5. Playing with Numbers

Exercise 5A

1. Question

The units digit of a two-digit number is 3 and seven times the sum of the digits is the number itself. Find the number.

Answer

It is given that the units place digit is 3.

So, let tens place digit be y.

∴ Our number = (10y + 3) …(1)

Our given condition is that seven times the sum of the digits is the number itself.

∴ By given condition,

$7(y + 3) = (10y + 3)$

$7y + 21 = 10y + 3$

∴ $10y - 7y = 21 - 3$

∴ $3y = 18$

∴ $y = 6$

Substituting the value of y in equation1,

Number = $10 \times 6 + 3 = 63$

Hence, required number is 63.

2. Question

In a two-digit number, the digit at the unit place is double the digit in the tens place. The number exceeds the sum of its digits by 18. Find the number.

Answer

Our first given condition is that the digit at the unit place is double the digit in the tens place.

∴ Let the tens digit be y.

The digit in the units place is 2y.

Number = $10y + 2y = 12y$

Now the second condition is that the number exceeds the sum of its digits by 18.

∴ By given condition,

(y + 2y) + 18 = (10y + 2y)

∴ 3y + 18 = 12y

12y - 3y = 18

9y =18

∴ y = 2

Hence, the digit in the tens place is 2.

So, digit in the units place is 4.

∴ Our number is 24.

3. Question

A two-digit number is 3 more than 4 times the sum of its digits. If 18 is added to the number, its digits are reversed. Find the number.

Answer

Let tens place digit be y and the units place be x.

∴ Our number is (10y + x)

Our given first condition is that our number is 3 more than 4 times the sum of its digits.

∴ By given condition,

4(y + x) + 3 = (10 y + x)

4y + 4x + 3 = 10y + x

6y - 3x = 3

3(2y - x) = 3

2y - x =1 …(1)

Our given second condition is that if 18 is added to the number, its digits are reversed.

The reversed number is (10x + y)

∴ By given condition,

(10y + x) + 18 = 10x + y

10y - y + x -10x = -18

9y - 9x = -18

9(y - x) = -18

y - x = -2

y = x - 2   [2]Putting this value of 'y' in eq (1), we have2(x - 2) - x = 12x - 4 - x = 1x = 5

From [2],

we have

y = 5 - 2 = 3

Hence,

y = 3 and x = 5

∴ Our number = (10 × 3 + 5) = 35

Hence, our number is 35.

4. Question

The sum of the digits of a two-digit number is 15. The number obtained by interchanging its digits exceeds the given number by 9. Find the original number.

Answer

Let tens place digit be y and the units place be x.

∴ Our number is (10y + x)

Our given first condition is that sum of the digits of a two-digit number is 15.

∴ By given condition,

y + x = 15 …(1)

Our given second condition is that the number obtained by interchanging its digits exceeds the given number by 9.

∴ By given condition,

10y + x + 9 = 10 x + y

∴ 10y - y + x - 10x = -9

9y - 9x = -9

y - x = -1 …(2)

Solving 1 and 2 simultaneously, we get,

∴ y = 7 and x = 8

∴ Our number = (10 × 7 + 8) = 78

Hence, our number is 78.

(Answer given is 48 but correct answer is 78)

5. Question

The difference between a 2-digit number and the number obtained by interchanging its digits is 63. What is the difference between the digits of the number?

Answer

Let tens place digit be y and the units place be x.

∴ Our number is (10y + x)

Our given first condition is that the difference between a 2-digit number and the number obtained by interchanging its digits is 63.

∴ By given condition,

$(10y + x) - (10x + y) = 63$

∴ $10y - y + x - 10x = 63$

$9y - 9x = 63$

$9(y - x) = 63$

$y - x = 7$

Hence, the difference between the digits of the number is 7.

6. Question

In a 3-digit number, the tens digit is thrice the units digit and the hundreds digit is four times the units digit. Also, the sum of its digits is 16. Find the number.

Answer

Let the units place digit be x.

Our given condition is that the tens digit is thrice the units digit and the hundreds digit is four times the units digit and sum of digits is 16.

∴ By given condition,

$4x + 3x + x = 16$

$8x = 16$]

$x = 2$

∴ The number is 862.

Exercise 5B

1. Question

Test the divisibility of each of the following numbers by 2:

(i) 94

(ii) 570

(iii) 285

(iv) 2398

(v) 79532

(vi) 13576

(vii) 46821

(viii) 84663

(ix) 66669

Answer

(i) 94

We know that if units place digit is divisible by 2 then our given number is divisible by 2.

Here units place is 4, which is divisible by 2.

Hence, 94 is divisible by 2.

(ii) 570

We know that if units place digit is divisible by 2 then our given number is divisible by 2.

Here units place is 0, which is divisible by 2.

Hence, 570 is divisible by 2.

(iii) 285

We know that if units place digit is divisible by 2 then our given number is divisible by 2.

Here units place is 5, which is not divisible by 2.

Hence, 570 is not divisible by 2.

(iv) 2398

We know that if units place digit is divisible by 2 then our given number is divisible by 2.

Here units place is 8, which is divisible by 2.

Hence, 2398 is divisible by 2.

(v) 79532

We know that if units place digit is divisible by 2 then our given number is divisible by 2.

Here units place is 8, which is divisible by 2.

Hence, 79532 is divisible by 2.

(vi) 13576

We know that if units place digit is divisible by 2 then our given number is divisible by 2.

Here units place is 6, which is divisible by 2.

Hence, 13576 is divisible by 2.

(vii) 46821

We know that if units place digit is divisible by 2 then our given number is divisible by 2.

Here units place is 1, which is not divisible by 2.

Hence, 46821 is not divisible by 2.

(viii) 84663

We know that if units place digit is divisible by 2 then our given number is divisible by 2.

Here units place is 3, which is not divisible by 2.

Hence, 84663 is not divisible by 2.

(ix) 66669

We know that if units place digit is divisible by 2 then our given number is divisible by 2.

Here units place is 9, which is not divisible by 2.

Hence, 66669 is not divisible by 2.

2. Question

Test the divisibility of each of the following numbers by 5:

(i) 95

(ii) 470

(iii) 1056

(iv) 2735

(v) 55053

(vi) 35790

(vii) 98765

(viii) 42658

(ix) 77990

Answer

(i) 95

We know that if units place is divisible by 5, ie. units place is having value either of 0 or 5, then our number is divisible by 5.

Here units place is 5, which is divisible by 5.

Hence, 95 is divisible by 5.

(ii) 470

We know that if units place is divisible by 5, ie. units place is having value either of 0 or 5, then our number is divisible by 5.

Here units place is 0, which is divisible by 5.

Hence, 470 is divisible by 5.

(iii) 1056

We know that if units place is divisible by 5, ie. units place is having value either of 0 or 5, then our number is divisible by 5.

Here units place is 6, which is not divisible by 5.

Hence, 1056 is not divisible by 5.

(iv) 2735

We know that if units place is divisible by 5, ie. units place is having value either of 0 or 5, then our number is divisible by 5.

Here units place is 5, which is divisible by 5.

Hence, 2735 is divisible by 5.

(v) 55053

We know that if units place is divisible by 5, ie. units place is having value either of 0 or 5, then our number is divisible by 5.

Here units place is 3, which is not divisible by 5.

Hence, 55053 is not divisible by 5.

(vi) 35790

We know that if units place is divisible by 5, ie. units place is having value either of 0 or 5, then our number is divisible by 5.

Here units place is 0, which is divisible by 5.

Hence, 35790 is divisible by 5.

(vii) 98765

We know that if units place is divisible by 5, ie. units place is having value either of 0 or 5, then our number is divisible by 5.

Here units place is 5, which is divisible by 5.

Hence, 98765 is divisible by 5.

(viii) 42658

We know that if units place is divisible by 5, ie. units place is having value either of 0 or 5, then our number is divisible by 5.

Here units place is 8, which is not divisible by 5.

Hence, 42658 is not divisible by 5.

(ix) 77990

We know that if units place is divisible by 5, ie. units place is having value either of 0 or 5, then our number is divisible by 5.

Here units place is 0, which is divisible by 5.

Hence, 77990 is divisible by 5.

3. Question

Test the divisibility of each of the following numbers by 10:

(i) 205

(ii) 90

(iii) 1174

(iv) 57930

(v) 60005

Answer

(i) 205

We know that if units place is divisible by 10, ie. units place is having value 0, then our number is divisible by 10.

Here units place is 5, which is not divisible by 10.

Hence, 205 is not divisible by 10.

(ii) 90

We know that if units place is divisible by 10, ie. units place is having value 0, then our number is divisible by 10.

Here units place is 0, which is divisible by 10.

Hence, 90 is divisible by 10.

(iii) 1174

We know that if units place is divisible by 10, ie. units place is having value 0, then our number is divisible by 10.

Here units place is 4, which is not divisible by 10.

Hence, 1174 is not divisible by 10.

(iv) 57930

We know that if units place is divisible by 10, ie. units place is having value 0, then our number is divisible by 10.

Here units place is 0, which is divisible by 10.

Hence, 57930 is divisible by 10.

(v) 60005

We know that if units place is divisible by 10, ie. units place is having value 0, then our number is divisible by 10.

Here units place is 5, which is not divisible by 10.

Hence, 60005 is not divisible by 10.

4. Question

Test the divisibility of each of the following numbers by 3:

(i) 83

(ii) 378

(iii) 474

(iv) 1693

(v) 60005

(vi) 67035

(vii) 591282

(viii) 903164

(ix) 100002

Answer

(i) 83

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here, sum of digits is 11, which is not divisible by 3.

Hence, 83 is not divisible by 3.

(ii) 378

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here, sum of digits is 18, which is divisible by 3.

Hence, 378 is divisible by 3.

(iii) 474

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here, sum of digits is 15, which is divisible by 3.

Hence, 474 is divisible by 3.

(iv) 1693

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here, sum of digits is 19, which is not divisible by 3.

Hence, 1693 is not divisible by 3.

(v) 60005

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here, sum of digits is 11, which is not divisible by 3.

Hence, 60005 is not divisible by 3.

(vi) 67035

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here, sum of digits is 21, which is divisible by 3.

Hence, 67035 is divisible by 3.

(vii) 591282

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here, sum of digits is 27, which is divisible by 3.

Hence, 591282 is divisible by 3.

(viii) 903164

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here, sum of digits is 23, which is not divisible by 3.

Hence, 903164 is not divisible by 3.

(ix) 100002

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here, sum of digits is 3, which is divisible by 3.

Hence, 100002 is divisible by 3.

5. Question

Test the divisibility of each of the following numbers by 9:

(i) 327

(ii) 7524

(iii) 32022

(iv) 64302

(v) 89361

(vi) 14799

(vii) 66888

(viii) 30006

(ix) 33333

Answer

(i) 327

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here, sum of digits is 12, which is not divisible by 9.

Hence, 327 is not divisible by 9.

(ii) 7524

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here, sum of digits is 18, which is divisible by 9.

Hence, 7524 is divisible by 9.

(iii) 32022

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here, sum of digits is 9, which is divisible by 9.

Hence, 32022 is divisible by 9.

(iv) 64302

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here, sum of digits is 15, which is not divisible by 9.

Hence, 64302 is not divisible by 9.

(v) 89361

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here, sum of digits is 27, which is divisible by 9.

Hence, 89361 is divisible by 9.

(vi) 14799

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here, sum of digits is 30, which is not divisible by 9.

Hence, 14799 is not divisible by 9.

(vii) 66888

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here, sum of digits is 36, which is divisible by 9.

Hence, 66888 is divisible by 9.

(viii) 30006

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here, sum of digits is 9, which is divisible by 9.

Hence, 30006 is divisible by 9.

(ix) 33333

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here, sum of digits is 15, which is not divisible by 9.

Hence, 33333 is not divisible by 9.

6. Question

Test the divisibility of each of the following numbers by 4:

(i) 134

(ii) 618

(iii) 3928

(iv) 50176

(v) 39392

(vi) 56794

(vii) 86102

(viii) 66666

(ix) 99918

(x) 77736

Answer

We know that if number formed by last two digits of a given number is divisible by 4, then entire given number is divisible by 4.

Here, number formed by last two digits is 34, which is not divisible by 4.

Hence, 134 is not divisible by 4.

(ii) 618

We know that if number formed by last two digits of a given number is divisible by 4, then entire given number is divisible by 4.

Here, number formed by last two digits is 18, which is not divisible by 4.

Hence, 618 is not divisible by 4.

(iii) 3928

We know that if number formed by last two digits of a given number is divisible by 4, then entire given number is divisible by 4.

Here, number formed by last two digits is 28, which is divisible by 4.

Hence, 3928 is divisible by 4.

(iv) 50176

We know that if number formed by last two digits of a given number is divisible by 4, then entire given number is divisible by 4.

Here, number formed by last two digits is 76, which is divisible by 4.

Hence, 50176 is divisible by 4.

(v) 39392

We know that if number formed by last two digits of a given number is divisible by 4, then entire given number is divisible by 4.

Here, number formed by last two digits is 92, which is divisible by 4.

Hence, 39392 is divisible by 4.

(vi) 56794

We know that if number formed by last two digits of a given number is divisible by 4, then entire given number is divisible by 4.

Here, number formed by last two digits is 94, which is not divisible by 4.

Hence, 56794 is not divisible by 4.

(vii) 86102

We know that if number formed by last two digits of a given number is divisible by 4, then entire given number is divisible by 4.

Here, number formed by last two digits is 02, which is not divisible by 4.

Hence, 86102 is not divisible by 4.

(viii) 66666

We know that if number formed by last two digits of a given number is divisible by 4, then entire given number is divisible by 4.

Here, number formed by last two digits is 66, which is not divisible by 4.

Hence, 66666 is not divisible by 4.

(ix) 99918

We know that if number formed by last two digits of a given number is divisible by 4, then entire given number is divisible by 4.

Here, number formed by last two digits is 18, which is not divisible by 4.

Hence, 99918 is not divisible by 4.

(x) 77736

We know that if number formed by last two digits of a given number is divisible by 4, then entire given number is divisible by 4.

Here, number formed by last two digits is 36, which is divisible by 4.

Hence, 77736 is divisible by 4.

7. Question

Test the divisibility of each of the following numbers by 8:

(i) 6132

(ii) 7304

(iii) 59312

(iv) 66664

(v) 44444

(vi) 154360

(vii) 998818

(viii) 265472

(ix) 7350162

Answer

(i) 6132

We know that if number formed by last three digits of a given number is divisible by 8, then entire given number is divisible by 8.

Here, number formed by last three digits is 132, which is not divisible by 8.

Hence, 6132 is not divisible by 8.

(ii) 7304

We know that if number formed by last three digits of a given number is divisible by 8, then entire given number is divisible by 8.

Here, number formed by last three digits is 304, which is divisible by 8.

Hence, 7304 is divisible by 8.

(iii) 59312

We know that if number formed by last three digits of a given number is divisible by 8, then entire given number is divisible by 8.

Here, number formed by last three digits is 312, which is divisible by 8.

Hence, 59312 is divisible by 8.

(iv) 66664

We know that if number formed by last three digits of a given number is divisible by 8, then entire given number is divisible by 8.

Here, number formed by last three digits is 664, which is divisible by 8.

Hence, 66664 is divisible by 8.

(v) 44444

We know that if number formed by last three digits of a given number is divisible by 8, then entire given number is divisible by 8.

Here, number formed by last three digits is 444, which is not divisible by 8.

Hence, 44444 is not divisible by 8.

(vi) 154360

We know that if number formed by last three digits of a given number is divisible by 8, then entire given number is divisible by 8.

Here, number formed by last three digits is 360, which is divisible by 8.

Hence, 154360 is divisible by 8.

(vii) 998818

We know that if number formed by last three digits of a given number is divisible by 8, then entire given number is divisible by 8.

Here, number formed by last three digits is 818, which is not divisible by 8.

Hence, 998818 is not divisible by 8.

(viii) 265472

We know that if number formed by last three digits of a given number is divisible by 8, then entire given number is divisible by 8.

Here, number formed by last three digits is 472, which is divisible by 8.

Hence, 265472 is divisible by 8.

(ix) 7350162

We know that if number formed by last three digits of a given number is divisible by 8, then entire given number is divisible by 8.

Here, number formed by last three digits is 162, which is not divisible by 8.

Hence, 7350162 is not divisible by 8.

8. Question

Test the divisibility of each of the following numbers by 11:

(i) 22222

(ii) 444444

(iii) 379654

(iv) 1057982

(v) 6543207

(vi) 818532

(vii) 900163

(viii) 7531622

Answer

(i) 22222

We know that if the difference of the sum of alternative digits of a number, i.e. digits which are in odd places together and digits in even places together, is divisible by 11 then that number is divisible by 11.

Here, sum of digits in odd places = 6 and sum of digits in even places = 4

∴ The difference of the sum of alternative digits of a number is 2, which is not divisible by 11.

Hence, 22222 is not divisible by 11.

(ii) 444444

We know that if the difference of the sum of alternative digits of a number, i.e. digits which are in odd places together and digits in even places together, is divisible by 11 then that number is divisible by 11.

Here, sum of digits in odd places = 12 and sum of digits in even places = 12

∴ The difference of the sum of alternative digits of a number is 0, which is divisible by 11.

Hence, 444444 is divisible by 11.

(iii) 379654

We know that if the difference of the sum of alternative digits of a number, i.e. digits which are in odd places together and digits in even places together, is divisible by 11 then that number is divisible by 11.

Here, sum of digits in odd places = 17 and sum of digits in even places = 17

∴ The difference of the sum of alternative digits of a number is 0, which is divisible by 11.

Hence, 379654 is divisible by 11.

(iv) 1057982

We know that if the difference of the sum of alternative digits of a number, i.e. digits which are in odd places together and digits in even places together, is divisible by 11 then that number is divisible by 11.

Here, sum of digits in odd places = 17 and sum of digits in even places = 15

∴ The difference of the sum of alternative digits of a number is 2, which is not divisible by 11.

Hence, 1057982 is not divisible by 11.

(v) 6543207

We know that if the difference of the sum of alternative digits of a number, i.e. digits which are in odd places together and digits in even places together, is divisible by 11 then that number is divisible by 11.

Here, sum of digits in odd places = 19 and sum of digits in even places = 8

∴ The difference of the sum of alternative digits of a number is 11, which is divisible by 11.

Hence, 6543207 is divisible by 11.

(vi) 818532

We know that if the difference of the sum of alternative digits of a number, i.e. digits which are in odd places together and digits in even places together, is divisible by 11 then that number is divisible by 11.

Here, sum of digits in odd places = 8 and sum of digits in even places = 19

∴ The difference of the sum of alternative digits of a number is 11, which is divisible by 11.

Hence, 818532 is divisible by 11.

(vii) 900163

We know that if the difference of the sum of alternative digits of a number, i.e. digits which are in odd places together and digits in even places together, is divisible by 11 then that number is divisible by 11.

Here, sum of digits in odd places = 4 and sum of digits in even places = 15

∴ The difference of the sum of alternative digits of a number is 11, which is divisible by 11.

Hence, 900163 is divisible by 11.

(viii) 7531622

We know that if the difference of the sum of alternative digits of a number, i.e. digits which are in odd places together and digits in even places together, is divisible by 11 then that number is divisible by 11.

Here, sum of digits in odd places = 18 and sum of digits in even places = 8

∴ The difference of the sum of alternative digits of a number is 10, which is not divisible by 11.

Hence, 7531622 is not divisible by 11.

9. Question

Test the divisibility of each of the following numbers by 7:

(i) 693

(ii) 7896

(iii) 3467

(iv) 12873

(v) 65436

(vi) 54636

(vii) 98175

(viii) 88777

Answer

(i) 693

We know that if number formed by removing last digit is subtracted by double of removed digit, is divisible by 7, then our given number is divisible by 7.

Here last digit is 3.

∴ Number to be tested = 69 – 2 × 3 = 63, which is divisible by 7.

Hence, 693 is divisible by 7.

(ii) 7896

We know that if number formed by removing last digit is subtracted by double of removed digit, is divisible by 7, then our given number is divisible by 7.

Here last digit is 6.

∴ Number to be tested = 789 – 2 × 6 = 777, which is divisible by 7.

Hence, 7896 is divisible by 7.

(iii) 3467

We know that if number formed by removing last digit is subtracted by double of removed digit, is divisible by 7, then our given number is divisible by 7.

Here last digit is 7.

∴ Number to be tested = 346 – 2 × 7 = 332.

Again repeating the process, taking last digit 2 for number 332,

Number to be tested = 33 – 2 × 4 = 19, which is not divisible by 7.

Hence, 3467 is not divisible by 7.

(iv) 12873

We know that if number formed by removing last digit is subtracted by double of removed digit, is divisible by 7, then our given number is divisible by 7.

Here last digit is 3.

∴ Number to be tested = 1287 – 2 × 3 = 1281.

Again repeating the process, taking last digit 1 for number 1281,

Number to be tested = 128 – 2 × 1 = 126, which is divisible by 7.

Hence, 12873 is divisible by 7.

(v) 65436

We know that if number formed by removing last digit is subtracted by double of removed digit, is divisible by 7, then our given number is divisible by 7.

Here last digit is 6.

∴ Number to be tested = 6543 – 2 × 6 = 6531.

Again repeating the process, taking last digit 1 for number 6531,

Number to be tested = 653 – 2 × 1 = 651

Again repeating the process, taking last digit 1 for number 651,

Number to be tested = 65 – 2 × 1 = 63, which is divisible by 7.

Hence, 65436 is divisible by 7.

(vi) 54636

We know that if number formed by removing last digit is subtracted by double of removed digit, is divisible by 7, then our given number is divisible by 7.

Here last digit is 6.

∴ Number to be tested = 5463 – 2 × 6 = 5451

Again repeating the process, taking last digit 1 for number 5451,

Number to be tested = 545 – 2 × 1 = 543

Again repeating the process, taking last digit 3 for number 543,

Number to be tested = 54 – 2 × 3 = 48, which is not divisible by 7.

Hence, 54636 is not divisible by 7.

(vii) 98175

We know that if number formed by removing last digit is subtracted by double of removed digit, is divisible by 7, then our given number is divisible by 7.

Here last digit is 5.

∴ Number to be tested = 9817 – 2 × 5 = 9807.

Again repeating the process, taking last digit 7 for number 9807,

Number to be tested = 980 – 2 × 7 = 966

Again repeating the process, taking last digit 6 for number 966,

Number to be tested = 96 – 2 × 6 = 84, which is divisible by 7.

Hence, 98175 is divisible by 7.

(viii) 88777

We know that if number formed by removing last digit is subtracted by double of removed digit, is divisible by 7, then our given number is divisible by 7.

Here last digit is 7.

∴ Number to be tested = 8877 – 2 × 7 = 8863.

Again repeating the process, taking last digit 3 for number 8863,

Number to be tested = 886 − 2 × 3 = 880

Here, last digit is 0. So, last digit will not be considered.

Hence, our number testing number will be 88, which is not divisible by 7.

Hence, 88777 is not divisible by 7.

10. Question

Find all possible values of x for which the number 7x3 is divisible by 3. Also, find each such number.

Answer

Here, our given number is 7x3, which is divisible by 3.

We know that if number is divisible by 3 only when sum of digits of given number is divisible by 3.

Hence, if 7x3 is divisible by 3, then,

$7 + x + 3 = 0, 3, 6, 9, 12, \ldots$

$\therefore 10 + x =$ multiple of 3.

Hence, x = (multiple of 3) − 10

Here, possible values for multiples of 3 are 12, 15 and 18

Hence, x = 2, 5 or 8

Hence, possible numbers are 723, 753 and 783

11. Question

Find all possible values of y for which the number 53y1 is divisible by 3. Also, find each such number.

Answer

Here, our given number is 53y1, which is divisible by 3.

We know that if number is divisible by 3 only when sum of digits of given number is divisible by 3.

Hence, if 53y1 is divisible by 3, then,

$5 + 3 + y + 1 = 0, 3, 6, 9, 12, \ldots$

$\therefore 9 + y =$ multiple of 3.

Hence, y = (multiple of 3) − 9

Here, possible values for multiples of 3 are 9, 12, 15 and 18

Hence, y = 0, 3, 6 and 9

Hence, possible numbers are 5301, 5331, 5361 and 5391.

(In given answer, 5301 is not considered)

12. Question

Find the value of x for which the number x806 is divisible by 9. Also, find the number.

Answer

Here, our given number is x806, which is divisible by 9.

We know that if number is divisible by 9 only when sum of digits of given number is divisible by 9.

Hence, if x806 is divisible by 9, then,

X + 8 + 0 + 6 = 0, 9, 18,…

∴ 14 + x = multiple of 9.

Hence, x = (multiple of 9) – 14

Here, possible values for multiples of 9 is 18

Hence, x = 4

∴ Possible number is 4806.

13. Question

Find the value of z for which the number 471z8 is divisible by 9. Also, find the number.

Answer

Here, our given number is 471z8, which is divisible by 9.

We know that if number is divisible by 9 only when sum of digits of given number is divisible by 9.

Hence, if 471z8 is divisible by 9, then,

4 + 7 + 1 + z + 8 = 0, 9, 18,…

∴ 20 + z = multiple of 9.

Hence, z = (multiple of 9) – 20

Here, possible values for multiples of 9 is 27

Hence, z = 7

∴ Possible number is 47178

14. Question

Give five examples of numbers, each one of which is divisible by 3 but not divisible by 9.

Answer

Examples of numbers, such that each one of which is divisible by 3 but not divisible by 9, are 21, 24, 30, 33 and 39.

15. Question

Give five examples of numbers, each one of which is divisible by 4 but not divisible by 8.

Answer

Examples of numbers, such that each one of which is divisible by 4 but not divisible by 8, are 28, 36, 44, 52 and 60

Exercise 5C

1. Question

Replace A, B, C by suitable numerals.

$$\begin{array}{r} 5\ A \\ +\ 8\ 7 \\ \hline C\ B\ 3 \\ \hline \end{array}$$

Answer

Here, in units place,

A + 7 = 3

Ie, A = -4, which is not possible.

Hence A is greater than 10,where, 1 carry is given to tens place.

∴A + 7 = 13

∴ A = 6

Now in tens place,

5 + 8 + 1 = B …as 1 is carried

∴ B = 14

Here, 1 will be carried to hundreds place.

Hence, B = 4 and C = 1

2. Question

Replace A, B, C by suitable numerals.

$$\begin{array}{r} 4\ C\ B\ 6 \\ +\ 3\ 6\ 9\ A \\ \hline 8\ 1\ 7\ 3 \\ \hline \end{array}$$

Answer

Here, in units place,

6 + A = 3

Ie. A = - 3, which is not possible.

Hence A is greater than 10,where, 1 carry is given to tens place.

∴ A + 6 = 13

∴A = 7

Now, in tens place,

B + 9 + 1 = 7 … as 1 is carried

∴ B = -3, which is not possible.

Hence B is greater than 10,where, 1 carry is given to hundreds place.

∴ B + 9 + 1 = 17

∴ B = 7

Now, in hundreds place,

C + 6 + 1 = 1 … as 1 is carried

Ie. C = -6, which is not possible.

Hence C is greater than 10, where, 1 carry is given to thousands place.

∴ C + 6 + 1 = 11

∴ C = 4

3. Question

Replace A, B by suitable numerals. $\begin{array}{r} A \\ +\ A \\ +\ A \\ \hline BA \\ \hline \end{array}$

Answer

Here, in units place,

A + A +A = A

Ie. 3A = A, ie. 3 = 1 which is wrong.

Hence A is greater than 10, where, 1 carry is given to tens place.

∴ A + A + A = A + 10

∴ 3A = A + 10

∴ 2A = 10

∴ A = 5

Now, in tens place,

B = 1 … as 1 is carried

4. Question

Replace A, B by suitable numerals. $\begin{array}{r} 6A \\ -\ AB \\ \hline 37 \\ \hline \end{array}$

Answer

Here, in tens place,

6 − 3 = 3

Which implies that maximum value of A is 3

Ie. A ≤ 3

Now in units place,

A - B = 7

This states that borrowing is involved.

∴ in tens place,

6 − A − 1 = 3

∴ A = 2

Now in units place,

A + 10 − B = 7 …as borrowing is involved

∴ 12 − B = 7

∴ B = 5

5. Question

Replace A, B, C by suitable numerals. $\begin{array}{r} C\ B\ 5 \\ -\ 2\ 8\ A \\ \hline 2\ 5\ 9 \\ \hline \end{array}$

Answer

Now in units place,

5 - A = 9

This states that borrowing is involved.

Ie. 10 + 5 - A = 9

∴ A = 6

Now in tens place, as 1 is borrowed from hundreds place and also lent,

B − 5 +10 - 1 = 8

B = 4

Now in hundred place, as 1 is lent,

C − 2 − 1 = 2

C = 5

6. Question

Replace A, B, C by suitable numbers: $\begin{array}{r} A\ \ B \\ \times\ \ 3 \\ \hline C\ \ A\ \ B \\ \hline \end{array}$

Answer

Here, (B × 3) = B

Here, B can be either 0 or 5, which satisfies above condition.

If B is 5, then 1 will be carried,

then, A×3+1 = A will not be possible for any number

∴ B = 0

Also, A×3=A is possible for either 0 or 5.

If we take A=0, then all number will become 0, which is not possible

.∴ A= 5

So, 1 will be carried.

∴ C = 1

7. Question

Replace A, B, C by suitable numbers: $\begin{array}{r} A\ \ B \\ \times\ \ B\ \ A \\ \hline (B+1)\ \ C\ \ B \\ \hline \end{array}$

Answer

Here, we can observe that B × A = B

i.e. A = 1

Here,

First digit = B+1Thus, 1 will be carried from $1+B^2$ and becomes (B+1) (B^2 -9) B.∴ C = B^2 -1Now, all B, B+1 and B^2 -9 are one digit number.This condition is satisfied for B=3 or B=4.For B< 3, B^2 -9 will be negative.For B>3, B^2 -9 will become a two digit number.For B=3, C = 3^2 - 9 = 9-9 = 0For B = 4, C = 4^2 -9 = 16-9 = 7

Hence, A=1, B=3, C = 0 or A=1, B=4, C = 7

8. Question

Replace A, B, C by suitable numerals.

```
6)5 A B (9 C
 -5 4
 ----
   3 B
  -3 6
  ----
     ×
  ----
```

Answer

Here,

(A−4) = 3

∴ A = 7

Now, C ×6=36

∴ C = 6

Clearly, B = 6∴ A=7, B=C=6

9. Question

Find two numbers whose product is a 1-digit number and the sum is a 2-digit number.

Answer

Clearly, for given condition which is, two numbers whose product is a 1-digit number and the sum is a 2-digit number, 1 and 9 satisfy.

Here,

$1\times9=9$ and $1+9=10$

Hence, 1 and 9 are required numbers

10. Question

Find three whole numbers whose product and sum are equal.

Answer

Clearly, for given condition which is, three whole numbers whose product and sum are equal, 1,2 and 3 satisfy.

Here, $1 + 2 + 3 = 1 \times 2 \times 3 = 6$

11. Question

Complete the magic square given below, so that the sum of the numbers in each row or in each column or along each diagonal is 15.

6	1	
	5	

Answer

Solving for diagonal,

6 + 5 + x = 15

∴ x = 4

6	1	
	5	
		4

Solving for first row,

6 + 1 + x = 15

∴ x = 8

6	1	8
	5	
		4

Solving for last column,

8 + x + 4 = 15

∴ x = 3

6	1	8
	5	3
		4

Solving for second row,

x + 5 + 3 = 15

∴ x = 7

6	1	8
7	5	3
		4

Solving for first column,

6 + 7 + x = 15

∴ x = 2

6	1	8
7	5	3
2		4

Solving second column,

1 + 5 + x = 15

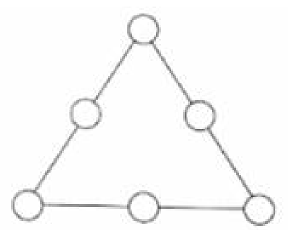
∴ x = 9

∴

6	1	8
7	5	3
2	9	4

12. Question

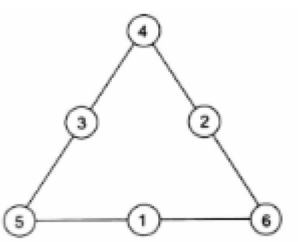
Fill in the numbers from 1 to 6 without repetition, so that each side of the triangle adds up to 12.



Answer

Place the largest numbers, i.e., 4, 5 and 6, at the three corners of the triangle. Now, 4 + 5 = 9, 4 + 6 = 10 and 5 + 6 = 11

Therefore, by placing 3 between 4 and 5, 2 between 4 and 6, and 1 between 5 and 6 we get the desired magic triangle.



13. Question

Fibonacci numbers Take 10 numbers as shown below:

a, b, (a + b), (a + 2b), (2a + 3b), (3a + 5b), (5a + 8b), (8a + 13b), (13a + 21b), and (21a + 34 b). Sum of all these numbers =11(5a + 8b) = 1 1 x 7th number.

Taking a = 8, b =13; write 10 Fibonacci numbers and verify that sum of all these numbers =11 x 7th number.

Answer

Here a = 8 and b = 13

The numbers in the Fibonacci sequence are arranged in the following manner:

1st, 2nd, (1st+2nd), (2nd+3th), (3th+4th), (4th+5th), (5th+6th), (6th+7th), (7th+8th), (8th+9th), (9th+10th)

The numbers are 8, 13, 21, 34, 55, 89, 144, 233, 377 and 610.

Sum of the numbers = 8+13+21+34+55+89+144+233+377+610

=1584

11×7th number = 11×144=1584

14. Question

Complete the magic square:

	14		0
8		6	11
4			7
	2	1	12

Answer

Here, sum of last column = 0 + 11 + 7 + 12

Solving for last row,

x + 2 + 1 + 12 = 30

∴ x = 15

	14		0
8		6	11
4			7
15	2	1	12

Solving for first column,

x + 8 + 4 + 15 = 30

∴ x = 3

3	14		0
8		6	11
4			7
15	2	1	12

Solving for first row,

3 + 14 + x + 0 =30

∴ x = 13

3	14	13	0
8		6	11
4			7
15	2	1	12

Solving for second row,

8 + x + 6 + 11 = 30

∴ x = 5

3	14	13	0
8	5	6	11
4			7
15	2	1	12

Solving for second column,

14 + 5 + x + 2 = 30

∴ x = 9

3	14	13	0
8	5	6	11
4	9		7
15	2	1	12

Solving for third column,

13 + 6 + x + 1 = 30

∴ x = 10

3	14	13	0
8	5	6	11
4	9	10	7
15	2	1	12

Exercise 5D

1. Question

If 5x6 is exactly divisible by 3, then the least value of x is

A. 0

B. 1

C. 2

D. 3

Answer

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here,

5 + x + 6 = multiple of 3

∴ 11 + x = 0, 3, 6, 9, ….

Hence,

11 + x = 12

∴ x= 1

the least value of x is 1

2. Question

If 64y8 is exactly divisible by 3, then the least value of y is

A. 0

B. 1

C. 2

D. 3

Answer

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here,

6 + 4 + y + 8 = multiple of 3

18 + y = 0, 3, 6, 9, ….

Hence,

18 + y = 18

∴ y = 0

the least value of y is 0.

3. Question

If 7x8 is exactly divisible by 9, then the least value of x is

A. 0

B. 2

C. 3

D. 5

Answer

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here,

7 + x + 8 = multiple of 9

15 + x = 0, 9, 18, …

Hence,

15 + x = 18

∴ x = 3

∴the least value of y is 3

4. Question

If 37y4 is exactly divisible by 9, then the least value of y is

A. 2

B. 3

C. 1

D. 4

Answer

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here,

3 + 7 + y + 4 = multiple of 9

y + 14 = 0, 9, 18, …

Hence,

y = 4

∴the least value of y is 3

5. Question

If 4xy7 is exactly divisible by 3, then the least value of (x + y) is

A. 1

B. 4

C. 5

D. 7

Answer

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here,

4 + x + y + 7 = multiple of 3

x + y + 11 = 0, 3, 6, 9, ….

Hence,

x + y + 11 = 12

∴ x + y = 1

∴ the least value of (x + y) is 1

6. Question

If x7y5 is exactly divisible by 3, then the least value of (x + y) is

A. 6

B. 0

C. 4

D. 3

Answer

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here,

x + 7 + y + 5 = multiple of 3

x + y + 12 = 0, 3, 6, 9, ….

Hence,

x + y + 12 = 12

∴ x + y = 0

But x + y cannot be 0 because then x and y both will have to be 0.Since x is the first digit, it cannot be 0.∴ x + y + 12 = 15

x + y = 3

∴ the least value of (x + y) is 3

7. Question

If x4y5z is exactly divisible by 9, then the least value of (x + y + z) is

A. 3

B. 6

C. 9

D. 0

Answer

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here,

x + 4 + y + 5 + z = multiple of 9

x + y + z + 9 = 0, 9, 18, ….

Hence,

x + y + z + 18 = 18

But x + y + z cannot be 0 because then x, y and z will have to be 0.Since x is the first digit, it cannot be 0.∴ x + y + z + 18 = 27

x + y + z = 9

∴ the least value of (x + y) is 9

8. Question

If 1A2B5 is exactly divisible by 9, then the least value of (A + B) is

A. 0

B. 1

C. 2

D. 10

Answer

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here,

1 + A + 2 + B + 5 = multiple of 9

A + B + 8 = 0, 9, 18, ….

Hence,

A + B + 8 = 9

A + B =1

9. Question

If the 4-digit number x27y is exactly divisible by 9, then the least value of (x + y) is

A. 0

B. 3

C. 6

D. 9

Answer

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here,

x + 2 + 7 + y = multiple of 9

x + y + 9= 0, 9, 18, …

Hence,

x + y + 9 = 9

∴ x + y =0

But x + y cannot be 0 because then x and y both will have to be 0.Since x is the first digit, it cannot be 0.∴ x + y + 9 = 18

x + y = 9

∴ the least value of (x + y) is 9

CCE Test Paper-5

1. Question

Find all possible values of x for which the 4-digit number 320x is divisible by 3. Also, find the numbers.

Answer

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here,

3 + 2 + 0 + x = multiple of 3

5 + x = 0, 3, 6, 9, 12, 15, ….

Hence,

1) 5 + x = 6

∴ x = 1

2) 5 + x = 9

∴ x = 4

3) 5 + x = 12

∴ x = 7

Hence, possible number 3201, 3204 and 3207.

2. Question

Find all possible values of y for which the 4-digit number 64y3 is divisible by 9. Also, find the numbers.

Answer

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here,

$6 + 4 + y + 3 =$ multiple of 9

$y + 13 = 0, 9, 18, \ldots$

Hence,

$y + 13 = 18$

$\therefore y = 5$

The number will be 6453.

3. Question

The sum of the digits of a 2-digit number is 6. The number obtained by interchanging its digits is 18 more than the original number. Find the original number.

Answer

Let the two numbers of the two-digit number be 'a' and 'b'.

$a + b = 6 \ldots (1)$

The number can be written as $(10a + b)$.

After interchanging the digits, the number becomes $(10b + a)$.

$(10a + b) + 18 = (10b + a)$ $9a - 9b = -18$

$a - b = -2 \ldots (2)$

Adding equations (1) and (2):

$2a = 4$

$\therefore a = 2$

Using $a = 2$ in equation (1),

$b = 6 - a = 6 - 2 = 4$

Therefore, the original number is 24.

4. Question

Which of the following numbers are divisible by 9?

(i) 524618

(ii) 7345845

(iii) 8987148

Answer

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here, sum of digits is 26, which is not divisible by 9.

Hence, 524618 is not divisible by 9.

(ii) 7345845

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here, sum of digits is 36, which is divisible by 9.

Hence, 7345845 is divisible by 9.

(iii) 8987148

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here, sum of digits is 45, which is divisible by 9.

Hence, 8987148 is divisible by 9.

5. Question

Replace A, B, C by suitable numerals:

$$\begin{array}{r} 5\ 7\ A \\ -\ C\ B\ 8 \\ \hline 2\ 9\ 3 \\ \hline \end{array}$$

Answer

Here, in units place,

A − 8 = 3

This implies that 1 is borrowed.

11 − 8 = 3

∴ A = 1

Now in tens place,Then, 7−B=9

1 is borrowed from 7.

∴ 16−B=9

∴ B = 7

Now in hundreds place,

5−C=2

But 1 has been borrowed from 5.

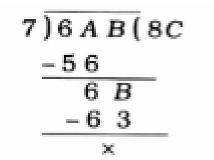
∴ 4 - C = 2

∴ C=2

∴ A=1, B=7 and C=2

6. Question

Replace A, B, C by suitable numerals:



Answer

Here,

(A−6) = 6

∴ A = 12

A can not be two digit number.

Hence, 1 will be borrowed.

Now, C ×7=63

∴ C = 9

Clearly, B = 3

∴ A=7, B=C=6

7. Question

Find the values of A, B, C when

$$\begin{array}{rrr} & A & B \\ \times & B & A \\ \hline B & C & B \\ \hline \end{array}$$

Answer

A × B = B

∴ A = 1

∴ C = 1 + B^2

Also 1 + B^2 is a single digit.

∴ B = 2

C = (1 + B^2) = (1 + 4) = 5

∴ A = 1, B = 2 and C = 5

8. Question

If 7 × 8 is exactly divisible by 3, then the least value of x is

A. 3

B. 0

C. 6

D. 9

Answer

We know that if sum of digits of a number is divisible by 3, then the number is divisible by 3.

Here,

7 + x + 8 = multiple of 3

x + 15 = 0, 3, 6, 9, ….

Hence,

x + 15 = 15

x = 0

∴ the least value of x is 0

9. Question

If 6x5 is exactly divisible by 9, then the least value of x is

A. 1

B. 4

C. 7

D. 0

Answer

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here,

6 + x + 5 = multiple of 9

x + 11 = 0, 9, 18, ….

Hence,

x + 11 = 18

∴ x = 7

∴ the least value of x is 7

10. Question

If x48y is exactly divisible by 9, then the least value of (x + y) is

A. 4

B. 0

C. 6

D. 7

Answer

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here,

x + 4 + 8 + y = multiple of 9

x + y + 12 = 0, 9, 18, ….

Hence,

x + 11 = 18

∴ x = 7

∴ the least value of x is 7

11. Question

If 486*7 is divisible by 9, then the least value of * is

A. 0

B. 1

C. 3

D. 2

Answer

We know that if sum of digits of a number is divisible by 9, then the number is divisible by 9.

Here, for the given number to be divisible by 9

4 + 8 + 6 + * + 7 = multiple of 9

* + 25 = 0, 9, 18, ….(multiple of 9)

Hence,

* + 25 = 27   [lowest multiple then]* = 2

$\therefore x = 2$

$\therefore$ the least value of x is 2