Playing with Numbers
Ex 5A

Q1

Answer :

Let the tens place digit be x.

The units place digit is 3.

∴ Number = (10x + 3) ... (1)

Given:
7(x + 3) = (10 x + 3)

7 x + 21 = 10 x + 3

∴ 10 x - 7x = 21 - 3

⇒ 3 x = 18

or x = 6

Using x = 6 in equation (1):

The number is 63.

Q2

Let the tens digit be x.

The digit in the units place is 2x.

Number = 10x + 2x

Given:
(x + 2x) + 18 = (10x + 2x)

∴ 3x + 18 = 12x

12x - 3x = 18

9x =18

x = 182 = 2

The digit in the tens place is 2.

The digit in the units place is twice the digit in the tens place.
The digit in the units place is 4.

Therefore, the number is 24.

Q3

Answer :

Let the tens place digit be a and the units place digit be b.
Then, number is (10a + b).

According to the question:

4(a + b) + 3 = (10 a + b)
4a + 4b + 3 = 10a + b
6a - 3b = 3
3(2a - b) = 3
2a - b =1 ... (1)

Given:
If 18 is added to the number, its digits are reversed.
The reverse of the number is (10b + a).

∴ (10a + b) + 18 = 10b + a
10a - a + b -10b = -18

9a - 9b = -18
9(a - b) = -18
a - b = -2 ... (2)

Subtracting equation (2) from equation (1):

$$\begin{array}{rrr} 2a & - b & = 1 \\ a & - b & = -2 \\ \hline - & + & + \\ \hline a & & = 3 \end{array}$$

Using a = 3 in equation (1):

2(3) - b = 1
6 - b = 1
∴ b = 5

Number = 10a+b = 10 × 3 + 5 = 35

Q4

Answer :

Let the tens place digit be a and the units place digit be b.
Then, the number is (10a + b).

Given:
a + b = 15 ... (1)

When the digits are interchanged the number will be (10 b + a).
Given:
10a + b + 9 = 10 b + a
∴ 10a - a + b - 10b = -9
9a - 9b = -9
a - b = -1 ... (2)

Adding equations (1) and (2):

$$\begin{array}{rrr} a & + b & = 15 \\ a & - b & = -1 \\ \hline 2a & & = 14 \end{array}$$

∴ a = 7

Using a = 7 in equation (2):
7 - b = -1
∴ b = 8

Original number = 10a+b = 10 × 7 + 8 = 78

Q5

Answer :

Let the tens place digit be 'x' and the units place digit be 'y'.
∴ Number = (10x + y)

Number obtained by interchanging the digits = (10y + x)

Given: (10x + y) - (10y + x) = 63

∴ 10x - x + y - 10 y = 63
9x - 9y = 63
9(x - y) = 63
x - y = 7

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

Q6

Answer :

Let the units place digit be x.
Then, the tens place digit will be 3x and the hundreds place digit will be 4x.

Given:
$4x + 3x + x = 16$
or $8x = 16$
or $x = 2$
Units place digit = 2
Tens place digit = $3 \times 2 = 6$
Hundreds place digit = $4 \times 2 = 8$

Therefore, the number is 862.

Playing with Numbers
Ex 5B

Q1

Answer :

A number is divisible by 2 only when its unit digit is 0, 2, 4, 6 or 8.
Therefore, the following numbers are divisible by 2:

(ii) 192
(iii) 720
(v) 2398
(vi) 179832
(vii) 468230
(ix) 379514

Q2

Answer :

A number is divisible by 5 only when its unit digit is either 0 or 5.
Therefore, the following numbers are divisible by 5:
(ii) 95
(iii) 270
(v) 1065
(vi) 5739210
(viii) 876945

Q3

Answer :

A number is divisible by 10 only if the digit in the units place is 0.
Therefore, the following numbers are divisible by 10:

(ii) 90
(vii) 3759210

Q4

Answer :

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

(i) 83
Sum of its digits = 8 + 3 = 11
11 is not divisible by 3.
So, 83 is not divisible by 3

(ii) 78
Sum of its digits = 7 + 8 = 15
15 is divisible by 3.
So, 78 is divisible by 3.

(iii) 474
Sum of its digits = 4+7+4 = 15
15 is divisible by 3.
So, 474 is divisible by 3.

(iv) 1693
Sum of its digits = 1+6+9+3 = 19
19 is not divisible by 3.
So, 1693 is not divisible by 3.

(v) 267144
Sum of its digits = 2+6+7+1+4+4=24
24 is divisible by 3.
So, 267144 is divisible by 3.

(vi) 372416
Sum of its digits = 3+7+2+4+1+6=23
23 is not divisible by 3.
So, 372416 is not divisible by 3.

(vii) 1248965
Sum of its digits = 1+2+4+8+9+6+5=35
35 is not divisible by 3.
So, 1248965 is not divisible by 3.

(viii) 9412503
Sum of its digits = 9+4+1+2+5+0+3=24
24 is divisible by 3.
So, 9412503 is divisible by 3.

Q5

Answer :

A number is divisible by 9, only when the sum of its digits is divisible by 9.

S. No.	Number	Sum of the digits	Divisible?
(i)	91	10	No
(ii)	306	9	Yes
(iii)	1526	14	No
(iv)	730143	18	Yes
(v)	568711	28	No
(vi)	862497	36	Yes
(vii)	966333	30	No
(viii)	1257777	36	Yes

Q6

Answer :

For a number to be divisible by 3, the sum of the digits must be divisible by 3.

$$\begin{aligned}\text{Sum of the digits } &= 7 + x + 3\\ &= 10 + x\end{aligned}$$

$10 + x$ will be divisible by 3 in the following cases:

$10 + x = 12$, *or* $x = 2$
Thus, the number will be 723.
$10 + x = 15$, *or* $x = 5$
Thus, the number will be 753.
$10 + x = 18$, *or* $x = 8$
Thus, the number will be 783.

So, the numbers can be 723, 753 or 783.

Q7

Answer :

If a number is divisible by 3, then the sum of the digits is also divisible by 3.

Sum of the digits = $5 + 3 + y + 1 = 9 + y$

The sum of the digits is divisible by 3 in the following cases:

$9 + y = 9$, *or* $y = 0$
Then the number is 5301.
$9 + y = 12$, *or* $y = 3$
Then the number is 5331.
$9 + y = 15$, *or* $y = 6$
Then the number is 5361.
$9 + y = 18$, *or* $y = 9$
Then the number is 5391.

∴ y = 0, 3, 6 or 9
The possible numbers are 5301, 5331, 5361 and 5391.

Q8

Answer :

For a number to be divisible by 9, the sum of the digits must be divisible by 9.

Sum of the digits in the given number = $x + 8 + 0 + 6 = x + 14$

The sum of the digits is divisible by 9, only in the following case:

$x = 4$
or
$x + 14 = 18$

Thus, the number x806 is divisible by 9 if x is equal to 4.

The number is 4806.

Q9 **Answer :**

If a number is divisible by 9, then the sum of the digits is also divisible by 9.

Sum of the digits of the given number = $4 + 7 + 1 + z + 8 = 20 + z$

$20 + z = 27$, *for* $z = 7$

27 is divisible by 9.

Therefore, 471z8 is divisible by 9 if z is equal to 7.

The number is 47178.

Playing with Numbers
Ex 5C

Q1

Answer :

$A = 6$
$\therefore\ A + 7 = 6 + 7 = 13$

1 is carried over.
$(1 + 5 + 8) = 14$

1 is carried over.
$\therefore B = 4$
and $C = 1$

$\therefore A = 6,\ B = 4\ and\ C = 1$

Q2

Answer :

$A = 7,\ A + 6 = 7 + 6 = 13$ (1 is carried over)

$(1 + B + 9) = 17,\ or\ B = 7$ (1 is carried over)

$A = 7,\ B = 7\ and\ C = 4$ (1 is carried over)

$\therefore A = 7,\ B = 7\ and\ C = 4$

Q3

Answer :

$A + A + A = A$ (with 1 being carried over)
This is satisfied if A is equal to 5.

When $A = 5$:

$A + A + A = 15$ (1 is carried over)

Or $B = 1$
$\therefore A = 5 \; and \; B = 1$

Q4

Answer :

First look at the left column, which is:
$6 - A = 3$

This implies that the maximum value of A can be 3.

$A \leq 3$ ... (1)

The next column has the following:
$A - B = 7$

To reconcile this with equation (1), borrowing is involved.

We know:
$12 - 5 = 7$

$\therefore A = 2 \; and \; B = 5$

Q5

Answer :

$5 - A = 9$
This implies that 1 is borrowed.
We know:
$15 - 6 = 9$
$\therefore A = 6$

$B - 5 = 8$
This implies that 1 is borrowed.
$13 - 5 = 8$
But 1 has also been lent
$\therefore B = 4$

$C - 2 = 2$
This implies that 1 has been lent.
$\therefore C = 5$

$\therefore A = 6, \; B = 4 \; and \; C = 5$

Q6

Answer :

$(B \times 3) = B$
Then, B can either be 0 or 5.
If B is 5, then 1 will be carried.
Then, $A \times 3 + 1 = A$ will not be possible for any number.
$\therefore B = 0$
$A \times 3 = A$ is possible for either 0 or 5.
If we take $A = 0$, then all number will become 0. However, this is not possible.
$\therefore A = 5$
Then, 1 will be carried.
$\therefore C = 1$
$\therefore A = 5$, $B = 0$ and $C = 1$

Q7

Answer :

$A \times B = B \Rightarrow A = 1$

$$\begin{array}{r} 1\ B \\ \times\ B\ 1 \\ \hline 1\ \ B \\ B\ \ B^2\ \ x \\ \hline B\ (1+B^2)\ B \end{array}$$

In the question:
First digit = B+1
Thus, 1 will be carried from $1+B^2$ and becomes $(B+1)$ $(B^2 -9)$ B.
$\therefore C = B^2 -1$
Now, 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 , $C = 3^2 - 9 = 9-9 = 0$
For B = 4, $C = 4^2 -9 = 16-9 = 7$

Required answer:

A=1, B=3, C = 0

or

A=1, B=4, C = 7

Q8

Answer :

$(A - 4) = 3 \Rightarrow A = 7$
Also, $6 \times 6 = 36 \Rightarrow C = 6$
$36 - 36 = 0 \Rightarrow B = 6$

$\therefore A = 7$
$B = C = 6$

Q9

Answer :

1 and 9 are two numbers, whose product is a single digit number.
$\therefore 1 \times 9 = 9$

Sum of the numbers is a two digit number.
$\therefore 1+9=10$

Q10

Answer :

The three whole numbers are 1, 2 and 3.

$1+2+3=6=1\times2\times3$

Q11

Answer :

Taking the diagonal that starts with 6:

$6+5+x=15 \Rightarrow x=4$

6	1	
	5	
		4

Now, taking the first row:

$6+1+x=15 \Rightarrow x=8$

6	1	8
	5	
		4

Taking the last column:

$8+x+4=15 \Rightarrow x=3$

6	1	8
	5	3
		4

Taking the second column:

$1+5+x=15 \Rightarrow x=9$

6	1	8
	5	3
	9	4

Taking the second row:

$x+5+3=15 \Rightarrow x=7$

6	1	8
7	5	3
	9	4

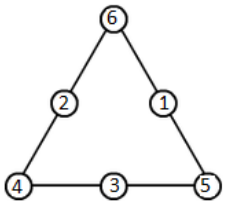
Taking the diagonal that begins with 8:

$8+5+x=15 \Rightarrow x=2$

6	1	8
7	5	3
2	9	4

Q12

Answer :



6+2+4 = 12
4+3+5 = 12
6+1+5 = 12

Q13

Answer :

Given:
$a = 8 \; and \; b = 13$
The numbers in the Fibonnaci 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 = $8 + 13 + 21 + 34 + 55 + 89 + 144 + 233 + 377 + 610$

$$= 1584$$

$11 \times 7th \; number \; = \; 11 \times 144 = 1584$

Q14

Answer :

The magic square is completed assuming that the sum of the row, columns and diagonals is 30. This is because the sum of all the number of the last column is 30.

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

Playing with Numbers
Ex 5D

Q1

Answer :

(b) 1

If a number is exactly divisible by 3, the sum of the digits must also be divisible by 3.
$5 + x + 6 = 11 + x$ must be divisible by 3.
The smallest value of x is 1.
$x = 1$
$\Rightarrow x + 11 = 12$ is divisible by 3.

Q2

Answer :

(a) 0

If a number is divisible by 3, then the sum of the digits is also divisible by 3.
$6 + 4 + y + 8 = 18 + y$
This is divisible by 3 as y is equal to 0.

Q3

Answer :

(c) 3

If a number is exactly divisible by 9, the sum of the digits must also be divisible by 9.
$7 + x + 8 = 15 + x$
18 is divisible by 9.
$\therefore 15 + x = 18 \Rightarrow x = 3$

Q4

Answer :

(d) 4

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

$3 + 7 + y + 4 = 14 + y$
For this sum to be divisible by 9:
$14 + y = 18 \Rightarrow y = 4$

Q5

Answer :

(a) 1
If a number is divisible by 3, the sum of the digits is also divisible by 3.
$4 + x + y + 7 = 11 + (x + y)$
For the sum to be divisible by 3:
$11 + (x + y) = 12 \Rightarrow (x + y) = 1$

Q6

Answer :

(d) 3

When a number is divisible by 3, the sum of the digits must also be divisible by 3.

$x+7+y+5=(x+y)+12$

This sum is divisible by 3 if x+y+12 is 12 or 15.

For 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

or x+y = 15-12=3

Q7

Answer :

(c) 9

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

$x+4+y+5+z=9+(x+y+z)$

The lowest value of $(x+y+z)$ $\text{is equal to } 0$ for the number x4y5z to be divisible by 9.

In this case, all x, y and z will be 0.

But x is the first digit, so it cannot be 0.

∴ x+4+y+5+z = 18

or x+y+z+9 = 18

or x+y+z = 9

Q8

Answer :

(b) 1

For a number to be divisible by 9, the sum of the digits must also be divisible by 9.

1+A+2+B+5=(A+B)+8

The number will be divisible by 9 if (A+B) =1.

Q9

Answer :

(d) 9

If a number is divisible by 9, then the sum of the digits is divisible by 9.

$x+2+7+y=(x+y)+9$

For this to be divisible by 9, the least value of $(x+y)$ $\text{is } 0$.

But for x+y = 0, x and y both will be zero.

Since x is the first digit, it can never be 0.

∴ x + y + 9 = 18

or x + y = 9