DIVISIBILITY TESTS FOR 2, 3, 4, 5, 6, 7, 8, 9, 10 AND 11

(i) TEST OF DIVISIBILITY BY 2 *A number is divisible by 2 if its ones digit is 0, 2, 4, 6 or 8.*

EXAMPLE 1. Each of the numbers 30, 52, 84, 136, 2108 is divisible by 2.

EXAMPLE 2. None of the numbers 71, 83, 215, 467, 629 is divisible by 2.

(ii) TEST OF DIVISIBILITY BY 3 *A number is divisible by 3 if the sum of its digits is divisible by 3.*

EXAMPLE 1. Consider the number 64275.
Sum of its digits = (6 + 4 + 2 + 7 + 5) = 24, which is divisible by 3.
Therefore, 64275 is divisible by 3.

EXAMPLE 2. Consider the number 39583.
Sum of its digits = (3 + 9 + 5 + 8 + 3) = 28, which is not divisible by 3.
Therefore, 39583 is not divisible by 3.

(iii) TEST OF DIVISIBILITY BY 4 *A number is divisible by 4 if the number formed by its digits in the tens and ones places is divisible by 4.*

EXAMPLE 1. Consider the number 96852.
The number formed by the tens and ones digits is 52, which is divisible by 4.
Therefore, 96852 is divisible by 4.

EXAMPLE 2. Consider the number 61394.
The number formed by the tens and ones digits is 94, which is not divisible by 4.
Therefore, 61394 is not divisible by 4.

(iv) TEST OF DIVISIBILITY BY 5 *A number is divisible by 5 if its ones digit is 0 or 5.*

EXAMPLE 1. Each of the numbers 65, 195, 230, 310 is divisible by 5.

EXAMPLE 2. None of the numbers 71, 83, 94, 106, 327, 148, 279 is divisible by 5.

(v) TEST OF DIVISIBILITY BY 6 *A number is divisible by 6 if it is divisible by each one of 2 and 3.*
Note that 2 and 3 are the prime factors of 6.

EXAMPLE 1. Each of the numbers 18, 42, 60, 114, 1356 is divisible by 6.

EXAMPLE 2. None of the numbers 21, 25, 34, 52 is divisible by 6.

(vi) TEST OF DIVISIBILITY BY 7 *A number is divisible by 7 if the difference between twice the ones digit and the number formed by the other digits is either 0 or a multiple of 7.*

EXAMPLE 1. Consider the number 6804.
Clearly, $(680 - 2 \times 4) = 672$, which is divisible by 7.
Therefore, 6804 is divisible by 7.

EXAMPLE 2. Consider the number 137.
Clearly, $(2 \times 7) - 13 = 1$, which is not divisible by 7.
Therefore, 137 is not divisible by 7.

EXAMPLE 3. Consider the number 1367.
Clearly, $136 - (2 \times 7) = 136 - 14 = 122$, which is not divisible by 7.
Therefore, 1367 is not divisible by 7.

(vii) TEST OF DIVISIBILITY BY 8 *A number is divisible by 8 if the number formed by its digits in hundreds, tens and ones places is divisible by 8.*

EXAMPLE 1. Consider the number 79152.
The number formed by hundreds, tens and ones digits is 152, which is clearly divisible by 8.
Therefore, 79152 is divisible by 8.

EXAMPLE 2. Consider the number 57348.
The number formed by hundreds, tens and ones digits is 348, which is not divisible by 8.
Therefore, 57348 is not divisible by 8.

(viii) TEST OF DIVISIBILITY BY 9 *A number is divisible by 9 if the sum of its digits is divisible by 9.*

EXAMPLE 1. Consider the number 65403.
Sum of its digits $= (6 + 5 + 4 + 0 + 3) = 18$, which is divisible by 9.
Therefore, 65403 is divisible by 9.

EXAMPLE 2. Consider the number 81326.
Sum of its digits $= (8 + 1 + 3 + 2 + 6) = 20$, which is not divisible by 9.
Therefore, 81326 is not divisible by 9.

(ix) TEST OF DIVISIBILITY BY 10 *A number is divisible by 10 if its ones digit is 0.*

EXAMPLE 1. Each of the numbers 30, 160, 690, 720 is divisible by 10.

EXAMPLE 2. None of the numbers 21, 32, 63, 84, etc., is divisible by 10.

(x) TEST OF DIVISIBILITY BY 11 *A number is divisible by 11 if the difference of the sum of its digits in odd places and the sum of its digits in even places (starting from the ones place) is either 0 or a multiple of 11.*

EXAMPLE 1. Consider the number 90728.
Sum of its digits in odd places $= (8 + 7 + 9) = 24$.
Sum of its digits in even places $= (2 + 0) = 2$.
Difference of the two sums $= (24 - 2) = 22$, which is clearly divisible by 11.
Therefore, 90728 is divisible by 11.

EXAMPLE 2. Consider the number 863423.
Sum of its digits in odd places $= (3 + 4 + 6) = 13$.
Sum of its digits in even places $= (2 + 3 + 8) = 13$.
Difference of these sums $= (13 - 13) = 0$.
Therefore, 863423 is divisible by 11.

EXAMPLE 3. Consider the number 76844.
Sum of its digits in odd places $= (4 + 8 + 7) = 19$.
Sum of its digits in even places $= (4 + 6) = 10$.
Difference of these sums $= (19 - 10) = 9$, which is not divisible by 11.
Therefore, 76844 is not divisible by 11.

GENERAL PROPERTIES OF DIVISIBILITY

PROPERTY 1. *If a number is divisible by another number, it must be divisible by each of the factors of that number.*

EXAMPLE We know that 36 is divisible by 12.
All factors of 12 are 1, 2, 3, 4, 6, 12.
Clearly, 36 is divisible by each one of 1, 2, 3, 4, 6, 12.

REMARKS As a consequence of the above result, we can say that
(i) every number divisible by 9 is also divisible by 3,
(ii) every number divisible by 8 is also divisible by 4.

PROPERTY 2. *If a number is divisible by each of two co-prime numbers, it must be divisible by their product.*

EXAMPLE 1. We know that 972 is divisible by each of the numbers 2 and 3. Also, 2 and 3 are co-primes.
So, according to Property 2, the number 972 must be divisible by 6, which is true.

EXAMPLE 2. We know that 4320 is divisible by each one of the numbers 5 and 8. Also, 5 and 8 are co-primes.
So, 4320 must be divisible by 40.
By actual division, we find that it is true.

EXAMPLE 3. Consider the number 372.
It may be verified that the above number is divisible by both 4 and 6.
But, by actual division, we find that 372 is not divisible by 24.
Be careful, 4 and 6 are not co-primes.

REMARK Since two prime numbers are always co-primes, it follows that if a number is divisible by each one of any two prime numbers then the number is divisible by their product.

PROPERTY 3. *If a number is a factor of each of the two given numbers, then it must be a factor of their sum.*

EXAMPLE 1. We know that 5 is a factor of 15 as well as that of 20.
So, 5 must be a factor of $(15 + 20)$, that is, 35.
And, this is clearly true.

EXAMPLE 2. We know that 7 is a factor of each of the numbers 49 and 63.
So, 7 must be a factor of $(49 + 63) = 112$.
Clearly, 7 divides 112 exactly.

PROPERTY 4. *If a number is a factor of each of the two given numbers then it must be a factor of their difference.*

EXAMPLE 1. We know that 3 is a factor of each one of the numbers 36 and 24.
So, 3 must be a factor of $(36 - 24) = 12$.
Clearly, 3 divides 12 exactly.

EXAMPLE 2. We know that 13 is a factor of each one of the numbers 65 and 117.
So, 13 must be a factor of $(117 - 65) = 52$.
Clearly, 13 divides 52 exactly.

TO FIND PRIME NUMBERS BETWEEN 100 AND 200

We know that $15 \times 15 > 200$.

So, we adopt the following rule:

Rule *Examine whether the given number is divisible by any prime number less than 15. If yes then it is not prime; otherwise it is prime.*

EXAMPLE *Which of the following are prime numbers?*

(i) 117 (ii) 139 (iii) 193

Solution (i) Test the divisibility of 117 by each one of the prime numbers 2, 3, 5, 7, 11, 13, taking one by one. We find that 117 is divisible by 13. So, 117 is not a prime number.

(ii) Test the divisibility of 139 by each one of the prime numbers 2, 3, 5, 7, 11, 13. We find that 139 is divisible by none of them. So, 139 is a prime number.

(iii) Test the divisibility of 193 by each one of the prime numbers 2, 3, 5, 7, 11, 13. We find that 193 is divisible by none of them.
So, 193 is a prime number.

TO FIND PRIME NUMBERS BETWEEN 100 AND 400

We know that $20 \times 20 = 400$.

Rule *Examine whether the given number is divisible by any prime number less than 20. If yes then it is not prime; otherwise it is prime.*

EXAMPLE *Which of the following is a prime number?*

(i) 263 (ii) 323 (iii) 361

Solution (i) Test the divisibility of 263 by each one of the prime numbers 2, 3, 5, 7, 11, 13, 17, 19. We find that 263 is not divisible by any of these numbers.
So, 263 is a prime number.

(ii) Test the divisibility of 323 by each one of the numbers 2, 3, 5, 7, 11, 13, 17, 19. We find that 323 is divisible by 17.
$\therefore$ 323 is not a prime number.

(iii) Test the divisibility of 361 by each one of the prime numbers 2, 3, 5, 7, 11, 13, 17, 19. We find that 361 is divisible by 19.
Hence, 361 is not a prime number.

EXERCISE 2B

1. Test the divisibility of the following numbers by 2:

(i) 2650 (ii) 69435 (iii) 59628
(iv) 789403 (v) 357986 (vi) 367314

2. Test the divisibility of the following numbers by 3:

(i) 733 (ii) 10038 (iii) 20701
(iv) 524781 (v) 79124 (vi) 872645

3. Test the divisibility of the following numbers by 4:

(i) 618 (ii) 2314 (iii) 63712
(iv) 35056 (v) 946126 (vi) 810524

4. Test the divisibility of the following numbers by 5:

(i) 4965 (ii) 23590 (iii) 35208
(iv) 723405 (v) 124684 (vi) 438750

5. Test the divisibility of the following numbers by 6:
(i) 2070 (ii) 46523 (iii) 71232
(iv) 934706 (v) 251780 (vi) 872536

6. Test the divisibility of the following numbers by 7:
(i) 826 (ii) 117 (iii) 2345
(iv) 6021 (v) 14126 (vi) 25368

7. Test the divisibility of the following numbers by 8:
(i) 9364 (ii) 2138 (iii) 36792
(iv) 901674 (v) 136976 (vi) 1790184

8. Test the divisibility of the following numbers by 9:
(i) 2358 (ii) 3333 (iii) 98712
(iv) 257106 (v) 647514 (vi) 326999

9. Test the divisibility of the following numbers by 10:
(i) 5790 (ii) 63215 (iii) 55555

10. Test the divisibility of the following numbers by 11:
(i) 4334 (ii) 83721 (iii) 66311
(iv) 137269 (v) 901351 (vi) 8790322

11. In each of the following numbers, replace * by the smallest number to make it divisible by 3:
(i) 27*4 (ii) 53*46 (iii) 8*711
(iv) 62*35 (v) 234*17 (vi) 6*1054

12. In each of the following numbers, replace * by the smallest number to make it divisible by 9:
(i) 65*5 (ii) 2*135 (iii) 6702*
(iv) 91*67 (v) 6678*1 (vi) 835*86

13. In each of the following numbers, replace * by the smallest number to make it divisible by 11:
(i) 26*5 (ii) 39*43 (iii) 86*72
(iv) 467*91 (v) 1723*4 (vi) 9*8071

14. Test the divisibility of:
(i) 10000001 by 11 (ii) 19083625 by 11 (iii) 2134563 by 9
(iv) 10001001 by 3 (v) 10203574 by 4 (vi) 12030624 by 8

15. Which of the following are prime numbers?
(i) 103 (ii) 137 (iii) 161 (iv) 179
(v) 217 (vi) 277 (vii) 331 (viii) 397

16. Give an example of a number
(i) which is divisible by 2 but not by 4.
(ii) which is divisible by 4 but not by 8.
(iii) which is divisible by both 2 and 8 but not by 16.
(iv) which is divisible by both 3 and 6 but not by 18.

17. Write (T) for true and (F) for false against each of the following statements:
(i) If a number is divisible by 4, it must be divisible by 8.
(ii) If a number is divisible by 8, it must be divisible by 4.
(iii) If a number divides the sum of two numbers exactly, it must exactly divide the numbers separately.
(iv) If a number is divisible by both 9 and 10, it must be divisible by 90.
Hint. *9 and 10 are co-primes.*
(v) A number is divisible by 18 if it is divisible by both 3 and 6.
Hint. *3 and 6 are not co-primes. Consider 186.*

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.

(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

(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) 2724
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) 53046
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) 81711
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) 62235
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) 234117
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) 621054
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) 6525

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) 22135

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) 67023

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) 91467

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) 667881

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) 835686

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 2695.

(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.

−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.

(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.