

Divisibility and Remainder Questions

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MCQ Question 1

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What will be the remainder when 2^{384} is divided by 17?

1. 1

2. 2

3. 3

4. 4

Answer (Detailed Solution Below)

Option 1 : 1

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Divisibility and Remainder MCQ Question 1 Detailed Solution

GIVEN:

2^{384} is divided by 17.

CALCULATION:

$$2^{384} = 2^{(4 \times 96)} = 16^{96}$$

We know that when 16 is divided by 17 the remainder is -1

When 16^{96} is divided by 17 then remainder = $(-1)^{96} = 1$.

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MCQ Question 2

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What will be the remainder if 2^{89} is divided by 9?

1. 2

2. 3

3. 4

4. 5

Answer (Detailed Solution Below)

Option 4 : 5

Divisibility and Remainder MCQ Question 2 Detailed Solution

GIVEN:

2^{89} is divided by 9.

CONCEPT:

If we divide 8 by 9 we will get the remainder as - 1

But remainder can not be negative

Therefore we can not use -1 as the remainder

To simplify calculation, we use $9 - 1 = 8$ as a remainder

CALCULATION:

$$(2^{89}/9)$$

$$\Rightarrow \{(2^3)^{29} \times 2^2\}/9$$

$$\Rightarrow \{(8)^{29} \times 4\}/9$$

$$\Rightarrow \{(-1)^{29} \times 4\}/9$$

$$\Rightarrow (-1 \times 4)/9$$

$$\Rightarrow -4/9$$

$$\Rightarrow \text{Remainder} = -4 + 9 = 5$$

\therefore The remainder if 2^{89} is divided by 9 is 5.

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MCQ Question 3

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If the 5-digit number 676xy is divisible by 3, 7 and 11, then what is the value of $(3x - 5y)$?

1. 9

2. 11

3. 10

4. 7

Answer (Detailed Solution Below)

Option 1 : 9

Divisibility and Remainder MCQ Question 3 Detailed Solution**Given:**

676xy is divisible by 3, 7 & 11

Concept:

When 676xy is divisible by 3, 7 & 11, it will also be divisible by the LCM of 3, 7 & 11.

Dividend = Divisor \times Quotient + Remainder

Calculation:

LCM (3, 7, 11) = 231

By taking the largest 5-digit number 67699 and divide it by 231.

$\therefore 67699 = 231 \times 293 + 16$

$\Rightarrow 67699 = 67683 + 16$

$$\Rightarrow 67699 - 16 = 67683 \text{ (completely divisible by 231)}$$

$$\therefore 67683 = 676xy \text{ (where } x = 8, y = 3)$$

$$(3x - 5y) = 3 \times 8 - 5 \times 3$$

$$\Rightarrow 24 - 15 = 9$$

\therefore The required result = 9

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MCQ Question 4

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How many whole numbers are there between 244 and 332 which are exactly divisible by 7?

1. 15

2. 23

3. 8

4. 13

Answer (Detailed Solution Below)

Option 4 : 13

Divisibility and Remainder MCQ Question 4 Detailed Solution

Numbers that are divisible by 7 between 244 and 332,

$$\Rightarrow 245, 252, \dots, 329$$

Using AP:

$$a_n = a + (n - 1)d$$

$$329 = 245 + (n - 1) \times 7$$

$$n = 13$$

\therefore There are 13 numbers



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MCQ Question 5

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If a number $5x423y$ is completely divisible by 88 then find the value of $5x - 8y$.

1. 16

2. 24

3. 32

4. 40

Answer (Detailed Solution Below)

Option 2 : 24

Divisibility and Remainder MCQ Question 5 Detailed Solution

Given

If a number $5x423y$ is completely divisible by 88

Concept used

Divisibility rule of 8 = Last three digit of any number should be divisible by 8 , then number is divisible by 8

Divisibility Rule of 88 = Number should be divisible by both 8 and 11.

Divisibility Rule of 11 = Sum of odd place digit - Sum of even digit place = 0 or multiple of 11

Calculation

If a number $5x423y$ is completely divisible by 88

So, By using divisibility rule of 8

$y = 2$ because 232 is divisible by 8

Now, By using divisibility rule of 11

$$\Rightarrow (x + 2 + 2) - (5 + 4 + 3) = 0$$

$$\Rightarrow (x + 4) - (12) = 0$$

$$\Rightarrow x = 8$$

$$\text{The value of } 5x - 8y = 40 - 16 = 24$$

\therefore The required answer is 24

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MCQ Question 6

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When a number is divided by 7 it gives 3 as remainder. Find the total possible numbers between 1 to 100.

1. 10

2. 14

3. 18

Answer (Detailed Solution Below)

Option 2 : 14

Divisibility and Remainder MCQ Question 6 Detailed Solution**Given:**

When a number is divided by 7 it gives 3 as the remainder.

Formula used:

$l = a + (n - 1) \times d$ (where l , a , n and d are last term, first term, number of terms and common difference respectively)

Calculations:

Required number = $7x + 3$

Putting $x = 0, 1, 2, \dots, 13$, we get 3, 10, 17,94.

The required series is 3, 10, 17,94

$\Rightarrow a = 3, d = 7$ and $l = 94$

$l = a + (n - 1) \times d$

$\Rightarrow 94 = 3 + (n - 1) \times 7$

$\Rightarrow n = 14$

\therefore The total possible numbers satisfying the given conditions are 14

**Mistake Point**

The first number will be 3 because when we multiply 7 by 0 and add 3, then the value will be $7 \times 0 + 3 = 3$

The numbers are = 3, 10, 17, 24, 31, 38, 45, 52, 59, 66, 73, 80, 87 and 94

Total number of numbers = 14



MCQ Question 7

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What is the product of the largest and the smallest possible values of m for which a number $5m83m4m1$ is divisible by 9?

1. 16

2. 40

3. 80

4. 10

Answer (Detailed Solution Below)

Option 1 : 16

Divisibility and Remainder MCQ Question 7 Detailed Solution**Concept:**

Divisibility rule of 9: A number is divisible by 9, when the sum of the digits of the number is divisible by 9.

Calculation:

$$5 + m + 8 + 3 + m + 4 + m + 1$$

for minimum value

$$\Rightarrow 21 + 3m$$

$$\Rightarrow \text{Minimum value of } m = 2 \text{ (as 27 is the multiple of 9)}$$

For maximum value

$$\Rightarrow 21 + 3m \quad (\text{as 45 is the multiple of 9})$$

$$\Rightarrow \text{Maximum value of } m = 8$$

\therefore The product of largest and smallest value

$$\Rightarrow 8 \times 2 = 16$$

Key Points

Here m is a digit (m can be 0, 1, 2, 3, ..., 8) not other than this.


We can't take $m = 20$, $m = 30$ etc.


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MCQ Question 8

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What will be remainder when we divide $(x^{71} + 71)$ by $(x + 1)$?

1. 71

2. 70

3. 0

4. 1

Answer (Detailed Solution Below)

Option 2 : 70

Divisibility and Remainder MCQ Question 8 Detailed Solution

Given:

$$(x^{71} + 71) \div (x + 1)$$

Calculation:

$$x + 1 = 0$$

$$\Rightarrow x = (-1)$$

Put $x = (-1)$ in $(x^{71} + 71)$

$$\Rightarrow (-1)^{71} + 71$$

$$\Rightarrow -1 + 71$$

$$\Rightarrow 70$$


\therefore Required remainder is 70.

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MCQ Question 9

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If P713 is divisible by 11, find the value of the smallest natural number P?

1. 5

2. 6

3. 7

4. 9

Answer (Detailed Solution Below)

Option 4 : 9

Divisibility and Remainder MCQ Question 9 Detailed Solution

Given:

If P713 is divisible by 11

Concept used:

The divisibility rule of 11 is that you must subtract and then add the digits in an alternating pattern from left to right. If your answer is 0 or 11 then it is divisible by 11.

Calculation:

Hence, we can see,

if we put $P = 9$

$$(9 + 1) - (7 + 3) = 10 - 10 = 0$$

∴ The value of the smallest natural number P is 9.

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MCQ Question 10

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If a five digit number 247xy is divisible by 3, 7 and 11, then what is the value of $(2y - 8x)$?

1. 9

2. 17

3. 6

4. 11

Answer (Detailed Solution Below)

Option 3 : 6

Divisibility and Remainder MCQ Question 10 Detailed Solution

Given:

If a five digit number $247xy$ is divisible by 3, 7 and 11

Calculation:

LCM of 3, 7, 11 is 231

According to question

Largest possible value of $247xy$ is 24799

when we divided 24799 by 231 we get 82 as a remainder

Number = $24799 - 82$

$\Rightarrow 24717$

Now $x = 1$ and $y = 7$

$(2y - 8x) = (2 \times 7 - 8 \times 1)$

$\Rightarrow (14 - 8)$

$\Rightarrow 6$

\therefore Required value is 6



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