Factors and Multiples
Exercise 2A

Q1

Answer :

Factor: A factor of a number is an exact divisor of that number.
Multiple: A multiple of a number is a number obtained by multiplying it by a natural number.

Example 1: We know that 15 = 1 × 15 and 15 = 3 × 5

∴ 1, 3, 5 and 15 are the factors of 15.
In other words, we can say that 15 is a multiple of 1, 3, 5 and 15.

Example 2: We know that 8 = 8 × 1, 8 = 2 × 4 and 8 = 4 × 2

∴ 1, 2, 4 and 8 are the factors of 8.
In other words, we can say that 8 is a multiple of 1, 2, 4 and 8.

Example 3: We know that 30 = 30 × 1, 30 = 5 × 6 and 30 = 6 × 5

Q2

Answer :

(i) 20
20 = 1 × 20; 20 = 10 × 2 and 20 = 4 × 5
The factors of 20 are 1, 2, 4, 5, 10 and 20.

(ii) 36
36 = 1 × 36; 36 = 2 × 18; 36 = 3 × 12 and 36 = 4 × 9
The factors of 36 are 1, 2, 3, 4, 6, 9, 12 and 36.

(iii) 60
60 = 1 × 60; 60 = 2 × 30; 60 = 3 × 20; 60 = 4 × 15 and 60 = 5 × 12
The factors of 60 are 1, 2, 3, 4, 5, 6, 10, 12, 15 and 60.

(iv) 75
75 = 1 × 75; 75 = 3 × 25 and 75 = 5 × 15
The factors of 75 are 1, 3, 5, 15, 25 and 75.

Q3

Answer :

(i) 17
17 × 1 = 17; 17 × 2 = 34; 17 × 3 = 51; 17 × 4 = 68 and 17 × 5 = 85
∴ The first five multiples of 17 are 17, 34, 51, 68 and 85.

(ii) 23
23 × 1=23; 23 × 2 = 46; 23 × 3 = 69; 23 × 4 = 92 and 23 × 5 = 115
∴ The first five multiples of 23 are 23, 46, 69, 92 and 115.

(iii) 65
65 × 1 = 65; 65 × 2 = 130; 65 × 3 = 195; 65 × 4 = 260 and 65 × 5 = 325
∴ The first five multiples of 65 are 65, 130, 195, 260 and 325.

(iv) 70
70 × 1=70; 70 × 2 = 140; 70 × 3 = 210; 70 × 4 = 280 and 70 × 5 = 350
∴ The first five multiples of 70 are 70, 140, 210, 280 and 350.

Q4

Answer :

(i) 32
Since 32 is a multiple of 2, it is an even number.
(ii) 37
Since 37 is not a multiple of 2, it is an odd number.
(iii) 50
Since 50 is a multiple of 2, it is an even number.
(iv) 58
Since 58 is a multiple of 2, it is an even number.
(v) 69
Since 69 is not a multiple of 2, it is an odd number.
(vi) 144
Since 144 is a multiple of 2, it is an even number.
(vii) 321
Since 321 is not a multiple of 2, it is an odd number.
(viii) 253
Since 253 is not a multiple of 2, it is an odd number.

Q5

Answer :

Prime number: A number is called a prime number if it has only two factors, namely 1 and itself .

Examples: 2, 3, 5, 7, 11, 13, 17, 19, 23 and 29 are prime numbers.

Q6

Answer :

(i) All prime numbers between 10 and 40 are 11, 13, 17, 19, 23, 29, 31 and 37.
(ii) All prime numbers between 80 and 100 are 83, 89 and 97.
(iii) All prime numbers between 40 and 80 are 41, 43, 47, 53, 59, 61, 67, 71, 73 and 79.
(iv) All prime numbers between 30 and 40 are 31 and 37.

Q7

Answer :

(i) The smallest prime number is 2.
(ii) There is only one even prime number, i.e., 2.
(iii) The smallest odd prime number is 3.

Q8

Answer :

(i) 87
The divisors of 87 are 1, 3, 29 and 87 i.e. 87 has more than 2 factors. Therefore 87 is not a prime number.

(ii) 89
The divisors of 89 are 1 and 89. Therefore 89 is a prime number.

(iii) 63
The divisors of 63 are 1, 3, 7, 9, 21 and 63 i.e. 63 has more than 2 factors. Therefore 63 is not a prime number.

(iv) 91
The divisors of 91 are 1, 7, 13 and 91 i.e. 91 has more than 2 factors. Therefore 91 is not a prime number.

Q9

Answer :

90, 91, 92, 93, 94, 95 and 96 are seven consecutive numbers and none of them is a prime.

Q10

Answer :

(i) No, there are no counting numbers with no factors at all because every number has at least two factors, i.e., 1 and itself.
(ii) There is only one number that has exactly one factor, i.e, 1.
(iii) The numbers between 1 and 100 that have exactly three factors are 4, 9, 25 and 49.

Q12

Answer :

Two consecutive odd prime numbers are called twin primes.
The pairs of twin primes between 50 to 100 are (59, 61) and (71, 73).

Q13

Answer :

If two numbers do not have a common factor other than 1, they are said to be co-primes.

Five pairs of co primes: (i) 2 and 3 (ii) 3 and 4 (iii) 4 and 5 (iv) 4 and 9 (v) 8 and 15

No, co–primes are not always primes.

For example, 3 and 4 are co-prime numbers, where 3 is a prime number and 4 is not a prime number.

Q14

Answer :

(i) 36
36 as the sum of two odd prime numbers is (36 = 31 + 5).
(ii) 42
42 as the sum of two odd prime numbers is (42 = 31 + 11).
(iii) 84
84 as the sum of two odd prime numbers is (84 = 41 + 43).
(iv) 98
98 as the sum of two odd prime numbers is (98 = 31 + 67).

Q15

Answer :

(i) 31
31 can be expressed as the sum of three odd prime numbers as (31 = 5 + 7 + 19).
(ii)) 35
35 can be expressed as the sum of three odd prime numbers as (35 = 17 + 13 + 5).
(iii) 49
49 can be expressed as the sum of three odd prime numbers as (49 = 13 + 17 + 19).
(iv) 63
63 can be expressed as the sum of three odd prime numbers as (63 = 29 + 31 + 3).

Q16

Answer :

(i) 36
36 can be expressed as the sum of twin primes as (36 = 17 + 19).
(ii) 84
84 can be expressed as the sum of twin primes as (84 = 41 + 43).
(iii) 120
120 can be expressed as the sum of twin primes as (120 = 59 + 61).
(iv) 144
144 can be expressed as the sum of twin primes as (144 = 71 + 73).

Q17

Answer :

(i) False. 2 is the smallest prime number.
(ii) False. 2 is an even prime number.
(iii) False. 3 and 7 are two prime numbers and their sum is 10, which is even.
(iv) False. 4 and 9 are co-primes but neither of them is a prime number.

Factors and Multiples
Ex 2B

Q1

Answer :

A number is divisible by 2 if its ones digit is 0, 2, 4, 6 or 8.
(i) Since the digit in the ones place in 26250 is 0, it is divisible by 2
(ii) Since the digit in the ones place in 69435 is not 0, 2, 4, 6 or 8, it is not divisible by 2.
(iii) Since the digit in the ones place in 59628 is 8, it is divisible by 2.
(iv) Since the digit in the ones place in 789403 is not 0, 2, 4, 6, or 8, it is not divisible by 2.
(v) Since the digit in the ones place in 357986 is 6, it is divisible by 2.
(vi) Since the digit in the ones place in 367314 is 4, it is divisible by 2.

Q2

Answer :

A number is divisible by 3 if the sum of its digits is divisible by 3.
(i) 733 is not divisible by 3 because the sum of its digits, $7 + 3 + 3$, is 13, which is not divisible by 3.
(ii) 10038 is divisible by 3 because the sum of its digits, $1 + 0 + 0 + 3 + 8$, is 12, which is divisible by 3.
(iii) 20701 is not divisible by 3 because the sum of its digits, $2 + 0 + 7 + 0 + 1$, is 10, which is not divisible by 3.
(iv) 524781 is divisible by 3 because the sum of its digits, $5 + 2 + 4 + 7 + 8 + 1$, is 27, which is divisible by 3.
(v) 79124 is not divisible by 3 because the sum of its digits, $7 + 9 + 1 + 2 + 4$, is 23, which is not divisible by 3.
(vi) 872645 is not divisible by 3 because the sum of its digits, $8 + 7 + 2 + 6 + 4 + 5$, is 32, which is not divisible by 3.

Q3

Answer :

A number is divisible by 4 if the number formed by the digits in its tens and units place is divisible by 4.

(i) 618 is not divisible by 4 because the number formed by its tens and ones digits is 18, which is not divisible by 4.
(ii) 2314 is not divisible by 4 because the number formed by its tens and ones digits is 14, which is not divisible by 4.
(iii) 63712 is divisible by 4 because the number formed by its tens and ones digits is 12, which is divisible by 4.
(iv) 35056 is divisible by 4 because the number formed by its tens and ones digits is 56, which is divisible by 4.
(v) 946126 is not divisible by 4 because the number formed by its tens and ones digits is 26, which is not divisible by 4.
(vi) 810524 is divisible by 4 because the number formed by its tens and ones digits is 24, which is divisible by 4.

Q4

Answer :

A number is divisible by 5 if its ones digit is either 0 or 5.

(i) 4965 is divisible by 5, because the digit at its ones place is 5.

(ii) 23590 is divisible by 5, because the digit at its ones place is 0.

(iii) 35208 is not divisible by 5, because the digit at its ones place is 8.

(iv) 723405 is divisible by 5, because the digit at its ones place is 5.

(v) 124684 is not divisible by 5, because the digit at its ones place is 4.

(vi) 438750 is divisible by 5, because the digit at its ones place is 0.

Q5

Answer :

A number is divisible by 6 if it is divisible by both 2 and 3.

i) Since 2070 is divisible by 2 and 3, it is divisible by 6.
Checking the divisibility by 2: Since the number 2070 has 0 in its units place, it is divisible by 2.
Checking the divisibility by 3: The sum of the digits of 2070, 2 + 0 + 7 + 0, is 9, which is divisible by 3. So, it is divisible by 3.

(ii) Since 46523 is not divisible by 2, it is not divisible by 6.

Checking the divisibility by 2: Since the number 46523 has 3 in its units place, it is not divisible by 2.

(iii) Since 71232 is divisible by both 2 and 3, it is divisible by 6.

Checking the divisibility by 2: Since the number has 2 in its units place, it is divisible by 2.
Checking the divisibility by 3: The sum of the digits of the number, 7 + 1 + 2 + 3 + 2, is 15, which is divisible by 3. So, the number is divisible by 3.

(iv) Since 934706 is not divisible by 3, it is not divisible by 6.
Checking the divisibility by 3: Since the sum of the digits of the number, 9 + 3 + 4 + 7 + 0 + 6, is 29, which is not divisible by 3. So, the number is not divisible by 3.

(v) Since 251780 is not divisible by 3, it is not divisible by 6.
Checking the divisibility by 3: The sum of the digits of the number, 2 + 5 + 1 + 7 + 8 + 0, is 23, which is not divisible by 3. So, the number is not divisible by 3.

(vi) Since 872536 is not divisible by 3, it is not divisible by 6.
Checking the divisibility by 3: The sum of the digits of the number, 8 + 7 + 2 + 5 + 3 + 6, is 31, which is not divisible by 3. So, the number is not divisible by 3.

Q6

Answer :

To determine if a number is divisible by 7, double the last digit of the number and subtract it from the number formed by the remaining digits. If their difference is a multiple of 7, the number is divisible by 7.

(i) 826 is divisible by 7.
We have $82 - 2 \times 6 = 70$, which is a multiple of 7.

(ii) 117 is not divisible by 7.
We have $11 - 2 \times 7 = -3$, which is not a multiple of 7.

(iii) 2345 is divisible by 7.
We have $234 - 2 \times 5 = 224$, which is a multiple of 7.

(iv) 6021 is divisible by 7.
We have $602 - 2 \times 1 = 600$, which is not a multiple of 7.

(v) 14126 is divisible by 7.
We have $1412 - 2 \times 6 = 1400$, which is a multiple of 7.

(vi) 25368 is divisible by 7.
We have $2536 - 2 \times 8 = 2520$, which is a multiple of 7.

Q7

Answer :

A number is divisible by 8 if the number formed by the last three digits (digits in the hundreds, tens and units places) is divisible by 8.

(i) 9364 is not divisible by 8.
It is because the number formed by its hundreds, tens and ones digits, i.e., 364, is not divisible by 8.

(ii) 2138 is not divisible by 8.
It is because the number formed by its hundreds, tens and ones digits, i.e., 138, is not divisible by 8.

(iii) 36792 is divisible by 8.
It is because the number formed by its hundreds, tens and ones digits, i.e., 792, is divisible by 8.

(iv) 901674 is not divisible by 8.
It is because the number formed by its hundreds, tens and ones digits, i.e., 674, is not divisible by 8.

(v) 136976 is divisible by 8.
It is because the number formed by its hundreds, tens and ones digits, i.e., 976, is divisible by 8.

(vi) 1790184 is divisible by 8.
It is because the number formed by its hundreds, tens and ones digits, i.e., 184, is divisible by 8.

Q8

Answer :

A number is divisible by 9 if the sum of its digits is divisible by 9.

(i) 2358 is divisible by 9, because the sum of its digits, 2 + 3 + 5 + 8, is 18, which is divisible by 9.

(ii) 3333 is not divisible by 9, because the sum of its digits, 3 + 3 + 3 + 3, is 12, which is not divisible by 9.

(iii) 98712 is divisible by 9, because the sum of its digits, 9 + 8 + 7 + 1 + 2, is 27, which is divisible by 9.

(iv) 257106 is not divisible by 9, because the sum of its digits, 2 + 5 + 1 0 + 6, is 21, which is not divisible by 9.

(v) 647514 is divisible by 9, because the sum of its digits, 6 + 4 + 7 + 5 + 1 + 4, is 27, which is divisible by 9.

(vi) 326999 is not divisible by 9, because the sum of its digits, 3 + 2 + 6 + 9 + 9 + 9, is 38, which is not divisible by 9.

Q9

Answer :

A number is divisible by 10 if its ones digit is 0.

(i) 5790 is divisible by 10, because its ones digit is 0.
(ii) 63215 is not divisible by 10, because its ones digit is 5, not 0.
(iii) 55555 is not divisible by 10, because its ones digit is 5, not 0.

Q10

Answer :

A number is divisible by 11 if the difference of the sum of its digits at odd places and the sum of its digits at even places is either 0 or a multiple of 11.

(i) 4334 is divisible by 11.

Sum of the digits at odd places = (4 + 3) = 7
Sum of the digits at even places = (3 + 4) = 7
Difference of the two sums = (7 − 7) = 0, which is divisible by 11.

(ii) 83721 is divisible by 11.
Sum of the digits at odd places = (1 + 7 + 8) = 16
Sum of the digits at even places = (2 + 3) = 5
Difference of the two sums = (16 − 5) = 11, which is divisible by 11.

(iii) 66311 is not divisible by 11.

Sum of the digits at odd places = (1 + 3 + 6) = 10
Sum of the digits at even places = (1 + 6) = 7
Difference of the two sums = (10 − 7) = 3, which is not divisible by 11.

(iv) 137269 is divisible by 11.

Sum of the digits at odd places = (9 + 2 + 3) = 14
Sum of the digits at even places = (6 + 7 + 1) = 14
Difference of the two sums = (14 − 14) = 0, which is a divisible by 11.

(v) 901351 is divisible by 11.

Sum of the digits at odd places = (0 + 3 + 1) = 4
Sum of the digits at even places = (9 + 1 + 5) = 15
Difference of the two sums = (4 − 15) = −11, which is divisible by 11.

(vi) 8790322 is not divisible by 11.

Sum of the digits at odd places = (2 + 3 + 9 + 8) = 22
Sum of the digits at even places = (2 + 0 + 7) = 9
Difference of the two sums = (22 − 9) = 13, which is not divisible by 11.

Q11

Answer :

(i) 27$\underline{2}$4
Here, 2 + 7 + * + 4 = 13 + * should be a multiple of 3.
To be divisible by 3, the least value of * should be 2, i.e., 13 + 2 = 15, which is a multiple of 3.
∴ * = 2

(ii) 53$\underline{0}$46
Here, 5 + 3 + * + 4 + 6 = 18 + * should be a multiple of 3.
As 18 is divisible by 3, the least value of * should be 0, i.e., 18 + 0 = 18.
∴ * = 0

(iii) 8$\underline{1}$711
Here, 8+ * + 7 + 1 + 1 = 17 + * should be a multiple of 3.
To be divisible by 3, the least value of * should be 1, i.e., 17 + 1 = 18 , which is a multiple of 3.
∴ * = 1

(iv) 62$\underline{2}$35
Here, 6 + 2 + * + 3 + 5 = 16 + * should be a multiple of 3.
To be divisible by 3, the least value of * should be 2, i.e., 16 + 2 = 18, which is a multiple of 3.
∴ * = 2

(v) 234$\underline{1}$17
Here, 2+ 3 +4 + * + 1 + 7 = 17 + * should be a multiple of 3.
To be divisible by 3, the least value of * should be 1, i.e., 17 + 1 = 18, which is a multiple of 3.
∴ * =1

(vi) 6$\underline{2}$1054
Here, 6 + * +1 + 0 + 5 + 4 = 16 + * should be a multiple of 3.
To be divisible by 3, the least value of * should be 2, i.e., 16 + 2 = 18, which is a multiple of 3.
∴ * =2

Q12

Answer :

(i) 65$\underline{2}$5
Here, 6 + 5+ * + 5 = 16 + * should be a multiple of 9.
To be divisible by 9, the least value of * should be 2, i.e., 16 + 2 = 18, which is a multiple of 9.
∴ * =2

(ii) 2$\underline{7}$135
Here, 2 + * + 1 + 3 + 5 = 11 + * should be a multiple of 9.
To be divisible by 9, the least value of * should be 7, i.e., 11 + 7 = 18, which is a multiple of 9.
∴ * = 7

(iii) 6702$\underline{3}$
Here, 6 + * + 7 + 0 + 2 = 15 + * should be a multiple of 9.
To be divisible by 9, the least value of * should be 3, i.e., 15 + 3 = 18, which is a multiple of 9.
∴ * = 3

(iv) 91$\underline{4}$67
Here, 9 + 1 * + 6 + 7 = 23 + * should be a multiple of 9.
To be divisible by 9, the least value of * should be 4, i.e., 23 + 4 = 27, which is a multiple of 9.
∴ * = 4

(v) 6678$\underline{8}$1
Here, 6 + 6 + 7 + 8 + * + 1 = 28 + * should be a multiple of 9.
To be divisible by 9, the least value of * should be 8, i.e., 28 + 8 = 36, which is a multiple of 9.
∴ * = 8

(vi) 835$\underline{6}$86
Here, 8 + 3 + 5 + * + 8 + 6 = 30 + * should be a multiple of 9.
To be divisible of 9, the least value of * should be 6, i.e., 30 + 6 = 36, which is a multiple of 9.
∴ * = 6

Q13

Answer :

(i) 26*5
Sum of the digits at odd places = 5 + 6 = 11
Sum of the digits at even places = * + 2
Difference = sum of odd terms – sum of even terms
= 11 – (* + 2)
= 11 – * – 2
= 9 – *
Now, (9 – *) will be divisible by 11 if * = 9.
i.e., 9 – 9 = 0
0 is divisible by 11.
∴ * = 9
Hence, the number is 269$\underline{5}$.

(ii) 39*43
Sum of the digits at odd places = 3 + * + 3 = 6 + *
Sum of the digits at even places = 4 + 9 = 13
Difference = sum of odd terms – sum of even terms
= 6 + * – 13
= * – 7
Now, (* – 7) will be divisible by 11 if * = 7.
i.e., 7 – 7 = 0
0 is divisible by 11.
∴ * = 7
Hence, the number is 39743.

(iii) 86*72
Sum of the digits at odd places 2 + * + 8 = 10 + *
Sum of the digits at even places 6 + 7 = 13
Difference = sum of odd terms – sum of even terms
= 10 + * – 13
= * – 3
Now, (* – 3) will be divisible by 11 if * = 3.
i.e., 3 – 3 = 0
0 is divisible by 11.
∴ * = 3
Hence, the number is 86372.

(iv) 467*91
Sum of the digits at odd places 1 + * + 6 = 7 + *
Sum of the digits at even places 9 + 7 + 4 = 20
Difference = sum of odd terms – sum of even terms
= (7 + *) – 20
= * – 13
Now, (* –13) will be divisible by 11 if * = 2.
i.e., 2– 13 = –11
–11 is divisible by 11.
∴ * = 2
Hence, the number is 467291.

(v) 1723*4
Sum of the digits at odd places 4+ 3+ 7= 14
Sum of the digits at even places *+2+1 = 3 + *
Difference = sum of odd terms – sum of even terms
= 14 – (3 + *)
= 11 – *
Now, (11 – *) will be divisible by 11 if * = 0.
i.e., 11 – 0 = 11
11 is divisible by 11.
∴ * = 0
Hence, the number is 172304.

(vi) 9*8071
Sum of the digits at odd places 1+0+* = 1 + *
Sum of the digits at even places 7 + 8 + 9 = 24
Difference = sum of odd terms – sum of even terms
=1 + * – 24
= * – 23
Now, (* – 23) will be divisible by 11 if * = 1.
i.e., 1 – 23 = –22
–22 is divisible by 11.
∴ * = 1
Hence, the number is 918071.

Q14

Answer :

(i) 10000001 by 11
10000001 is divisible by 11.
Sum of digits at odd places = (1 + 0 + 0 + 0) = 1
Sum of digits at even places = (0 + 0 + 0 + 1) = 1
Difference of the two sums = (1 − 1) = 0, which is divisible by 11.

(ii) 19083625 by 11
19083625 is divisible by 11.
Sum of digits at odd places = (5 + 6 + 8 + 9) = 28
Sum of digits at even places = (2 + 3 + 0 + 1) = 6
Difference of the two sums = (28 − 6) = 22, which is divisible by 11.

(iii) 2134563 by 9
2134563 is not divisible by 9.
It is because the sum of its digits, 2 + 1 + 3 + 4 + 5 + 6 + 3, is 24, which is not divisible by 9.

(iv) 10001001 by 3
10001001 is divisible by 3.
It is because the sum of its digits, 1 + 0 + 0 + 0 + 1 + 0 + 0 + 1, is 3, which is divisible by 3.

(v) 10203574 by 4
10203574 is not divisible by 4.
It is because the number formed by its tens and the ones digits is 74, which is not divisible by 4.
(vi) 12030624 by 8
12030624 is divisible by 8.
It is because the number formed by its hundreds, tens and ones digits is 624, which is divisible by 8.

Q15

Answer :

A number between 100 and 200 is a prime number if it is not divisible by any prime number less than 15.
Similarly, a number between 200 and 300 is a prime number if it is not divisible by any prime number less than 20.

(i) 103 is a prime number, because it is not divisible by 2, 3, 5, 7, 11 and 13.
(ii) 137 is a prime number, because it is not divisible by 2, 3, 5, 7 and 11.
(iii) 161 is a not prime number, because it is divisible by 7.
(iv) 179 is a prime number, because it is not divisible by 2, 3, 5, 7, 11 and 13.
(v) 217 is a not prime number, because it is divisible by 7.
(vi) 277 is a prime number, because it is not divisible by 2, 3, 5, 7, 11, 13, 17 and 19.
(vii) 331 is a prime number, because it is not divisible by 2, 3, 5, 7, 11, 13, 17 and 19.
(viii) 397 is a prime number, because it is not divisible by 2, 3, 5, 7, 11, 13, 17 and 19.

Q16

Answer :

(i) 14 is divisible by 2, but not by 4.
(ii) 12 is divisible by 4, but not by 8.
(iii) 24 is divisible by both 2 and 8, but not by 16.
(iv) 30 is divisible by both 3 and 6, but not by 18.

Q17

Answer :

(i) If a number is divisible by 4, it must be divisible by 8. False
Example: 28 is divisible by 4 but not divisible by 8.

(ii) If a number is divisible by 8, it must be divisible by 4. True
Example: 32 is divisible by both 8 and 4.

(iii) If a number divides the sum of two numbers exactly, it must exactly divide the numbers separately. False
Example: 91 (51 + 40) is exactly divisible by 13. However, 13 does not exactly divide 51 and 40.

(iv) If a number is divisible by both 9 and 10, it must be divisible by 90. True
Example: 900 is both divisible by 9 and 10. It is also divisible by 90.

Factors and Multiples
Ex 2C

Q1

Answer :

We use the division method as shown below:

$$\begin{array}{r|l} 2 & 12 \\ 2 & 6 \\ 3 & 3 \\ & 1 \end{array}$$

$\therefore 12 = 2 \times 2 \times 3$

$= 2^2 \times 3$

Q2

Answer :

We will use the division method as shown below:

$$\begin{array}{r|l} 2 & 18 \\ 3 & 9 \\ 3 & 3 \\ & 1 \end{array}$$

$\therefore 18 = 2 \times 3 \times 3$

$= 2 \times 3^2$

Q3

Answer :

We will use the division method as shown below:

$$
\begin{array}{r|l}
2 & 48 \\
2 & 24 \\
2 & 12 \\
2 & 6 \\
3 & 3 \\
 & 1
\end{array}
$$

$\therefore 48 = 2 \times 2 \times 2 \times 2 \times 3$

$= 2^4 \times 3$

Q4

Answer :

We will use the division method as shown below:

$$
\begin{array}{r|l}
2 & 56 \\
2 & 28 \\
2 & 14 \\
 & 7
\end{array}
$$

$\therefore 56 = 2 \times 2 \times 2 \times 7$

$= 2^3 \times 7$

Q5

Answer :

We will use the division method as shown below:

$$
\begin{array}{r|l}
2 & 90 \\
3 & 45 \\
3 & 15 \\
5 & 5 \\
 & 1
\end{array}
$$

$\therefore 90 = 2 \times 3 \times 3 \times 5$

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

Q6

Answer :

We will use the division method as shown below:

$$
\begin{array}{r|l}
2 & 136 \\
2 & 68 \\
2 & 34 \\
17 & 17 \\
 & 1
\end{array}
$$

$\therefore 136 = 2 \times 2 \times 2 \times 17$

$= 2^3 \times 17$

Q7

Answer :

We will use the division method as shown below:

2 | 252
2 | 126
3 | 63
3 | 21
7 | 7
1

∴ 252 = 2 × 2 × 3 × 3 × 7 × 1
= $2^2 \times 3^2 \times 7 \times 1$

Q8

Answer :

We will use the division method as shown below:

2 | 420
2 | 210
3 | 105
7 | 35
5 | 5
1

∴ 420 = 2 × 2 × 3 × 7 ×5 × 1
=2^2×3×5×7

Q9

Answer :

We will use the division method as shown below:

7 | 637
7 | 91
13 | 13
1

∴ 637 = 7 ×7 × 13
= $7^2 \times 13$

Q10

Answer :

We will use the division method as shown below:

3 | 945
3 | 315
3 | 105
5 | 35
7 | 7
1

∴ 945 = 3 × 3 × 3 × 5 × 7 × 1
= $3^3 \times 5 \times 7$

Q11

Answer :

We will use the division method as shown below:

$$\begin{array}{r|l} 2 & 1224 \\ 2 & 612 \\ 2 & 306 \\ 3 & 153 \\ 3 & 51 \\ 17 & 17 \\ & 1 \end{array}$$

$\therefore 1224 = 2 \times 2 \times 2 \times 3 \times 3 \times 17$

$= 2^3 \times 3^2 \times 17$

Q12

Answer :

We will use the division method as shown below:

$$\begin{array}{r|l} 3 & 1323 \\ 3 & 441 \\ 3 & 147 \\ 7 & 49 \\ 7 & 7 \\ & 1 \end{array}$$

$\therefore 1323 = 3 \times 3 \times 3 \times 7 \times 7 \times 1$

$= 3^3 \times 7^2$

Q13

Answer :

We will use the division method as shown below:

$$\begin{array}{r|l} 2 & 8712 \\ 2 & 4356 \\ 2 & 2178 \\ 3 & 1089 \\ 3 & 363 \\ 11 & 121 \\ 11 & 11 \\ & 1 \end{array}$$

$\therefore 8712 = 2 \times 2 \times 2 \times 3 \times 3 \times 11 \times 11$

$= 2^3 \times 3^2 \times 11^2$

Q14

Answer :

We will use the division method as shown below:

$$\begin{array}{r|l} 7 & 9317 \\ 11 & 1331 \\ 11 & 121 \\ 11 & 11 \\ & 1 \end{array}$$

$\therefore 9317 = 7 \times 11 \times 11 \times 11$

$= 7 \times 11^3$

Q15

Answer :

We will use the division method as shown below:

$$\begin{array}{r|l} 3 & 1035 \\ 3 & 345 \\ 5 & 115 \\ 23 & 23 \\ & 1 \end{array}$$

$\therefore 1035 = 3 \times 3 \times 5 \times 23$

$= 3^2 \times 5 \times 23$

Q16

Answer :

We will use the division method as shown below:

$$\begin{array}{r|l} 3 & 1197 \\ 3 & 399 \\ 7 & 133 \\ 19 & 19 \\ & 1 \end{array}$$

$\therefore 1197 = 3 \times 3 \times 7 \times 19$

$= 3^2 \times 7 \times 19$

Q17

Answer :

We will use the division method as shown below:

$$\begin{array}{r|l} 3 & 4641 \\ 7 & 1547 \\ 13 & 221 \\ 17 & 17 \\ & 1 \end{array}$$

$\therefore 4614 = 3 \times 7 \times 13 \times 17$

Q18

Answer :

We will use the division method as shown below:

$$\begin{array}{r|l} 3 & 4335 \\ 5 & 1445 \\ 17 & 289 \\ 17 & 17 \\ & 1 \end{array}$$

$\therefore 4335 = 3 \times 5 \times 17 \times 17$

$= 3 \times 5 \times 17^2$

Q19

Answer :

We will use the division method as shown below:

$$\begin{array}{r|l} 3 & 2907 \\ 3 & 969 \\ 17 & 323 \\ 19 & 19 \\ & 1 \end{array}$$

$\therefore 2907 = 3 \times 3 \times 17 \times 19$

$= 3^2 \times 17 \times 19$

Q20

Answer :

We will use the division method as shown below:

$$
\begin{array}{r|l}
5 & 13915 \\
11 & 2783 \\
11 & 253 \\
23 & 23 \\
 & 1
\end{array}
$$

$\therefore 13915 = 5 \times 11 \times 11 \times 23$

$= 3 \times 11^2 \times 23$

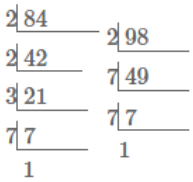
Factors and Multiples
Ex 2D

Q1

Answer :

The given numbers are 84 and 98.

We have:



$84 = 2 \times 2 \times 3 \times 7 = 2^2 \times 3 \times 7$
$98 = 2 \times 7 \times 7 = 2 \times 7^2$

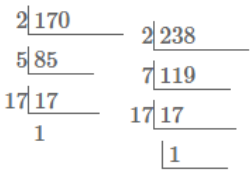
∴ HCF of the given numbers = $2 \times 7 = 14$

Q2

Answer :

The given numbers are 170 and 238.

We have:



$170 = 2 \times 5 \times 17$
$238 = 2 \times 7 \times 17$

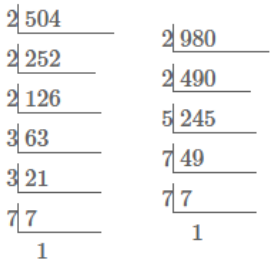
∴ H.C.F. of the given numbers = $2 \times 17 = 34$

Q3

Answer :

The given numbers are 504 and 980.

We have:



$504 = 2 \times 2 \times 2 \times 3 \times 3 \times 7 = 2^3 \times 3^2 \times 7$

$980 = 2 \times 2 \times 5 \times 7 \times 7 = 2^2 \times 5 \times 7^2$

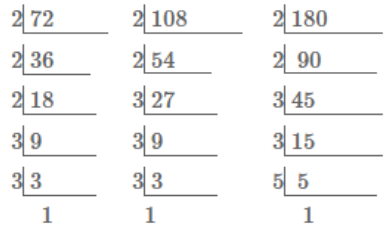
$\therefore$ HCF of the given numbers $= 2^2 \times 7 = 28$

Q4

Answer :

The given numbers are 72, 108 and 180

We have:



Now, $72 = 2 \times 2 \times 2 \times 3 \times 3 = 2^3 \times 3^2$

$108 = 2 \times 2 \times 3 \times 3 \times 3 = 2^2 \times 3^3$

$180 = 2 \times 2 \times 3 \times 3 \times 5 = 2^2 \times 3^2 \times 5$

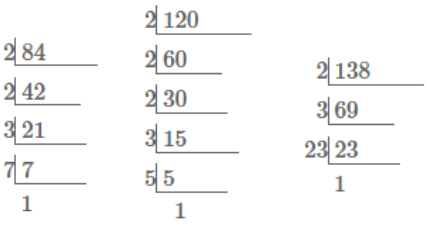
$\therefore$ HCF $= 2^2 \times 3^2 = 36$

Q5

Answer :

The given numbers are 84, 120 and 138.

We have:



Now, $84 = 2 \times 2 \times 3 \times 7$

$120 = 2 \times 2 \times 2 \times 3 \times 5$

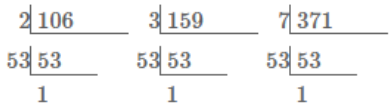
$138 = 2 \times 3 \times 23$

$\therefore$ HCF $= 2 \times 3 = 6$

Q6

Answer :

The given numbers are 106, 159 and 371.
We have:



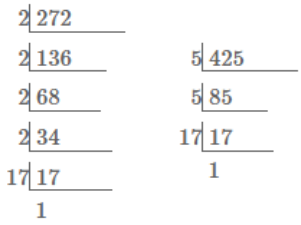
Now, 106 = 2 × 53
159 = 3 × 53
371 = 7 × 53
∴ HCF = 53

Q7

Answer :

Given numbers are 272 and 425.

We have:

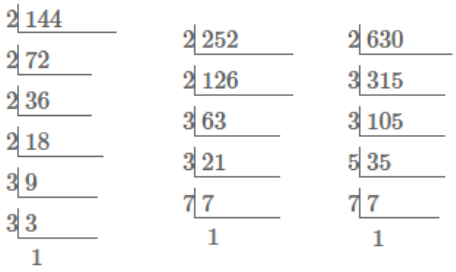


Now, 272 = 2 × 2× 2 × 2 × 17
425 = 5 × 5 × 17
∴ The required HCF is 17.

Q8

Answer :

The given numbers are 144, 252 and 630.
We have:



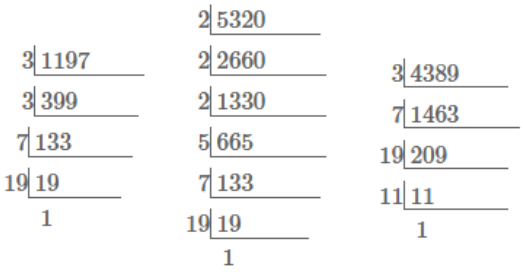
Now, 144 = 2 × 2× 2 × 2× 3 × 3
252 = 2 ×2 × 3× 3 × 7
630 = 2 ×3 × 3× 5 × 7
∴ HCF = 2 × 3 × 3 =18

Q9

Answer :

The given numbers are 1197, 5320 and 4389.

We have:

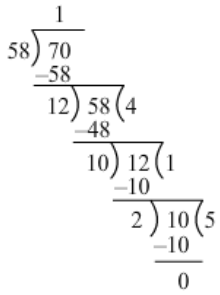


Now, 1197 = 3 × 3× 7× 19 = 3^2 × 7 × 19
5320 = 2 × 2 × 2× 5 × 7 × 19 = 2^3 × 5 × 7 × 19
4389 = 3 ×7 × 19 × 11
∴ Required HCF = 19 × 7 = 133

Q10

Answer :

We have:



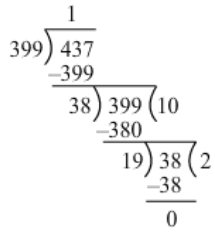
∴ The HCF of 58 and 70 is 2.

Q11

Answer :

The given numbers are 399 and 437.

We have:

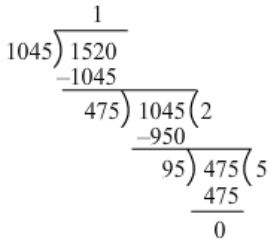


∴ The HCF is 19.

Q12

Answer :

The given numbers are 1045 and 1520.
We have:



∴ The HCF of 1045 and 1520 is 95.

Q13

Answer :

The given numbers are 1965 and 2096.

We have:

$$
\begin{array}{r}
1 \\
1965\overline{)\,2096} \\
-1965 \\
\hline
131\overline{)\,1965}\,(15 \\
-1965 \\
\hline
0
\end{array}
$$

∴ The HCF is 131.

Q14

Answer :

The given numbers are 2241and 2341.
We have:

$$
\begin{array}{r}
1 \\
2241\overline{)\,2324} \\
-2241 \\
\hline
83\overline{)\,2241}\,(27 \\
-2241 \\
\hline
0
\end{array}
$$

∴ HCF = 83

Q15

Answer :

The given numbers are 658, 940 and 1128.

First we will find the HCF of 658 and 940.

$$
\begin{array}{r}
1 \\
658\overline{)\,940} \\
-658 \\
\hline
282\overline{)\,658}\,(2 \\
-564 \\
\hline
94\overline{)\,282}\,(3 \\
-282 \\
\hline
0
\end{array}
$$

Thus, the HCF of 658 and 940 is 94.

Now, we will find the HCF of 94 and 1128.

$$
\begin{array}{r}
1 \\
94\overline{)\,1128} \\
-1128 \\
\hline
0
\end{array}
$$

Thus, the HCF of 94 and 1128 is 94.

∴ The HCF of 658, 940 and 1128 is 94.

Q16

Answer :

The given numbers are 754, 1508 and 1972.

First, we will find the HCF of 754 and 1508.

$$
\begin{array}{r}
2 \\
754\overline{)\,1508} \\
-1508 \\
\hline
0
\end{array}
$$

So, the HCF of 754 and 1508 is 754.

Now, we will find the HCF of 754 and 1972.

$$
\begin{array}{r}
2 \\
754\overline{)\,1972} \\
-1508 \\
\hline
464\overline{)\,754}\,(1 \\
-464 \\
\hline
290\overline{)\,464}\,(1 \\
-290 \\
\hline
174\overline{)\,290}\,(1 \\
-174 \\
\hline
116\overline{)\,174}\,(1 \\
-116 \\
\hline
58\overline{)\,116}\,(2 \\
-116 \\
\hline
0
\end{array}
$$

So, the HCF of 754 and 1972 is 58.

∴ The HCF of 754, 1058 and 1972 is 58.

Q17

Answer :

The given numbers are 391, 425 and 527.

First, we will find the HCF of 391 and 425.

$$
\begin{array}{r}
1 \\
391\overline{)\,425} \\
391 \\
\hline
34\overline{)\,391}\,(11 \\
-374 \\
\hline
17\overline{)\,34}\,(2 \\
-34 \\
\hline
0
\end{array}
$$

So, the HCF of 391 and 425 is 17.

Now, we will find the HCF of 17 and 527.

$$
\begin{array}{r}
30 \\
17\overline{)\,527} \\
510 \\
\hline
17\overline{)\,17}\,(1 \\
-17 \\
\hline
0
\end{array}
$$

So, the HCF of 17 and 527 is 17.

∴ The HCF of 391, 425 and 527 is 17.

Q18

Answer :

The given numbers are 1794, 2346 and 4761.
First, we will find the HCF of 1794 and 2346.

$$
\begin{array}{r}
1 \\
1794\overline{)\,2346} \\
-1794 \\
\hline
552\overline{)\,1794}\,(3 \\
-1656 \\
\hline
138\overline{)\,552}\,(4 \\
-552 \\
\hline
0
\end{array}
$$

So, the HCF of 1794 and 2346 is 138.
Now, we will find the HCF of 138 and 4761.

$$
\begin{array}{r}
34 \\
138\overline{)\,4761} \\
-4692 \\
\hline
69\overline{)\,138}\,(2 \\
-138 \\
\hline
0
\end{array}
$$

So, the HCF of 138 and 4761 is 69.

∴ The HCF of 1794, 2346 and 4761 is 69.

Q19

Answer :

The given numbers are 59 and 97.

$59 = 59 \times 1$
$97 = 97 \times 1$

∴ HCF = 1

Since 59 and 97 does not have any common factor other than 1, the two numbers are co-primes.

Q20

Answer :

The given numbers are 161 and 192.
We have:

$$
\begin{array}{r|l}
2 & 192 \\
2 & 96 \\
2 & 48 \\
7 & 161 \quad\; 2 \;|\; 24 \\
23 & 23 \quad\; 2 \;|\; 12 \\
 & 1 \quad\; 2 \;|\; 6 \\
 & \quad\; 3
\end{array}
$$

Now, $161 = 7 \times 23 \times 1$
$192 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 = 2^6 \times 3 \times 1$
∴ HCF = 1
Hence, 161 and 192 are co-primes.

Q21

Answer :

The given numbers are 343 and 432.
We have:

	2 | 432
	2 | 216
7 | 343	2 | 108
7 | 49	2 | 54
7 | 7	3 | 27
1	3 | 9
	3 | 3
	1

Now, $343 = 7 \times 7 \times 7 \times 1 = 7^3 \times 1$
$432 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 = 2^4 \times 3^3 \times 1$
∴ HCF =1
Hence, 343 and 432 are co-primes.

Q22

Answer :

Given numbers are 512 and 945.
We have:

2 | 512
2 | 256
2 | 128
2 | 64
2 | 32
2 | 16
2 | 8
2 | 4
2 | 2
1

3 | 945
3 | 315
3 | 105
5 | 35
7 | 7
1

$512 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^9$
$945 = 3 \times 3 \times 3 \times 5 \times 7 = 3^3 \times 5 \times 7$
Thus, the HCF of 512 and 945 is 1.
∴ 512 and 945 are co-primes.

Q23

Answer :

The given numbers are 385 and 621.

$$\begin{array}{r|l} 5 & 385 \\ 7 & 77 \\ 11 & 11 \\ & 1 \end{array} \qquad \begin{array}{r|l} 3 & 621 \\ 3 & 207 \\ 3 & 69 \\ 23 & 23 \\ & 1 \end{array}$$

$385 = 5 \times 7 \times 11 \times 1$

$621 = 3 \times 3 \times 3 \times 23 = 3^3 \times 23 \times 1$

$\therefore$ HCF = 1

Hence, they are co-primes.

Q24

Answer :

The given numbers are 847 and 1014.

$$\begin{array}{r|l} 7 & 847 \\ 11 & 121 \\ 11 & 11 \\ & 1 \end{array} \qquad \begin{array}{r|l} 2 & 1014 \\ 3 & 507 \\ 13 & 169 \\ 13 & 13 \\ & 1 \end{array}$$

$847 = 7 \times 11 \times 11 \times 1 = 7 \times 11^2 \times 1$

$1014 = 2 \times 3 \times 13 \times 13 \times 1$

$\therefore$ HCF = 1

Hence, 847 and 1014 are co-primes.

Q25

Answer :

Because the remainder is 6, we have to find the number that exactly divides (615 - 6) and (963 - 6).

Required number = HCF of 609 and 957

$$\begin{array}{r} 1 \\ 609\overline{)\,957} \\ -609 \end{array}$$

$$\begin{array}{r} 348\overline{)609}\,(1 \\ -348 \end{array}$$

$$\begin{array}{r} 261\overline{)348}\,(1 \\ -\,261 \end{array}$$

$$\begin{array}{r} 87\overline{)261}\,(3 \\ -\,261 \\ 0 \end{array}$$

Therefore, the required number is 87.

Q26

Answer :

Clearly, we have to find the number which exactly divides (2011 − 9) and (2623 − 5).
So, the required number is the HCF of 2002 and 2618.

$$
\begin{array}{r}
1 \\
2002\overline{)\ 2618} \\
-2002 \\
\hline
\end{array}
$$

$$
\begin{array}{r}
\\
616\overline{)2002}\,(3 \\
-1848 \\
\hline
\end{array}
$$

$$
\begin{array}{r}
\\
154\overline{)616}\,(4 \\
-\ 616 \\
\hline
0
\end{array}
$$

∴ The required number is 154.

Q27

Answer :

Since the respective remainders of 445, 572 and 699 are 4, 5 and 6, we have to find the number which exactly divides (445-4), (572-5) and (696-6).

So, the required number is the HCF of 441, 567 and 693.
Firstly, we will find the HCF of 441 and 567.

$$
\begin{array}{r}
1 \\
441\overline{)\ 567} \\
-441 \\
\hline
126\overline{)\ 441}\,(3 \\
-378 \\
\hline
63\overline{)\ 126}\,(2 \\
-126 \\
\hline
0
\end{array}
$$

∴ HCF = 63

Now, we will find the HCF of 63 and 693.

$$
\begin{array}{r}
11 \\
63\overline{)\ 693} \\
-693 \\
\hline
0
\end{array}
$$

∴ HCF = 63

Hence, the required number is 63.

Q28

Answer :

(i) $\frac{161}{207}$

To reduce the given fraction to its lowest term, we will divide the numerator and the denominator by their HCF.

Now, we will find the HCF of 161 and 207.

$$
\begin{array}{r}
1 \\
161\overline{)\ 207} \\
-161 \\
\hline
46\overline{)\ 161}\,(3 \\
-138 \\
\hline
23\overline{)\ 46}\ (2 \\
-46 \\
\hline
0
\end{array}
$$

∴ HCF = 23

Dividing the numerator and the denominator by the HCF, we get:

$\frac{161 \div 23}{207 \div 23} = \frac{7}{9}$

(ii) $\frac{517}{799}$

To reduce the given fraction to its lowest term, we will divide the numerator and the denominator by their HCF.

Now, we will find the HCF of 517 and 799.

$$
\begin{array}{r}
1 \\
517\overline{)\,799} \\
-517 \\
\hline
282\overline{)\,517}\,(1 \\
-282 \\
\hline
235\overline{)\,282}\,(1 \\
-235 \\
\hline
47\overline{)\,235}\,(5 \\
-235 \\
\hline
0
\end{array}
$$

∴ HCF = 47

Dividing the numerator and the denominator by the HCF, we get:

$$\frac{517 \div 47}{799 \div 47} = \frac{11}{17}$$

(iii) $\frac{296}{481}$

To reduce the given fraction to its lowest term, we will divide the numerator and the denominator by their HCF.

Now, we will find the HCF of 296 and 481.

$$
\begin{array}{r}
1 \\
296\overline{)\,481} \\
-296 \\
\hline
185\overline{)\,296}\,(1 \\
-185 \\
\hline
111\overline{)\,185}\,(1 \\
111 \\
\hline
74\overline{)\,111}\,(1 \\
-74 \\
\hline
37\overline{)\,74}\,(2 \\
-74 \\
\hline
0
\end{array}
$$

∴ HCF = 37

Dividing the numerator and the denominator by the HCF, we get:

$$\frac{296 \div 37}{481 \div 37} = \frac{8}{13}$$

Q29

Answer :

The lengths of the three pieces of timber are 42 m, 49 m and 63 m.

The greatest possible length of each plank will be given by the HCF of 42, 49 and 63.

Firstly, we will find the HCF of 42 and 49 by division method.

$$
\begin{array}{r}
1 \\
42\overline{)\,49} \\
-42 \\
\hline
7\overline{)\,42}\,(6 \\
-42 \\
\hline
0
\end{array}
$$

∴ The HCF of 42 and 49 is 7.

Now, we will find the HCF of 7 and 63.

$$
\begin{array}{r}
9 \\
7\overline{)\,63} \\
-63 \\
\hline
0
\end{array}
$$

∴ The HCF of 7 and 63 is 7.

Therefore, HCF of all three numbers is 7

Hence, the greatest possible length of each plank is 7 m.

Q30

Answer :

Three different containers contain 403 L, 434 L and 465 L of milk.

The capacity of the container that can measure the milk in an exact number of times will be given by the HCF of 403, 434 and 465.

$$
\begin{array}{r}
1 \\
403\overline{)\,434} \\
-403 \\
\hline
31\overline{)\,403}\,(13 \\
-403 \\
\hline
0
\end{array}
$$

∴ HCF = 31

Now, we will find the HCF of 31 and 465.

$$
\begin{array}{r}
15 \\
31\overline{)\,465} \\
-465 \\
\hline
0
\end{array}
$$

∴ HCF = 31

Hence, the capacity of the required container is 31 L.

Q31

Answer :

Number of apples = 527
Number of pears = 646
Number of oranges = 748
The fruits are to be arranged in heaps containing the same number of fruits.
The greatest number of fruits possible in each heap will be given by the HCF of 527, 646 and 748.

Firstly, we will find the HCF of 527 and 646.

$$
\begin{array}{r}
1 \\
527\overline{)\,646} \\
-527 \\
\hline
119\overline{)\,527}\,(4 \\
-476 \\
\hline
51\overline{)\,119}\,(2 \\
102 \\
\hline
17\overline{)\,51}\,(3 \\
-51 \\
\hline
0
\end{array}
$$

$$
\begin{array}{r}
44 \\
17\overline{)\,748} \\
-748 \\
\hline
0
\end{array}
$$

∴ HCF of 527, 646 and 748 = 17

So, the greatest number of fruits in each heap will be 17.

Q32

Answer :

7 m = 700 cm
3 m 85 cm = 385 cm
12 m 95 cm = 1295 cm

The required length of the tape that can measure the lengths 700 cm, 385 cm and 1295 cm will be given bu the HCF of 700 cm, 385 cm and 1295 cm.

Evaluating the HCF of 700, 385 and 1295 using prime factorisation method, we have:

2	700
2	350
5	175
5	35
7	7
	1

$700 = 2 \times 2 \times 5 \times 5 \times 7 = 2^2 \times 5^2 \times 7$

5	385
11	77
7	7
	1

$385 = 5 \times 11 \times 7$

5	1295
7	259
37	37
	1

$1295 = 5 \times 7 \times 37$

$\therefore$ HCF = $5 \times 7 = 35$

Hence, the longest tape which can measure the lengths 7 m, 3 m 85 cm and 12 m 95 cm exactly is of 35 cm.

Q33

Answer :

Length of the courtyard = 18 m 72 cm = 1872 cm
Breadth of the courtyard = 13 m 20 cm = 1320 cm

Now, maximum edge of the square tile is given by the HCF of 1872 cm and 1320 cm.

$$
\begin{array}{r}
1 \\
1320\overline{)\,1872} \\
\underline{-1320} \\
\end{array}
$$

$$
\begin{array}{r}
552\overline{)1320}\,(2 \\
\underline{-1104} \\
\end{array}
$$

$$
\begin{array}{r}
216\overline{)552}\,(2 \\
\underline{-432} \\
\end{array}
$$

$$
\begin{array}{r}
120\overline{)216}\,(1 \\
\underline{-120} \\
\end{array}
$$

$$
\begin{array}{r}
96\overline{)120}\,(1 \\
\underline{-96} \\
\end{array}
$$

$$
\begin{array}{r}
24\overline{)96}\,(4 \\
\underline{-96} \\
0
\end{array}
$$

HCF of 1872 and 1320 = 24

∴ maximum edge of the square tile = 24 cm

$$\text{Required number of tiles} = \frac{\text{area of courtyard}}{\text{area of each square tile}}$$

$$= \frac{1872 \times 1320}{24 \times 24}$$

$$= 4290$$

Q34

Answer :

(i) 2 and 3 are two prime numbers.

Now, HCF of 2 and 3 is as follows:

$2 = 2 \times 1$

$3 = 3 \times 1$

∴ HCF = 1

(ii) 4 and 5 are two consecutive numbers.

Now, HCF of 4 and 5 is as follows:

$4 = 2 \times 2 \times 1 = 2^2 \times 1$

$5 = 5 \times 1$

∴ HCF = 1

(iii) 2 and 3 are two co-primes.

Now, HCF of 2 and 3 is as follows:

$2 = 2 \times 1$

$3 = 3 \times 1$

∴ HCF = 1

(iv) 2 and 4 are two even numbers.

Now, HCF of 2 and 4 is as follows:

$2 = 2 \times 1$

$4 = 2 \times 2 \times 1$

∴ HCF = $2 \times 1 = 2$

Factors and Multiples
Ex 2E

Q1

Answer :

The given numbers are 42 and 63.

We have:

$$\begin{array}{r|l} 7 & 42, 63 \\ \hline 3 & 6, 9 \\ \hline 3 & 2, 3 \\ \hline 2 & 2, 1 \\ \hline & 1, 1 \end{array}$$

∴ LCM =7 × 3 × 3 × 2 × 1
=126

Q2

Answer :

The given numbers are 60 and 75.

We have:

$$\begin{array}{r|l} 3 & 60, 75 \\ \hline 5 & 20, 25 \\ \hline 5 & 4, 5 \\ \hline 2 & 4, 1 \\ \hline 2 & 2, 1 \\ \hline & 1, 1 \end{array}$$

∴ LCM = 3 × 5× 5 × 2 × 2
= 300

Q3

Answer :

The given numbers are 12, 18 and 20.
We have:

$$\begin{array}{r|l} 2 & 12,18,20 \\ \hline 2 & 6,9,10 \\ \hline 3 & 3,9,5 \\ \hline 3 & 1,3,5 \\ \hline 5 & 1,1,5 \\ \hline & 1,1,1 \end{array}$$

∴ LCM = 2 × 2 × 3× 3 × 5
= 180

Q4

Answer :

The given numbers are 36, 60 and 72.

We have:

$$\begin{array}{r|l} 2 & 36,60,72 \\ \hline 2 & 18,30,36 \\ \hline 3 & 9,15,18 \\ \hline 3 & 3,5,6 \\ \hline 5 & 1,5,2 \\ \hline 2 & 1,1,2 \\ \hline & 1,1,1 \end{array}$$

∴ LCM = 2 × 2 × 2 × 3 × 3 × 5
= 360

Q5

Answer :

The given numbers are 36, 40 and 126.

We have:

$$\begin{array}{r|l} 2 & 36,40,126 \\ \hline 3 & 18,20,63 \\ \hline 3 & 6,20,21 \\ \hline 2 & 2,20,7 \\ \hline 2 & 1,10,7 \\ \hline 5 & 1,5,7 \\ \hline 7 & 1,1,7 \\ \hline & 1,1,1 \end{array}$$

∴ LCM = 2 × 3 × 3 ×2 × 2 × 5 × 7
= 2520

Q6

Answer :

The given numbers are 16, 28, 40 and 77.
We have:

$$\begin{array}{r|l} 2 & 16,28,40,77 \\ 7 & 8,14,20,77 \\ 2 & 8,2,20,11 \\ 2 & 4,1,10,11 \\ 2 & 2,1,5,11 \\ 5 & 1,1,5,11 \\ 11 & 1,1,1,11 \\ & 1,1,1,1 \end{array}$$

$\therefore$ LCM = 2 × 7 × 2 × 2 × 2 × 5 × 11
= 6160

Q7

Answer :

The given numbers are 28, 36, 45 and 60.

We have:

$$\begin{array}{r|l} 2 & 28,36,45,60 \\ 2 & 14,18,45,30 \\ 3 & 7,9,45,15 \\ 3 & 7,3,15,5 \\ 5 & 7,1,5,5 \\ 7 & 7,1,1,1 \\ & 1,1,1,1 \end{array}$$

$\therefore$ LCM = 2 × 2 × 3 × 3 × 5 × 7
= 1260

Q8

Answer :

The given numbers are 144, 180 and 384.
We have:

$$\begin{array}{r|l} 2 & 144,180,384 \\ 2 & 72,90,192 \\ 2 & 36,45,96 \\ 2 & 18,45,48 \\ 3 & 9,45,24 \\ 3 & 3,15,8 \\ 2 & 1,5,8 \\ 2 & 1,5,4 \\ 2 & 1,5,2 \\ 5 & 1,5,1 \\ & 1,1,1 \end{array}$$

$\therefore$ LCM = $2^7 \times 3^2 \times 5$
= 5760

Q9

Answer :

The given numbers are 48, 64, 72, 96 and 108.
We have:

$$
\begin{array}{r|l}
2 & 48, 64, 72, 96, 108 \\
\hline
2 & 24, 32, 36, 48, 54 \\
\hline
2 & 12, 16, 18, 24, 27 \\
\hline
2 & 6, 8, 9, 12, 27 \\
\hline
3 & 3, 4, 9, 6, 27 \\
\hline
2 & 1, 4, 3, 2, 9 \\
\hline
2 & 1, 2, 3, 1, 9 \\
\hline
3 & 1, 1, 3, 1, 9 \\
\hline
3 & 1, 1, 1, 1, 3 \\
\hline
 & 1, 1, 1, 1, 1
\end{array}
$$

$\therefore$ LCM = $2^6 \times 3^3$
= 1728

Q10

Answer :

The given numbers are 117 and 221.

We have:

$$
\begin{array}{r|l}
3 & 117 \\
\hline
3 & 39 \\
\hline
13 & 13 \\
\hline
 & 1
\end{array}
\qquad
\begin{array}{r|l}
13 & 221 \\
\hline
17 & 17 \\
\hline
 & 1
\end{array}
$$

Now,
117 = 3 × 3 × 13
221 = 13 × 17

$\therefore$ HCF = 13 × 1

Now, LCM = 13 × 17 × 3 × 3
= 1989

Q11

Answer :

The given numbers are 234 and 572.

We have:

$$\begin{array}{r|l} 2 & 234 \\ 3 & 117 \\ 3 & 39 \\ 13 & 13 \\ & 1 \end{array} \qquad \begin{array}{r|l} 2 & 572 \\ 2 & 286 \\ 13 & 143 \\ 11 & 11 \\ & 1 \end{array}$$

Now, we have:

234 = 2 × 3 × 3 × 13
572 = 2 × 2 × 1 3 × 11

∴ LCM = 13 × 2 × 2 × 11 × 9
= 5148
Also, HCF = 13 × 2 = 26

Q12

Answer :

The given numbers are 693 and 1078.

We have:

$$\begin{array}{r|l} 3 & 693 \\ 3 & 231 \\ 7 & 77 \\ 11 & 11 \\ & 1 \end{array} \qquad \begin{array}{r|l} 2 & 1078 \\ 7 & 539 \\ 7 & 77 \\ 11 & 11 \\ & 1 \end{array}$$

Now, we have:

693 = 3 × 3 ×7 × 11
1078 = 2 × 7× 7 × 11

∴ HCF = 7 × 11= 77
Also, LCM = 2 × 3 × 3 ×7 × 7 × 11 = 9702

Q13

Answer :

The given numbers are 145 and 232.
We have:

$$\begin{array}{r|l} 5 & 145 \\ 29 & 29 \\ & 1 \end{array} \qquad \begin{array}{r|l} 2 & 232 \\ 2 & 116 \\ 2 & 58 \\ 29 & 29 \\ & 1 \end{array}$$

Now, we have:

145 = 5 × 29
232 = 2 ×2 × 2 × 29

∴ HCF = 29
Also, LCM = 29 × 2 × 2 × 2 × 5 = 1160

Q14

Answer :

The given numbers are 861 and 1353.

We have:

$$\begin{array}{r|l} 3 & 861 \\ 7 & 287 \\ 41 & 41 \\ & 1 \end{array} \qquad \begin{array}{r|l} 3 & 1353 \\ 11 & 451 \\ 41 & 41 \\ & 1 \end{array}$$

Now, we have:

$861 = 3 \times 41 \times 7$
$1353 = 41 \times 11 \times 3$

$\therefore$ HCF $= 41 \times 3 = 123$
Also, LCM $= 41 \times 3 \times 11 \times 7 = 9471$

Q15

Answer :

HCF of 2923 and 3239:

$$\begin{array}{r} 1 \\ 2923\overline{)\,3239} \\ -2923 \\ \hline 316\overline{)\,2923}\,(9 \\ -2844 \\ \hline 79\overline{)\,316}\,(4 \\ -316 \\ \hline 0 \end{array}$$

$\therefore$ HCF $= 79$

We know that product of two numbers = HCF $\times$ LCM

$$\Rightarrow \text{LCM} = \frac{\text{Product of two numbers}}{\text{HCF}}$$
$$\Rightarrow \text{LCM} = \frac{2923 \times 3239}{79}$$

$$\therefore \text{LCM} = 119843$$

Q16

Answer :

(i) 87 and 145

$$\begin{array}{r|l} 3 & 87 \\ 29 & 29 \\ & 1 \end{array} \qquad \begin{array}{r|l} 5 & 145 \\ 29 & 29 \\ & 1 \end{array}$$

We have:
$87 = 3 \times 29$
$145 = 5 \times 29$

HCF $= 29$
LCM $= 29 \times 15 \times 1 = 435$

Now, HCF $\times$ LCM $= 29 \times 435 = 12615$
Product of the two numbers $= 87 \times 145 = 12615$

$\therefore$ HCF $\times$ LCM = Product of the two numbers
Verified.

(ii)186 and 403

2	186
3	93
31	31
	1

13	403
31	31
	1

186 = 2 × 3 × 31
403 = 31 × 13

HCF = 31
LCM = 31 × 13 × 6 = 2418

Now, HCF × LCM = 31 × 2418 = 74958
Product of the two numbers = 186 × 403 = 74958

∴ HCF × LCM = Product of the two numbers
Verified.

(iii) 490 and 1155

2	490
5	245
7	49
7	7
	1

5	1155
7	231
3	33
11	11
	1

490 = 7 × 7 × 2 × 5
1155 = 5 × 7 ×3 × 11

HCF = 7 × 5 = 35
LCM = 7 × 5 ×7 × 2 × 3 × 11 = 16170

Now, HCF × LCM = 35 × 16170 = 565950
Product of the two numbers = 490 × 1155 = 565950

∴ HCF × LCM = Product of the two numbers
Verified.

Q17

Answer :

Product of the two numbers = 2160
HCF = 12

We know that LCM × HCF = Product of the two numbers

∴ LCM = $\frac{2160}{12}$ = 180

Q18

Answer :

Product of the two numbers = 2560
LCM = 320

We know that

LCM × HCF = Product of the two numbers

∴ HCF = $\frac{2560}{320}$ = 8

Q19

Answer :

HCF = 145
LCM = 2175
One of the number = 725

We know that
HCF × LCM = Product of two numbers
∴ Other number = $\frac{145\times2175}{725}$ = 435

Q20

Answer :

HCF = 131
LCM = 8253
One of the number = 917

We know that
LCM × HCF = Product of two numbers
Other number = $\frac{8253\times131}{917}$

∴ The other number is 1179.

Q21

Answer :

The given numbers are 15, 20, 24, 32 and 36.

The smallest number divisible by the numbers given above will be their LCM.

$$
\begin{array}{r|l}
2 & 15,20,24,32,36 \\
\hline
3 & 15,10,12,16,18 \\
\hline
5 & 5,10,4,16,6 \\
\hline
2 & 1,2,4,16,6 \\
\hline
2 & 1,1,2,8,3 \\
\hline
2 & 1,1,1,4,3 \\
\hline
2 & 1,1,1,2,3 \\
\hline
3 & 1,1,1,1,3 \\
\hline
 & 1,1,1,1,1
\end{array}
$$

LCM = $2^5 \times 3^2 \times 5$
= 1440
∴ The least number divisible by 15, 20, 24, 32 and 36 is 1440.

Q22

Answer :

25, 40 and 60 exactly divides the least number that is equal to their LCM.
So, the required number that leaves 9 as a remainder will be LCM + 9.

Finding the LCM:

$2 \mid 25, 40, 60$
$2 \mid 25, 20, 30$
$2 \mid 25, 10, 15$
$3 \mid 25, 5, 15$
$5 \mid 25, 5, 5$
$5 \mid 5, 1, 1$
$1, 1, 1$

$\text{LCM} = 2^3 \times 3 \times 5^2 = 600$
$\therefore$ Required number $= 600 + 9 = 609$

Q23

Answer :

LCM of 16, 18, 24 and 30:

$2 \mid 16, 18, 24, 30$
$2 \mid 8, 9, 12, 15$
$2 \mid 4, 9, 6, 15$
$2 \mid 2, 9, 3, 15$
$3 \mid 1, 9, 3, 15$
$3 \mid 1, 3, 1, 5$
$5 \mid 1, 1, 1, 5$
$1, 1, 1, 1$

$\text{LCM} = 2^4 \times 3^2 \times 5 = 720$

We have to find the least five-digit number that is exactly divisible by 16, 18, 24 and 30.
But LCM=720 is a three digit number.

The least five digit number = 10000
Dividing 10000 by 720, we get:

$$\begin{array}{r} 13 \\ 720 \overline{)\ 10000} \\ \underline{-720} \\ 2800 \\ \underline{-2160} \\ 640 \end{array}$$

The greatest four-digit number exactly divisible by 720 = 10000-640
=9360
So, the least five-digit number exactly divisible by 720 = 9360 + 720
= 10080

Q24

Answer :

First, we will find the LCM of 9, 12, 15, 18 and 24.

$2 \mid 9, 12, 15, 18, 24$

$2 \mid 9, 6, 15, 9, 12$

$2 \mid 9, 3, 15, 9, 6$

$3 \mid 9, 3, 15, 9, 3$

$3 \mid 3, 1, 5, 3, 1$

$5 \mid 1, 1, 5, 1, 1$

$1, 1, 1, 1, 1$

$\therefore$ LCM of the numbers $= 2^3 \times 3^2 \times 5$

$= 360$

The least six-digit number $= 100000$

The greatest five-digit number divisible by 360 will be the quotient of $\frac{100000}{360}$ mutiplied by 360.

$$360 \overline{)100000} \quad 277$$

720

2800

2520

280

So, the greatest five-digit number exactly divisible by the given numbers will be

$360 \times 277 = 99720$

Q25

Answer :

Three bells toll at intervals of 9, 12 and, 15 minutes.

The time when they will toll together again is given by the LCM of 9, 12 and 15.

$3 \mid 9, 12, 15$

$3 \mid 3, 4, 5$

$5 \mid 1, 4, 5$

$2 \mid 1, 4, 1$

$2 \mid 1, 2, 1$

$1, 1, 1$

Required time $= 2^2 \times 3^2 \times 5$

$= 180$ minutes

$= 3$ h

If they start tolling together, they will toll together again after 3 h.

Q26

Answer :

From the starting point, they will step together again when they travel a distance that is exactly divisible by the lengths of their steps.
The least distance from the starting point where they will step together will be given by the LCM of 36, 48 and 54.

$2 \mid 36, 48, 54$
$2 \mid 18, 24, 27$
$3 \mid 9, 12, 27$
$3 \mid 3, 4, 9$
$3 \mid 1, 4, 3$
$2 \mid 1, 4, 1$
$2 \mid 1, 2, 1$
$1, 1, 1$

The required distance $= 2 \times 2 \times 3 \times 3 \times 3 \times 2 \times 2$
$= 16 \times 27$
$= 432$ cm
∴ They will step together again at a distance of 432 cm from the starting point.

Q27

Answer :

The time when the lights will change simultaneously again will be quantity which is exactly divisible by 48, 72 and 108. The least time when they change simultaneously will be given by their LCM.

$2 \mid 48, 72, 108$
$2 \mid 24, 36, 54$
$2 \mid 12, 18, 27$
$2 \mid 6, 9, 27$
$3 \mid 3, 9, 27$
$3 \mid 1, 3, 9$
$3 \mid 1, 1, 3$
$1, 1, 1$

Required time $= 2^4 \times 3^3$
$=$ 432 seconds
$=$ 7 min 12 seconds
So, the lights will change simultaneously at 8:07:12 a.m.

Q28

Answer :

The length of the required rope must be such that it is exactly divisible by 45, 50 and 75. The least length will be given by the LCM of 45, 50 and 75.

$2 \mid 45, 50, 75$
$3 \mid 45, 25, 75$
$3 \mid 15, 25, 25$
$5 \mid 5, 25, 25$
$5 \mid 1, 5, 5$
$1, 1, 1$

Required length $= 3 \times 3 \times 5 \times 5 \times 2$
$= 450$ cm
So, the minimum length of the rope that can be measured by the full length of each of the three rods is 450 cm.

Q29

Answer :

The LCM of the time intervals of the beeps will give the time when the electronic devices will beep together.

LCM of 15 and 20:

$$\begin{array}{r|l} 5 & 15, 20 \\ \hline 3 & 3, 4 \\ \hline 2 & 1, 4 \\ \hline 2 & 1, 2 \\ \hline & 1, 1 \end{array}$$

Required time = $5 \times 3 \times 2 \times 2$

$= 60$ min

So, they will beep simultaneously after 60 min or 1 h.

∴ They will beep together again at 7:00 a.m.

Q30

Answer :

Distance covered by a wheel for one complete revolution = circumference of the wheel

All the wheels will make complete numbers of revolutions when the distances covered by them is equal to their LCM.

$$\begin{array}{r|l} 5 & 50, 60, 75, 100 \\ \hline 5 & 10, 12, 15, 20 \\ \hline 2 & 2, 12, 3, 4 \\ \hline 2 & 1, 6, 3, 2 \\ \hline 3 & 1, 3, 3, 1 \\ \hline & 1, 1, 1, 1 \end{array}$$

Required least distance = $5 \times 5 \times 2 \times 2 \times 3$

$= 25 \times 4 \times 3$

$= 300$ cm $= 3$ m

So, each wheel will make a complete number of revolutions after travelling 3 m.

Factors and Multiples
Ex 2F

Q1

Answer :

(c) 83479560

A number is divisible by 3 if the sum of its digits is divisible by 3.

a) Consider the number 24357806.
Sum of its digits = 2 + 4 + 3 + 5+ 7 + 8 + 0 + 6 = 35, which is not divisible by 3.
So, 2357806 is not divisible by 3.

b) Consider the number 35769812.
Sum of its digits = 3 + 5 + 7 + 6 +9 + 8 + 1 + 2 = 41, which is not divisible by 3.
So, 35769812 is not divisible by 3.

c) Consider the number 83479560.
Sum of its digits = 8 + 3 + 4+ 7 + 9 + 5 + 6 + 0 = 42, which is divisible by 3.
So, 2357806 is divisible by 3.

d) Consider the number 3336433.
Sum of its digits = 3 + 3 +3 + 6 +4 + 3 +3 = 25, which is not divisible by 3.
So, 3336433 is not divisible by 3.

Q2

Answer :

(a) 8576901

A number is divisible by 9 if the sum of its digits is divisible by 9.

a) Consider the number 8576901.
Sum of its digits = 8 + 5 +7 + 6 + 9+ 0 + 1 = 36, which is divisible by 9.
So, 8576901 is divisible by 9.

b) Consider the number 96345210.
Sum of its digits = 9 + 6 + 3+ 4 + 5+ 2 + 1 + 0 = 30, which is not divisible by 9.
So, 96345210 is not divisible by 9.

c) Consider the number 67594310.
Sum of its digits = 6 + 7 + 5 + 9 + 4 + 3 + 1 + 0 = 35, which is not divisible by 9.
So, 67594310 is not divisible by 9.

Q3

Answer :

(d)87941032

A number is divisible by 4 if the number formed by its digits in the tens and ones places is divisible by 4.

(a) 78653234
Consider the number 78653234.
Here, the number formed by the tens and the ones digit is 34, which is not divisible by 4.
Therefore, 78653234 is not divisible by 4.

(b) 98765042
Consider the number 98765042.
Here, the number formed by the tens and the ones digit is 42, which is not divisible by 4.
Therefore, 98765042 is not divisible by 4.

(c) 24689602
Consider the number 24689602.
Here, the number formed by the tens and the ones digit is 02, which is not divisible by 4.
Therefore, 24689602 is not divisible by 4

(d) 87941032
Consider the number 87941032.
Here, the number formed by the tens and ones digit is 32, which is divisible by 4.
Therefore, 87941032 is divisible by 4.

Q4

Answer :

(b) 37450176

A number is divisible by 8 if the number formed by its digits in hundreds, tens and ones places is divisible by 8.

(a) 96354142
Consider the number 96354142.
Here, the number formed by the digits in hundreds, tens and ones places is 142, which is clearly not divisible by 8.
Therefore, 96354142 is not divisible by 8.

(b) 37450176
Consider the number 37450176.
The number formed by the digits in hundreds, tens and ones places is 176, which is clearly divisible by 8.
Therefore, 37450176 is divisible by 8.

(c) 57064214
Consider the number 57064214.
Here, the number formed by the digits in hundreds, tens and ones places is 214, which is clearly not divisible by 8.
Therefore, 57064214 is not divisible by 8.

Q5

Answer :

(a) 8790432 and (c) 85492014

A number is divisible by 6, if it is divisible by both 2 and 3.

(a) 8790432
Consider the number 8790432.
The number in the ones digit is 2.
Therefore, 8790432 is divisible by 2.
Now, the sum of its digits (8+7+9+0+2+3+2) is 33. Since 33 is divisible by 3, we can say that 8790432 is also divisible by 3.
Since 8790432 is divisible by both 2 and 3, it is also divisible by 6.

(b) 98671402
Consider the number 98671402.
The number in the ones digit is 2.
Therefore, 98671402 is divisible by 2.
Now, the sum of its digits (9+8+6+7+1+4+0+2) is 37. Since 37 is not divisible by 3, we can say that 98671402 is also not divisible by 3.
Since 98671402 is not divisible by both 2 and 3, it is not divisible by 6.

(c) 85492014
Consider the number 85492014.
The number in the ones digit is 4.
Therefore, 85492014 is divisible by 2.
Now, the sum of its digits (8+5+4+9+2+0+1+4) is 33. Since 33 is divisible by 3, we can say that 85492014 is also divisible by 3.
Since 85492014 is divisible by both 2 and 3, it is also divisible by 6.

Q6

Answer :

(c) 22222222
A number is divisible by 11, if the difference of the sum of its digits in odd places and the sum of the digits in even places (starting from ones place) is either 0 or a multiple of 11.

(a) 3333333
Consider the number 3333333.
Sum of its digits in odd places (3 + 3 + 3 + 3) = 12
Sum of its digits in even places (3 + 3 + 3) = 9
Difference of the two sums = 12 − 9 = 3
Since this number (3) is not divisible by 11, 3333333 is not divisible by 11.

(b) 1111111
Consider the number 1111111.
Sum of its digits in odd places (1 + 1 + 1 + 1) = 4
Sum of its digits in even places (1 + 1 + 1) = 3
Difference of the two sums = 4 − 3 = 1
Since this number (1) is not divisible by 11, 1111111 is also not divisible by 11.

(c) 22222222
Consider the number 22222222.
Sum of its digits in odd places (2 + 2 + 2 + 2)= 8
Sum of its digits in even places (2 + 2 + 2 + 2) = 8
Difference of the two sums = 8 − 8 = 0
Since this number (0) is divisible by 11, 22222222 is also divisible by 11.

Q7

Answer :

(d) 97

(a) 81 is not a prime number because 81 can be written as 9×9.
(b) 87 is not a prime number because 87 can be written as 29×3.
(c) 91 is not a prime number because 91 can be written as 13×7.
(d) 97 is a prime number.

Q8

Answer :

(c) 179

(a) 117 is not a prime number because 117 can be written as 3 × 39.
(b) 171 is not a prime number because 171 can be written as 19×9.
(c) 179 is prime number.

Q9

Answer :

(c)263

(a) 323 is not a prime number because 323 can be written as 17 × 19.
(b) 361 is not a prime number because 361 can be written as 19 × 19.
(c) 263 is a prime number.

Q10

Answer :

(b) 9, 10

(a) 8, 12 are not co-primes as they have a common factor 4.
(b) 9, 10 are co-primes as they do not have a common factor.
(c) 6, 8 are not co-primes as they have a common factor 2.
(d)15,18 are not co-primes as they have a common factor 3.

Q11

Answer :

(c) 32

(a) 23 is not a composite number as it cannot be broken into factors.
(b) 29 is not a composite number as it cannot be broken into factors.
(c) 32 is a composite number as it can be broken into factors, which are 2 × 2 × 2 × 2 × 2.

Q12

Answer :

(d) $2 \times 3^2 = 18$
We first factorise the two numbers:

2	144
2	72
2	36
2	18
3	9
3	3
	1

2	198
3	99
3	33
11	11
	1

$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 2^4 \times 3^2$
$198 = 2 \times 3 \times 3 \times 11 = 2 \times 3^2 \times 11$
Here, 18 ($2 \times 3^2 = 18$) is the highest common factor of the two numbers.

Q13

Answer :

(a) $2^2 \times 3 = 12$
We will first factorise the two numbers:

2	144
2	72
2	36
2	18
3	9
3	3
	1

2	180
2	90
3	45
3	15
5	5
	1

2	192
2	96
2	48
2	24
2	12
2	6
3	3
	1

$144 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 2^4 \times 3^2$
$180 = 2 \times 2 \times 3 \times 3 \times 5 = 2^2 \times 3^2 \times 5$
$192 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 = 2^6 \times 3$

Here, 12 (i.e. $2^2 \times 3 = 12$) is the highest common factor of the three numbers.

Q14

Answer :

(b) 161 and 192

(a) 39 and 91 are not co-primes as 39 and 91 have a common factor, i.e. 13.
(b) 161 and 192 are co-primes as 161 and 192 have no common factor other than 1.
(c) 385 and 462 are not co-primes as 385 and 462 have common factors 7 and 11.

Q15

Answer :

(d) $\frac{17}{23}$

$\frac{289}{391}$

H.C.F.=17

Dividing both the numerator and the denominator by the H.C.F. of 289 & 391:

17	289
17	17
	1

17	391
23	23
	1

$\frac{289 \div 17}{391 \div 17} = \frac{17}{23}$

Q16

Answer :

(d) 11
Since we need 2 as the remainder, we will subtract 2 from each of the numbers.
167 − 2 = 165
134 − 2 = 132
Now, any of the common factors of 165 and 132 will be the required divisor.
On factorising:
165 = 3 × 5 × 11
132 = 2 × 2 × 3 × 11
Their common factors are 11 and 3.
So, 11 is the required divisor.

Q17

Answer :

(c) 360

$$\begin{array}{r|l} 2 & 24, 36, 40 \\ \hline 2 & 12, 18, 20 \\ \hline 2 & 6, \ \ 9, 10 \\ \hline 3 & 3, \ 9, \ \ 5 \\ \hline 3 & 1, \ 3, \ \ 5 \\ \hline 5 & 1, \ 1, \ \ 5 \\ \hline & 1, \ 1, \ \ 1 \end{array}$$

L.C.M. = $2^3 \times 3^2 \times 5$
= 360

Q18

Answer :

(d) 540

$$\begin{array}{r|l} 2 & 12, 15, 20, 27 \\ \hline 2 & 6, 15, 10, 27 \\ \hline 3 & 3, 15, 5, 27 \\ \hline 3 & 1, 5, 5, \ 9 \\ \hline 3 & 1, 5, 5, \ 3 \\ \hline 5 & 1, 5, 5, \ 1 \\ \hline & 1, 1, 1, 1 \end{array}$$

L.C.M. = $2^2 \times 3^3 \times 5 = 540$

Q19

Answer :

(d) none of these

The smallest number that is exactly divisible by 11, 28, 36 and 45 will be their L.C.M.
So, the required number will be the L.C.M. plus 3.

$$
\begin{array}{r|l}
2 & 11, 28, 36, 45 \\
\hline
2 & 11, 14, 18, 45 \\
\hline
3 & 11, 7, 9, 45 \\
\hline
3 & 11, 7, 3, 15 \\
\hline
5 & 11, 7, 1, 5 \\
\hline
7 & 11, 7, 1, 1 \\
\hline
11 & 11, 1, 1, 1 \\
\hline
 & 1, 1, 1, 1
\end{array}
$$

L.C.M. of the three numbers = $2^2 \times 3^2 \times 5 \times 7 \times 11$
= 13860
∴ Required number = 13860 + 3 = 13863

Q20

Answer :

(c) 1
H.C.F. of two co-primes is 1.
This is because two co-prime numbers do not have any common factor.
For example, 15 and 16 are co-primes.
Their H.C.F. is 1.

Q21

Answer :

(c) *ab*

If *a* and *b* are co-primes then their LCM will be ab.
For example, 4 and 9 are co-primes.
L.C.M. of 4 and 9 is 4×9.

Q22

Answer :

(c) 180
Here, H.C.F. = 12
Product of two numbers = 2160

We know:
L.C.M. × H.C.F. = Product of the two numbers

$$\text{L.C.M.} = \frac{2160}{\text{H.C.F.}}$$

$$= \frac{2160}{12}$$

= 180
L.C.M. = 180

Q23

Answer :

(b) 435

One of the numbers is 725.

H.C.F. = 145

L.C.M. = 2175

We know:

L.C.M. × H.C.F. = Product of the two numbers

∴ Product of the two numbers = 145 × 2175

= 315375

∴ Other number $= \frac{315375}{725}$

= 435

Q24

Answer :

(c) 1440

The least number divisible by each of the numbers 15, 20, 24, 32 and 36 is their L.C.M.

$2 \mid 15, 20, 24, 32, 36$

$2 \mid 15, 10, 12, 16, 18$

$2 \mid 15, 5, 6, 8, 9$

$2 \mid 15, 5, 3, 4, 9$

$2 \mid 15, 5, 3, 2, 9$

$3 \mid 15, 5, 3, 1, 9$

$3 \mid 5, 5, 1, 1, 3$

$5 \mid 5, 5, 1, 1, 1$

$1, 1, 1, 1, 1$

L.C.M. = $2^5 \times 3^2 \times 5$

= 1440

Q25

Answer :

(d) 3 hours

The L.C.M. of 9, 12 and 15 will give us the minutes after which the bells will next toll together.

$2 \mid 9, 12, 15$

$2 \mid 9, 6, 15$

$3 \mid 9, 3, 15$

$3 \mid 3, 1, 5$

$5 \mid 1, 1, 5$

$1, 1, 1$

L.C.M. = $2^2 \times 3^2 \times 5$

= 180

So,the bells will toll together after 180 min.

On converting into hours:

180/60 = 3 hours