x 11 x 5) is a composite number?

17x 11 x 2+17x 11x 5 =17 x 11 x 5

= 17 x 11 x 7

Since, 17 x 11 x 2+17 x 11 x 5 can be expressed as a product of primes, therefore, it is a composite number.

II Short Answer Type Questions

1. Using Euclid's Division Algorithm find the HCF of 726 and 275.

Euclid's division lemma

$726 = 275 \times 2 + 176$

$275 = 176 \times 1 + 99$

$176 = 99 \times 1 + 77$

$99 = 77 \times 1 + 22$

$77 = 22 \times 3 + 11$

$22 = 11 \times 2 + 0$

Thus, HCF = 11

2. Show that exactly one of the number *n*, *n* + 2 or n+4 is divisible by 3

Let n be any positive integer and b =3

Than, $n = 3q + r$

where, q is the quotient and r is the remainder and

$0 \le r < 3$

So, the remainders may be 0, 1 or 2 and n may be in

the form of $3q$, $3q + 1$, $3q + 2$

Let $n = 3q$, $3q + 1$ or $3q + 2$.

(i) When $n = 3q$

$\Rightarrow n$ is divisible by 3.

$n + 2 = 3q + 2$

$\Rightarrow n + 2$ is not divisible by 3.

$n + 4 = 3q + 4 = 3(q + 1) + 1$

$\Rightarrow n + 4$ is not divisible by 3. **1**

(ii) When $n = 3q + 1$

$\Rightarrow n$ is not divisible by 3.

$n + 2 = (3q + 1) + 2 = 3q + 3 = 3(q + 1)$

$\Rightarrow n + 2$ is divisible by 3.

$n + 4 = (3q + 1) + 4 = 3q + 5 = 3(q + 1) + 2$

$\Rightarrow n + 4$ is not divisible by 3. **1**

(iii) When $n = 3q + 2$

$\Rightarrow n$ is not divisible by 3.

$n + 2 = (3q + 2) + 2 = 3q + 4 = 3(q + 1) + 1$

$\Rightarrow n + 2$ is not divisible by 3.

$n + 4 = (3q + 2) + 4 = 3q + 6 = 3(q + 2)$

$\Rightarrow n + 4$ is divisible by 3.

Hence, exactly one of the numbers n, $n + 2$ or $n + 4$

is divisible by 3. **1**

3. Find the HCF of 180, 252 and 324 by Euclid's Division algorithm.

Since, $324 = 252 \times 1 + 72$

$252 = 72 \times 3 + 36$

$72 = 36 \times 2 + 0$

HCF (324, 252) = 36

$180 = 36 \times 5 + 0$

HCF(36, 180) = 36

HCF of 180, 252 and 324 is 36.

4. Use Euclid's division algorithm to find HCF of 4052 and 12576.

$\therefore$ 12576 > 4052, apply the Euclid's division

lemma to 12576 and 4052, to get

12576= 4052 x 3+ 420

Since 420≠ 0, so apply E.D.L. to 4052 and 420

to get 4052 =420x 9+272

Since, 272 ≠ 0, so apply E.D.L. to 420 and 272

420= 272 x1+ 148

Since, 148≠ 0, so apply E.D.L. to 272 and 148

to get 272 =148 x1+124

Since, 124≠ 0, so apply E.D.L. to 148 and 124

148= 124 x 1+ 24

Since, 24 ≠ 0, so apply E.D.L. to 124 and 24

124 =24x 5+4

Since, 4 ≠0, so apply E.D.L. to 24 and 4

24= 4x 6 +0 ←Stop!

Since, remainder has become zero.

∴ HCF (12576, 4052) =4.

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

According to the statement of the question, we have

LCM of two numbers= 14x HCF of two numbers

Also LCM + HCF = 600

⇒ 14 x HCF + HCF = 600

⇒ 15 HCF = 600

⇒ HCF = 40

∴ LCM 14x 40= 560

Now, one number is 280

∴ 280 x Other number=40x 560

⇒ Other number= $\frac{40 \times 560}{280}$ =80

6. Show that any positive odd integer is of the form 6q+1, 6q+3 or 6q+5 where q is some integer

Apply Euclid's Division lemma to a and 6, we have

a = 6q + r where 0 ≤ r ≤ 6

Thus, r can take values 0, 1, 2, 3, 4, 5.

Consider the equation, a = 3q +r

Case 1: When r = 0

Thus, a = 6q

Rewriting the above equation, we have

a = 2(3q)

Which is an even number.

Case 2: When r = 1

Thus, a = 6q +1

Rewriting the above equation, we have

a = 2 x 3q + 1

= 2m + 1, where m =3q

Which is an odd number.

Case 3: When r = 2

Thus, a = 6q + 2

Rewriting the above equation, we have

a = 2x (3q +1)

= 2m, where m = 3q +1

Which is an even number.

Case 4: When r= 3

Thus, a = 6q + 3

Rewriting the above equation, we have

a = 2x (3q +1) + 1

= 2m+1, where m = 3q +1

Which is an odd number.

Case 5: When r = 4

Thus, a = 6q + 4

Rewriting the above equation, we have

a = 2x (3q + 2)

= 2m, where m = 3q +2

Which is an even number.

Case 6: When r = 5

Thus, a = 6q +5

Rewriting the above equation, we have

a = 2x (3q +2) +1

= 2m+1, where m= 3q + 2

Which is an odd number.

Therefore, any positive odd integer is of the form

6q +1, 6q + 3 or 6q + 5, where q is some integer.

7. Using Euclid's division algorithm, find HCF of 56, 96 and 404.

Applying Euclid's division algorithm to 56 and 96

96= 56x 1 + 40

56= 40x 1 + 16

40 = 16x 2 + 8

16= 8 x 2 + 0

∴ HCF (56, 96) = 8

Next, apply Euclid's division algorithm to 8 and 404

404 = 8x 50+4

8 = 4x 2+ 0

Thus, HCF (56, 96, 404) = 4

8. Find HCF and LCM of 404 and 96 and verify that HCF x LCM = Product of the two given numbers.

404 = 2x2x 101 = 2^2 x 101

96 = 2x 2x2x2x2x3 =2^5 x 3

∴ HCF of 404 and 96 = 2^2=4

[Product of smallest power of each common factor]

LCM of 404 and 96= 101 x 2^5 x 3 = 9696

[Product of greatest power of each prime factor]

HCF x LCM- 4 x9696= 38784

Also 404x 96= 38784

Hence HCF x LCM= Product of 404 and 96.

9. Express $5.\overline{4178}$ in the $\frac{p}{q}$ form

Let x = $5.\overline{4178}$

Or x

Thus, $5.\overline{4178}$ = $\frac{27062}{4995}$

10. Find the LCM and HCF of 1296 and 5040 by prime factorisation method:

∵

2	5040
2	2520
2	1260
2	630
3	315
3	105
5	35
	7

and

2	1296
2	648
2	324
2	162
3	81
3	27
3	9
	3

∴ 5040 = 2x2x2x2x3x3x5 7

$=2^4 \times 3^2 \times 5 \times 7$

1296 = 2x2x2x2x3x3x3x3x3

$= 2^4 \times 3^4$

∴ LCM = Product of each prime factor with highest powers

$= 2^4 \times 3^4 \times 5 \times 7$

= 16 x 81 x 5 x 7 = 45360

HCF = Product of common prime factors with lowest powers

$= 2^4 \times 3^2$

= 16x 9= 144

11. The decimal expansion of the rational number $\frac{43}{2^4 \times 5^3}$, Will terminate after how many places of decimal?

$\frac{43}{2^4 \times 5^3} = \frac{43 \times 5^1}{2^4 \times 5^3 \times 5^1}$

$\frac{43 \times 5}{2^4 \times 5^3 \times 5^1}$

Thus, will terminate after 4 places of Thus, 24 x 5 decimal

12. Show that any positive odd integer is of the form 4q +1 or 4q +3 where q is a positive integer.

Let a be any positive integer and b = 4. Applying Euclid's division lemma there exist integers q and r such that

a = 4q + r,

where $0 \le r < 4$ a = 4q or 4q + 1 or 4q + 2 or 4q +3

However since 'a' is odd we reject the case 4q and 4q+2 as they both are divisible by 2.

Therefore, any positive odd integer is of the form 4q +1 or4q + 3.

13. Check whether 14^n can end with the digit zero for any natural number n ?

Let, us suppose that 14^n ends with the digit 0 for some n ∈ N 14^n is divisible by 5

But, prime factors of 14 are 2 and 7.

∴ Prime factor of $(14)^n$ are $(2 \times 7)^n$

It is clear that in prime factorisation of 14^n there is no place for 5.

∴ By Fundamental theorem of Arithmetic.

Every composite no. can be expressed as a product of primes and this factorisation is unique a part from the order in which the prime factor occur. Our Supposition is wrong. Hence, there exists no natural number n for which 14^n ends with the digit zero.

14. Prove that $\sqrt{2}$ is an irrational number.

Let, if possible to the contrary that $\sqrt{2}$ is not irrational number i.e., 2 is a rational number. That mean $\sqrt{2}$ can be expressed in $\frac{p}{q}$ form where p and q are coprime positive integers and q ≠0. So $\sqrt{2} = \frac{p}{q}$

⇒ $p^2 = 2q^2$

Thus, p^2 is a multiple of 2

⇒ p is a multiple of 2.

Let p = 2m for some integer m.

⇒ $p^2 = 2q^2$

Thus, q^2 is a multiple of 2.

⇒ q is a multiple of 2.

Hence, 2 is a common factor of p and q. This contradicts the fact that p and g are coprimes.

∴ Our supposition is wrong.

Hence, $\sqrt{2}$ is an irrational number.

I. Long answer choice questions

1. Prove that one of every three consecutive positive integers is divisible by 3.

Let n be any positive integer.

∴ $n = 3q + r$, where $r = 0, 1, 2$

Putting $r = 0$,

$n = 3q + 0 = 3q$,

which is divisible by 3.

2. State Fundamental theorem of Arithmetic. Find LCM of numbers 2520 and 10530 by prime factorization method.

Fundamental theorem of arithmetic: Every composite number can be expressed as the product of powers of primes and this factorization is unique.

Since, $2520 = 2^3 \times 3^2 \times 5 \times 7$

and $10530 = 2 \times 3^4 \times 5 \times 13$

LCM = $2^3 \times 3^4 \times 5 \times 7 \times 13$

= 294840

3. A fruit vendor has 990 apples and 945 oranges. He packs them into baskets. Each basket contains only one of the two fruits but in equal number. Find the number of fruits to be put in each basket in order to have minimum number of baskets.

HCF of 990 and 945

945) 990 (1
- 945
45) 945 (21
- 90
45
- 45
0

990 = 945 x 1 + 45

945 = 45 x 21 +0

Since, HCF of 990 and 945 is 45.

Thus, the fruit vendor should put 45 fruits in each basket to have minimum number of baskets.

4. Can the number 6^n, *n* being a natural number, end with the digit 5 ? Give reasons

If 6^n ends with 0 or 5, then it must have 5 as a factor.

But only prime factors of 6^n are 2 and 3.

∴ $6^n = (2 \times 3)^n = 2^n \times 3^n$

From the fundamental theorem of arithmetic, the prime factorization of every composite number is unique.

∴ 6^n can never end with 0 or 5.

5. For any positive integer *n*, prove that *n*3 – *n* is divisible by 6

$n^3 - n = n(n^2-1)$

$= n(n-1)(n+1)$

Let $a = 3q + r$

where $r = 0, 1, 2$

Case I: When $r = 0$, $a = 3q$

$n^3 - n = n(n-1)(n+1)$

$= 3q(3q-1)(3q+1)$

$= 3m$

where m = q (3q – 1)(3q + 1)

$(n^3 -$ n) is divisible by 3

Case II: When **r** = 1, a = 3q + 1

$n^3 - n = n(n-1)(n+1)$

$= (3q+1)(3q)(3q+2)$

$(3q)(3q+1)(3q+2)$

$= 3m$

Where $m = q(3q+1)(3q+2)$

$\therefore (n^3 -$ n) is divisible by 3

Case III: When **r** = 2 a = 3q + 2

$n^3 - n = n(n-1)(n+1)$

$= (3q+2)(3q+1)(3q+3)$

$3(q+1)(3q+2)(3q+1)$

$= 3m$

Where $m = q(q+1)(3q+2)(3q+1)$

$\therefore (n^3 -$ n) is divisible by 3

Let $a = 2q + r$

where $r = 0, 1$

Case I: When $r = 0$

$n^3 - n = n(n-1)(n+1)$

$= 2q(2q-1)(2q+1)$

$= 2m$

Where $m = q(2q-1)(2q+1)$

$\therefore (n^3 -$ n) is divisible by 3

Case II: When $r = 1$ $a = 2q + 1$

$n^3 - n = n(n-1)(n+1)$

$= 2q(2q+1)(2q+2)$

$= 2m$

where $m = q(2q + 1)(2q + 2)$

So we can say that one of the numbers among

$n, (n - 1)$ and $(n - 1)$ is always divisible by 2 and 3

∴ As per the divisibility rule of 6

The given number is divisible by 6

∴ $n^3 - n$ is divisible by 6 Hence Proved

6. Find the LCM of 205, 0.5 and 0.175

LCM Of Rational $= \frac{LCM\ of\ numerators}{HCF\ of\ denominators}$

Number are $\frac{25}{10}, \frac{5}{10}, \frac{175}{1000}$

Now 25 = 5 x 5 ; 5 = 5 x 1 ; 175 = 5x 5 x 7

∴ LCM of (25, 5, 175) 5 x 5 x 7 = 175

Also 10 = 2x 5; 1000 = 2 x 2 x 2 x 5 x 5 x 5

∴ HCF of (10, 10, 1000) = 10

∴ LCM of (2.5, 0.5, 0.175) $= \frac{175}{10}$ = 17.5

7. A forester wants to plant 66 apple trees, 88 banana trees and 110 mango trees in equal rows (in terms of number of trees). Also he wants to make distinct rows of trees (i.e., only one type of trees in one row). Find the number of minimum rows required .

66 = 2 x 3 x 11; 88 = 2 x 2 x 2 x 11 ; 110 = 2 x 5 x 11

∴ HCF of 66, 88 and 110 = 22

∴ Number of trees in each row = 22

∴ Number of rows $= \frac{66}{22} + \frac{88}{22} + \frac{110}{22}$ = 3 + 4 + 5 = 12

8. The HCF of 2472, 1284 and a third number N is 12, If their LCM is 2^3 x 3^3 x 5 x 103 x 107. Then find the number N.

2472 = 2^3 x 3 x 103

1284 = 2^3 x 3 x 107

∴ LCM = 2^3 x 3^2 x 5 x 103 x 107

∴ N = 2^3 x 3^2 x 5 = 180

9. **Prove that 15 +17$\sqrt{3}$ be an irrational number**

Let $\sqrt{3} = \frac{a}{b}$ where a and b are coprime integers b ≠ 0

Squaring both sides, we get 3 = $\frac{a^2}{b^2}$

Multiplying with b on both sides, we get

3b = $\frac{a^2}{b}$

LHS = 3 x b = Integer

RHS = $\frac{a^2}{b}$ = $\frac{Integer}{Integer}$ = Rational number

∴ LHS ≠ RHS

∴ Our supposition is wrong

⇒ $\sqrt{3}$ is irrational

Let 15 + 17$\sqrt{3}$ be a rational number

15 + 17$\sqrt{3}$ = $\frac{a}{b}$, where a and b are coprime

b ≠ 0

⇒ 17$\sqrt{3}$ = $\frac{a}{b}$ - 15

$\sqrt{3} = \frac{a-15b}{17b}$

$\frac{a-15b}{17b}$ is a rational number

But $\sqrt{3}$ is irrational

∴ $\sqrt{3} = \frac{a-15b}{17b}$

III. Long answer choice questions

1. **A, B and C starts cycling around a circular path in the same direction at the same time Circumference of the path is 1980 m. If speed of A is 330 m/min, speed of B is 198 m/min and that of C is 220 m/min and they start from the same point, then after what time will they be together at the starting point?**

As, Time = $\frac{Distance}{Speed}$

Time taken by A to complete one round

= $\frac{1980}{330}$ = 6min

Time taken by B to complete one round

$= \frac{1980}{198} = 10$min

Time taken by C to complete one round

$= \frac{1980}{220} = 9$ min

The three cyclists will be together after LCM (6, 10, 9)

$6 = 2 \times 3$

$10 = 2 \times 5$

$9 = 3^2$

LCM (6, 10, 9) = $2^1 \times 3^2 \times 5 = 90$ min.

2. The HCF of 408 and 1032 is expressible in the form 1032 m - 2040. Find the value of m. Also, find the LCM of 408 and 1032.

Let us find HCF of 408 and 1032

Here, 1032 > 408

$\therefore$ $1032 = 2 \times 408 + 216$

$408 = 1 \times 216 + 192$

$216 = 1 \times 192 + 24$

$192 = 8 \times 24 + 0$

Thus, HCF of 408 and 1032 is 24.

Now, HCF (408, 1032)

i.e. $24 = 1032 \times m - 2040$

$\Rightarrow$ $1032 \times m = 24 + 2040$

$\Rightarrow$ $1032 \times m = 2064$

$\Rightarrow$ $m = \frac{2064}{1032} = 2$

Again, $408 = 2^3 \times 3 \times 17$

$2^3 \times 3 \times 43$

$\therefore$ LCM of 408 and 1032 = $2^3 \times 3 \times 17$

$1032 = 2^3 \times 3 \times 43$

$\therefore$ LCM of 408 and 1032 = $2^3 \times 3 \times 17 \times 43 = 17544$

3. **Obtain the HCF of 420 and 272 by using Euclid's division algorithm and verify the same by using Fundamental theorem of Arithmetic.**

Case I: Using Euclid's division algorithm

$420 = 272 \times 1 + 148$

$272 = 148 \times 1 + 124$

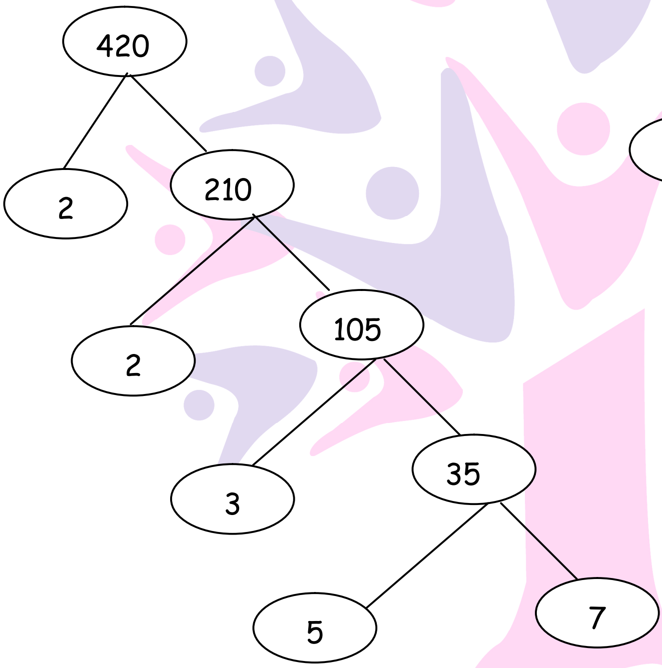
$148 = 124 \times 1 + 24$

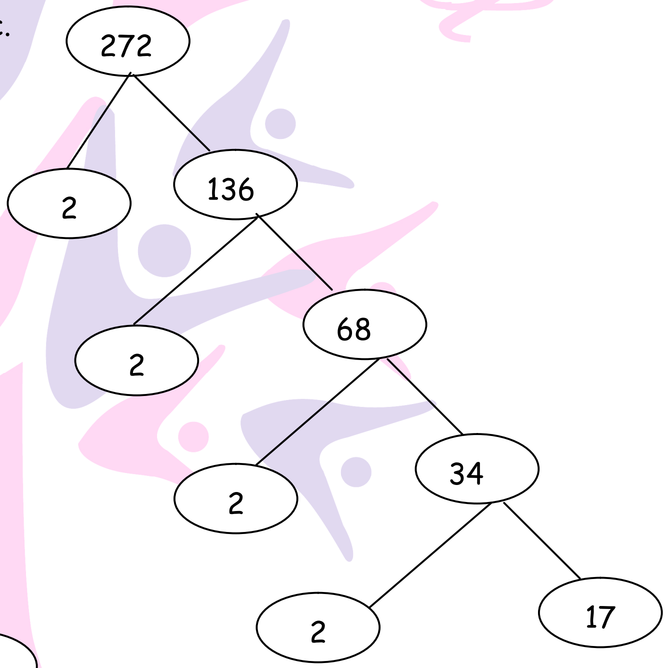
$124 = 24 \times 5 + 4$

$24 = 4 \times 6 + 0$

$\therefore$ HCF (420, 272) = 4

Case II: Using Fundamental theorem of Arithmetic.





$420 = 2 \times 2 \times 3 \times 5 \times 7$

$= 2^2 \times 3 \times 5 \times 7$

$272 = 2 \times 2 \times 2 \times 7$

$= 2^4 \times 17$

$\therefore$ HCF (420, 272) = $2^2 \times 4$

From I and II the result obtained is verified.

4. **If ' h is HCF of 609 and 957. Find x and y satisfying h= 609x + 957y. Also show that x and y are not Here $957 > 609$**

So, starting with

a = 957 and b= 609 and applying Euclid's division algorithm

we get

957 = 609 x 1 + 348 ......(i)

609 = 348 x 1 +261 ......(ii)

348= 261 x 1 +87 ......(iii)

261 = 87 x 3 + 0 ← remainder(r) ......(iv)

⇒ HCF (609, 957) = 87

Alternatively,

```
609)957 (1
    609
    ---------
    348)609 (1
        348
    ---------
    261) 348(1
         261
    ---------
      87) 261 (3
          261
          ---
            0
```

From (iii) 87- 348-261 x1

= 348 - (609 - 348 x 1) x 1

[∴ From (ii) 261 = 609 - 348 x 1]

= 348 - 609x 1 + 348 x 1

= 348 x 2 - 609 x 1

= (957-609 x 1) x 2- 609 x 1

=957 x 2- 609 x 2- 609x 1

= 957 x (2) + 609 (-2 -1)

= 957 x (2) + 609 x (-3) ...(iv)

Thus, 87 = 957 y + 609 x

where y = 2

and x = -3

Adding and subtracting 957x 609 in (iv),

we get

87 = 957 x 2 + 609 x (-3) + 957 x 609 – 957 x 609

= 957 x 2 + 957 x 609 + 609 x (-3) + 609 x (-957)

= 957 x (2 +609) +609 x (-3 -957)

⇒ 87 = 957 x (611) + 609 x (-960)

= $957x$ + 609y

Where x= 611, y - 960

(v) represents another linear combination and hence x and y are not unique.