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Reminder cycle

Question: 01

Find the remainder when $(321)^{5687}$ is divided by 8

A. 1
B. 2
C. 3
D. 4

Answer: A

Explanation:

Solution: 321 can be expressed as [(8×40) + 1] so

remainder of the above question is $(1)^{5687} = 1$

Question: 02

Find the remainder when $(146)^{56}$ is divided by 7

A. 1
B. 3
C. 5
D. 7

Answer: A

Explanation:

Solution: 146 can be expressed as [(7×21) – 1] so

Remainder of the above question is $(-1)^{56} = 1$

Question: 03

Find the remainder when $(269)^{57587}$ is divided by 6

A. 4
B. 5
C. 6
D. 8

Answer: B

Explanation:

Solution: 269 can be expressed as [(6x 45) – 1] so

Remainder of the above question is $(-1)^{57587} = -1 = -1 + 6 = 5$

Question: 04

Find the remainder when 73 x 75 x 78 x 194 x 57 is divided by 25

A. 1
B. 3
C. 0
D. 7

Answer: C

Explanation:

Solution: $= \frac{-2 \times 0 \times 7 \times 7}{25}$

$= \frac{73 \times 75 \times 57 \times 194657}{25}$ = 0

shortcut tricks : *If denominator is perfectly divisible by any one number of given numerator expression values then remainder of the whole expression is Zero.*

Question: 05

Find the remainder when 84 + 98+ 197 + 240 + 140 is divided by 32

A. 13
B. 16
C. 23
D. 27

Answer: C

Explanation:

Solution: $= \frac{84+98+197+240+140}{32}$

$= \frac{-12+2+5+16+12}{32}$

=759/32

So reminder of the above expression is 23

Question: 06

What is the remainder of 1421 * 1423 * 1425 when divided by 12 ?

A. 1
B. 2
C. 3
D. 4

Answer: C

Explanation:

1421, 1423 and 1425 gives 5, 7 and 9 as remainders respectively when divided by 12.

Remainder [(1421 * 1423 * 1425) / 12] = Remainder [(5 * 7 * 9)] / 12, gives a remainder of 3.

Question: 07

Find the remainder when 1! + 2! + 3! + ... 99! + 100! is divided by the product of first 7 natural numbers

A. 870
B. 873
C. 875
D. 876

Answer: B

Explanation: 07

From 7! the remainder will be zero. Why ? because 7! is nothing but product of first 7 natural numbers and all **factorial** after that will have 7! as one of the factor. so we are concerned only factorials till 7!, i.e, 1! + 2! + 3! + 4! + 5! + 6!

1! + 2! + 3! + 4! + 5! + 6! = 873 and as 7! > 873 our remainder will be 873

Question: 08

What is the remainder when 64^{999} is divided by 7?

A. 1
B. 2
C. 3
D. 4

Answer: A

Explanation: 08

Remainder [64^{999} / 7] = Remainder[64 * 64 * …. 64 (999 times) / 7]

Remainder[64/7] = 1, hence Remainder [64^{999} / 7] = Remainder [1^{999} / 7] = 1

Question: 09

What is the remainder when $444^{444 \wedge 444}$ is divided by 7 ?

A. 2
B. 4
C. 1
D. 5

Answer: C

Explanation:

Remainder[444/7] = 3

Remainder[$444^{444 \wedge 444}$ / 7] = Remainder [$3^{444 \wedge 444}$ / 7]

= Remainder [$(3^2)^{222 \wedge 444}$ / 7] = Remainder [$2^{222 \wedge 444}$ / 7] (As Remainder [3^2 / 7] = 2)

= Remainder [$(2^3)^{74 \wedge 444}$ / 7] = Remainder [$1^{74 \wedge 444}$ / 7] = 1 (As Remainder [2^3 / 7] = 1)

Question: 10

What is the remainder when $15^{23} + 23^{23}$ is divided by 19 ?

A. 0
B. 1
C. 2
D. 3

Answer: A

Explanation:

$15^{23} + 23^{23}$ is divisible by 15 + 23 = 38 (as 23 is odd).

So $\mathrm{Rem}[(15^{23} + 23^{23})/19] = 0$

Question: 11

Find the remainder when $97^{97^{97}}$ is divided by 11

A. 1
B. 2
C. 3
D. 4

Answer: D

Explanation: 11

Remainder [97/11] = 9

So, Remainder $[97^{97^{\wedge}97}/11]$ = Remainder $[9^{97^{\wedge}97}/11]$

From Euler's theorem, Remainder $[9^{10}/11] = 1$

97 and 10 are again co primes. So $\varphi(10) = 10\ (1\text{-}1/2)\ (1\text{-}1/5) = 4$

Remainder $[97^{4}/11] = 1$

97 = 4n + 1, So Remainder $[97^{97}/11]$ = Remainder [97/10] = 7

Means 97^{97} can be written as 10n + 7

Now our original question,

Remainder $[9^{97^{\wedge}97}/11]$ = Remainder $[9^{10n+7}/11]$ = Remainder $[9^{7}/11] = 4$

Question: 12

What is the remainder when 21^{865} is divided by 17

A. 2
B. 3
C. 4
D. 5

Answer: C

Explanation:

Remainder[21/17] = 4

Remainder [21^{865}/ 17] = Remainder [4^{865}/ 17]

4 and 17 are co prime numbers. (A prime number is always coprime to any other number)

$\varphi(17) = 17 \times (1 - 1/17) = 16$.

So Euler's theorem says Remainder [4^{16}/ 17] = 1

To use this result in the given problem we need to write 865 in 16n + r form.

865 = 16 * 54 + 1, so 4^{865} can be written as $4^{16 * 54} \times 4$

Remainder[4^{865}/17] = Remainder[4^{16*54}/17] * Remainder[4/17] = 1 * 4 = 4

Question: 13

What is the remainder when 7^{100} is divided by 4?

A. 0
B. 1
C. 2
D. 3

Answer: A

Explanation:

Remainder[$7^1 / 4$] = 3, Remainder[$7^2 / 4$] = 1, Remainder[$7^3 / 4$] = 3, Remainder[$7^4 / 4$] = 1 and so on...

Pattern repeats in cycles of 2. Remainder [$7^n / 4$] is 3 when n is odd and is 1 when n is even.

7^{100} when divided by 4 gives a remainder of 1.

Question: 14

Find the remainder when 100^{99} is divided by 11

A. 0
B. 1
C. 2
D. 3

Answer: B

Explanation:

Remainder[100^{99} / 11] = Remainder[$(11 * 9 + 1)^{99}$ / 11] = 1.

Question: 15

The numbers 1 to 29 are written side by side as follows 1234567891011......2829. If the number is divided by 9, then what is the remainder?

A. 0
B. 1
C. 2
D. 3

Answer: D

Explanation:

Sum of digits from 1 to 10=46
Sum of digits from 11 to 20=56
Sum of digits from 21 to 29=63
Sum of digits in the number
165=12
which gives a **remainder of 3** when divided by
9
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THANK YOU