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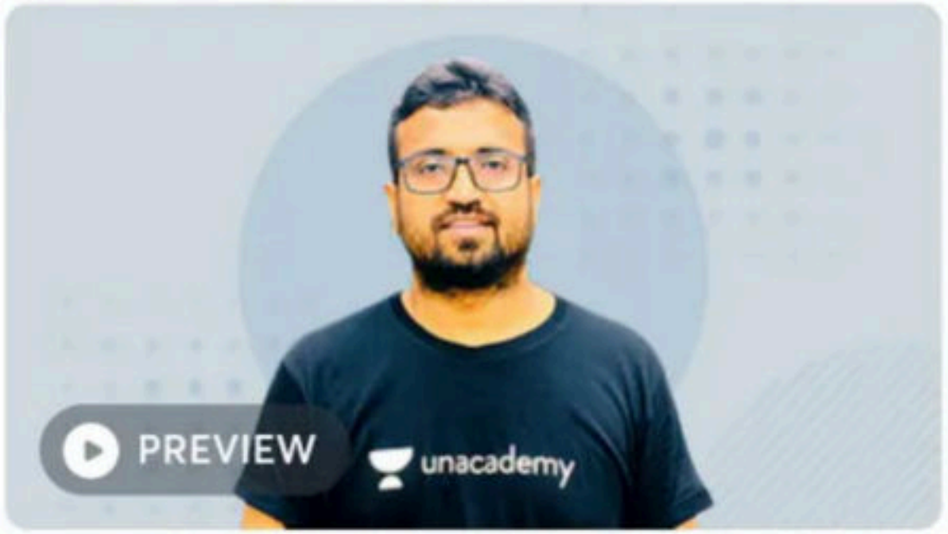
Doubt Clearing Session

Complete Course on General Aptitude - GATE & ESE, 2024 & 2025

Saurabh Thakur • Lesson 4 • May 10, 2023



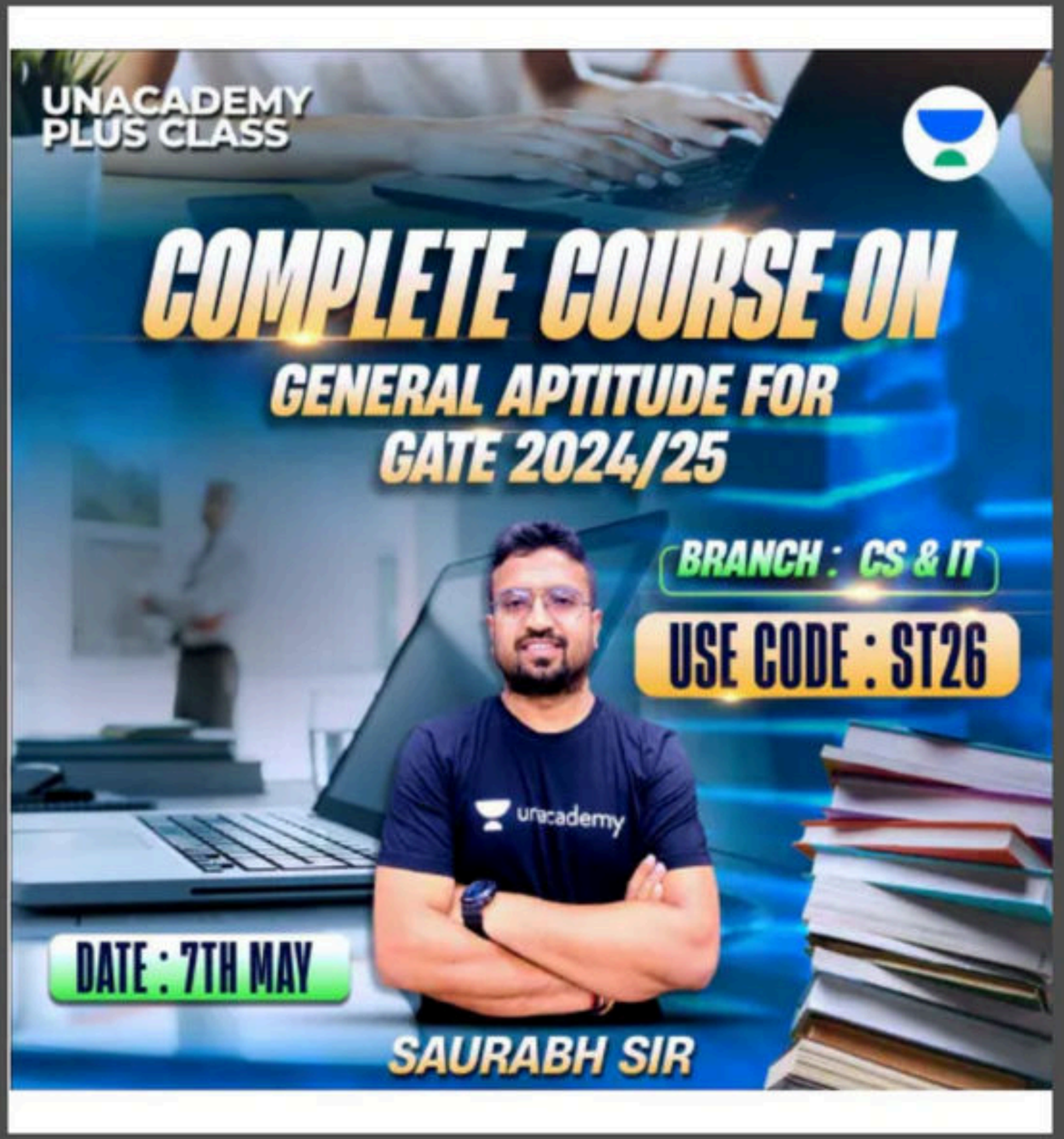
HINDI GA,GS AND MATHEMATICS

Complete Course on General Aptitude - GATE & ESE, 2024 & 2025

Saurabh Thakur

Starts on May 7, 2:15 PM

May 7 - Aug 13 · 15 weeks

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32M+
WATCH MINUTE
12+
YEARS TEACHING EXPERIENCE
SUBSCRIPTION
CODE: ST26
SAURABH THAKUR
IIM ROHTAK
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NUMBER SYSTEM.

$4!$

$N! \div 4!$

$N!$ is divisible by 4

$4! = 4 \cdot 3 \cdot 2 \cdot 1$

$5! = \frac{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{4}$

$6! \longrightarrow \frac{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{4}$

OS — End

UDU.

#03. | L23 |

Objective

2^{23}.

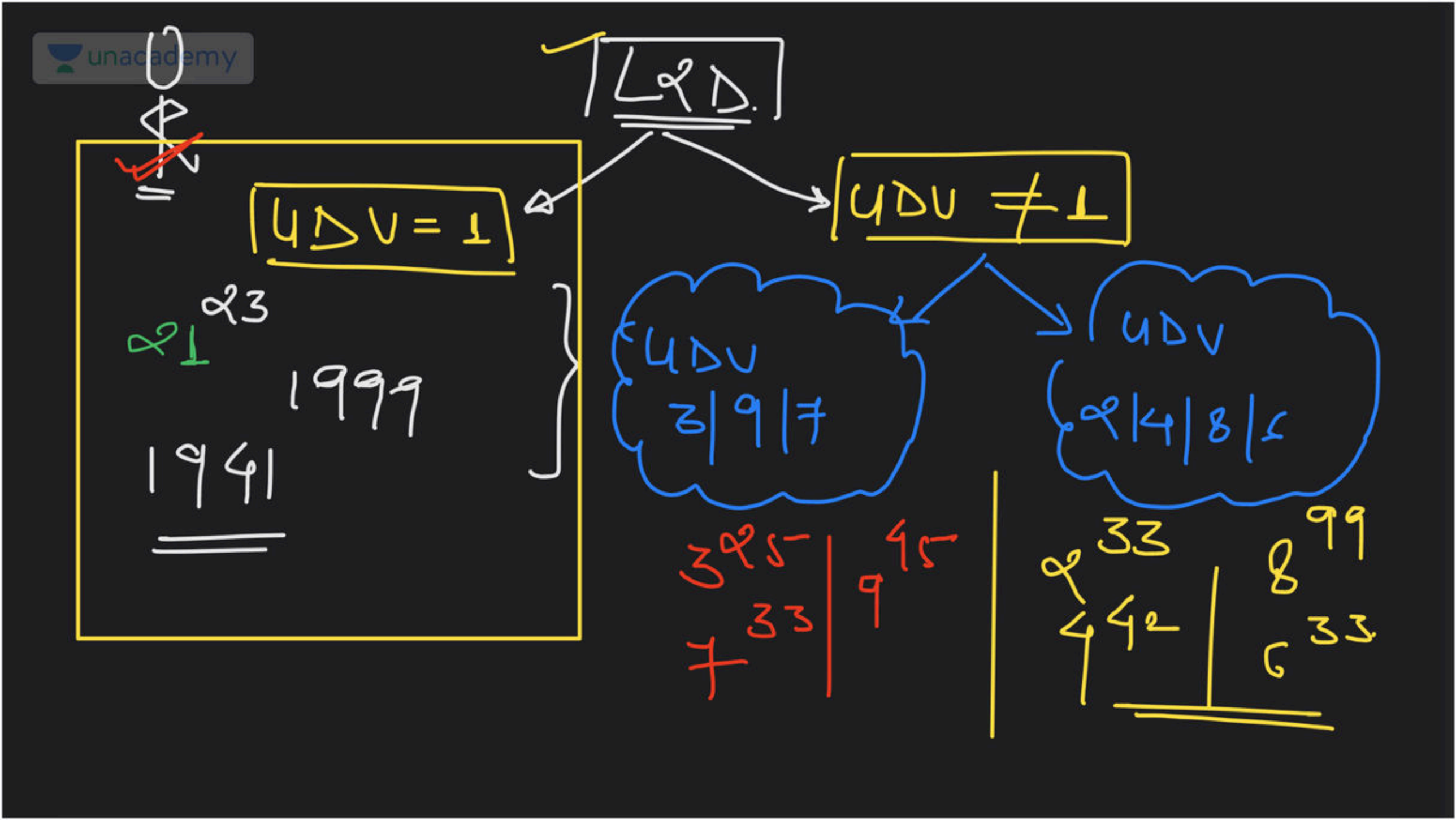
2^{55}

7^{29} = ?

2^{1} = ?

1971

2023.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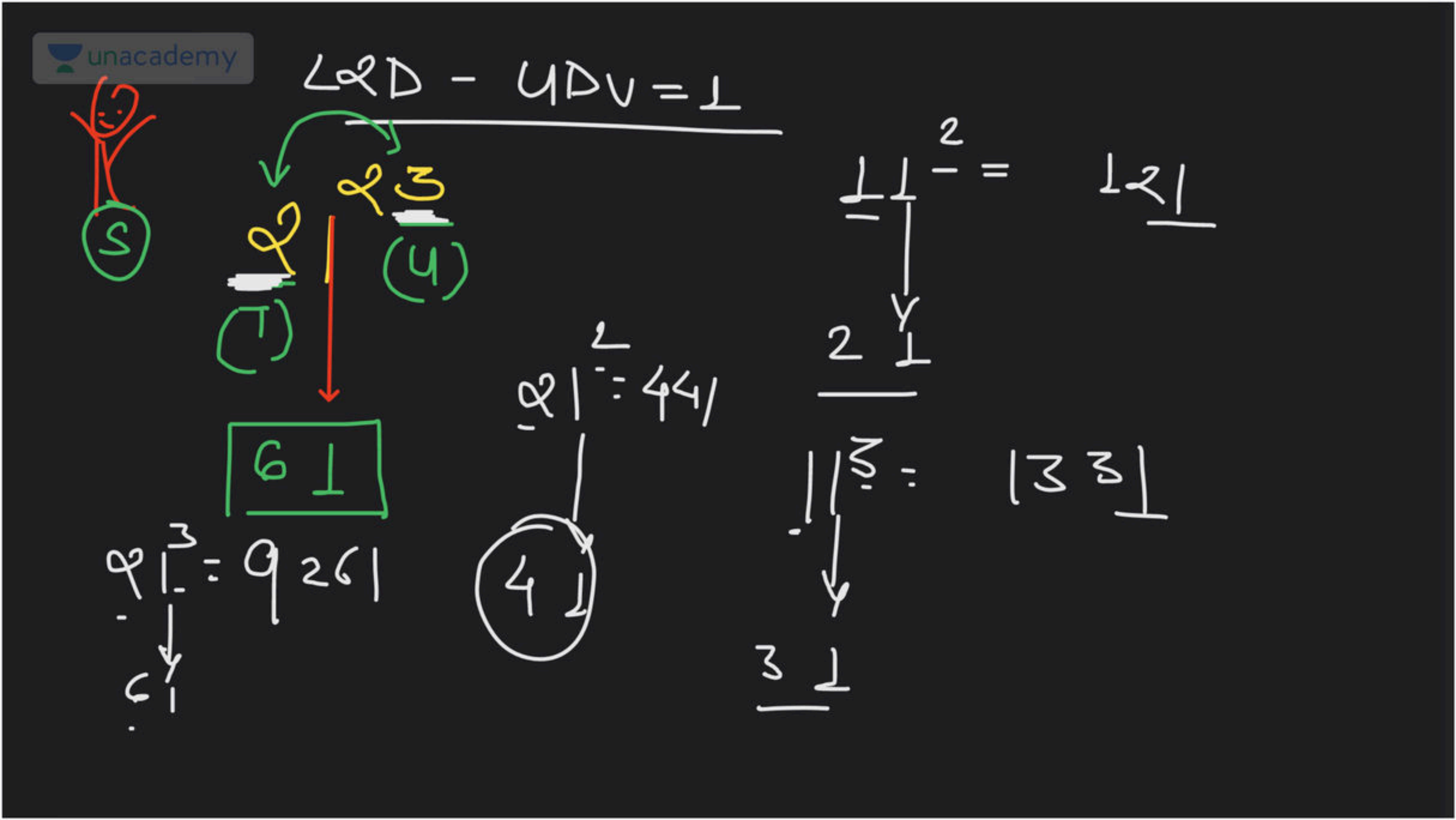
L.C.D.
HCF = 1
HCF ≠ 1
1999
1941
HCF
3 | 9 | 7
HCF
2 | 4 | 8 | 6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LRD - UDV = 1
S
2
3
1
4
6 1
9 2 6 1
4 1
1 1 = 1 2 1
2 1
1 3 3 1
3 1

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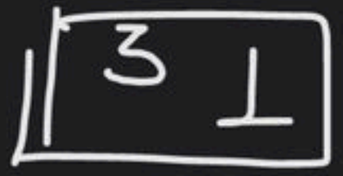
TEST.

67

1. 31

98769

2. 71



654857

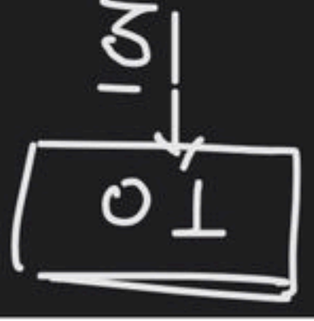
3. 1991

654357

4. 2031

2023

31 | 9023 | ⟹ 0



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$n! \geq n!$

$5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$

$6! = 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$

0

120

720

5040

40320

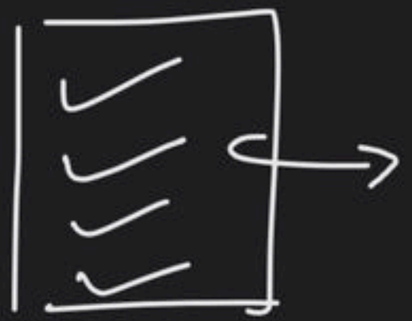
362880

362880

0

$5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$

OP



Washing

Ablution.

Jiggy.

Pristine

Euphony.

Cacophony.

LeD — uDv≠1

3	9	7

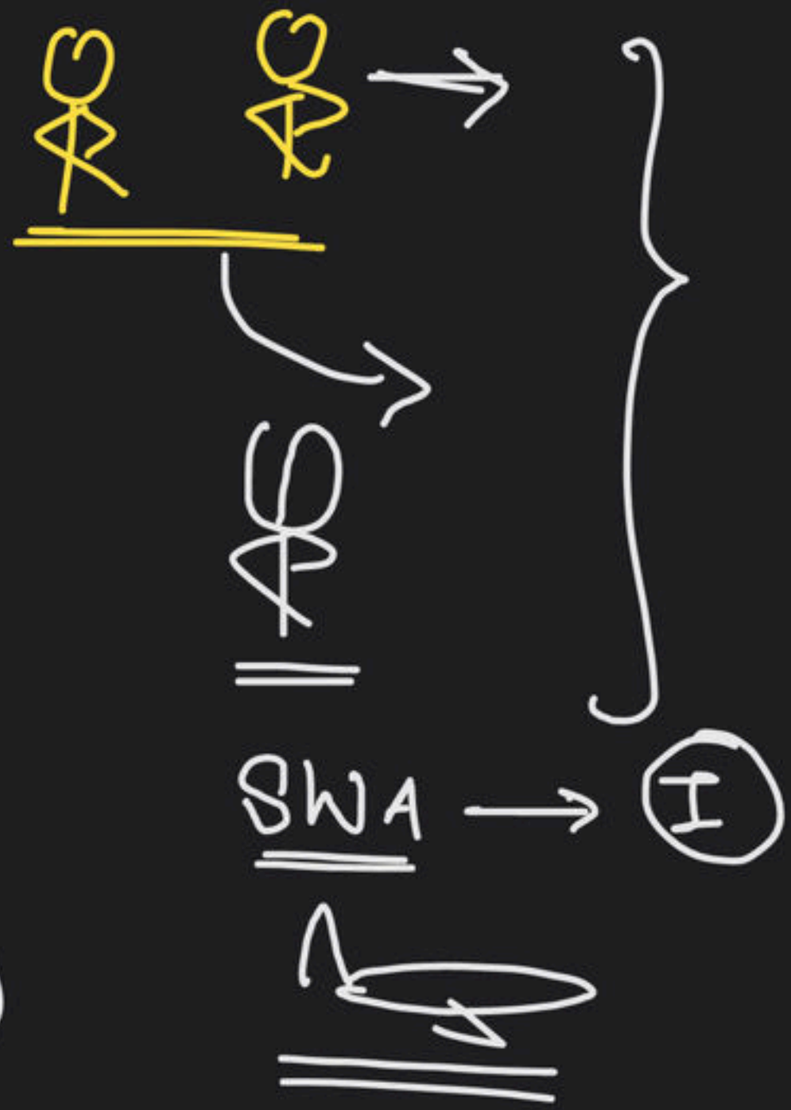
Objective ⇒ "1 - बनाना है"

(Make 1')

34 = 8 (1)

9² = 81

74 = 240 (1)



5.

3^{23}

$(3^4)^5 \times 3^3$

$(81)^5 \times 27$

01×27

97

1

$3^4 = 81$

3^{31}

$(3^4)^7 \times 3^3$

$(81)^7 \times 27$

61×27

47

L-2 D

TEST

1. 3^{43}

2. $3^{99} + 41^{99}$

1. $\frac{}{3}\overline{43}$

$(3^4)^{10} \times 3^3$

$(81)^{10} \times 27$

0×27

$\boxed{27}$

2. $3^{99} + \overline{41}^{99}$

$[(3^4)^{24} \times 3^3] +$

$(81)^{24} \times 27 +$

$1^{24} \times 27 +$

$1 + 9 + 67 \Rightarrow \underline{\underline{28}}$

9

9^{25}

$(9^2)^{12} \times 9^1$

$(81)^{12} \times 9$

61×9

$\boxed{149}$

$9^2 = 81$

$29 - 81$

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TEST.

1. 9^{39}

2. $9^{45} \times 91^{33}$

3. $9^{77} + 1031$ ৎ

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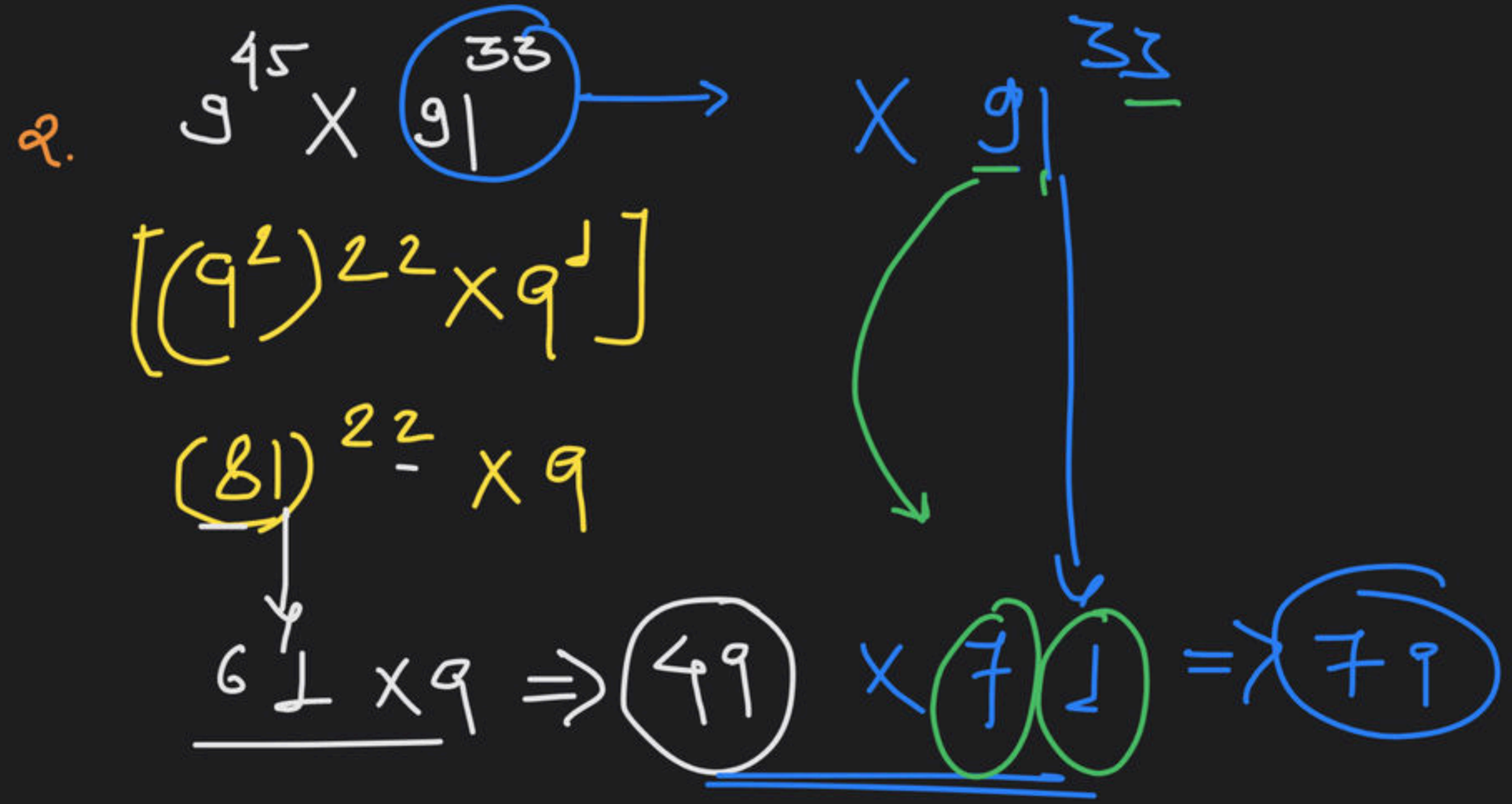
1. 9^{39}

$(9^2)^{19} \times 9^1$

$(81)^{19} \times 9$

81×9.

89.


Q.
$9^{45} \times 91^{33}$
$[(9^2)^{22} \times 9^1]$
$(81)^{22} \times 9$
$61 \times 9 \Rightarrow 49$
$\times 71 \Rightarrow 79$

77 9023!

3. $9 + 1031$ ~

$(9^2)^{38} \times 9^1 + 31$

$(61)^{38} \times 9 + 31$

41 X 9

69

+61

0

31

01

⇒ 70

3 | 9 | 7

$7^{43} \rightarrow 7^{3} \rightarrow 43$

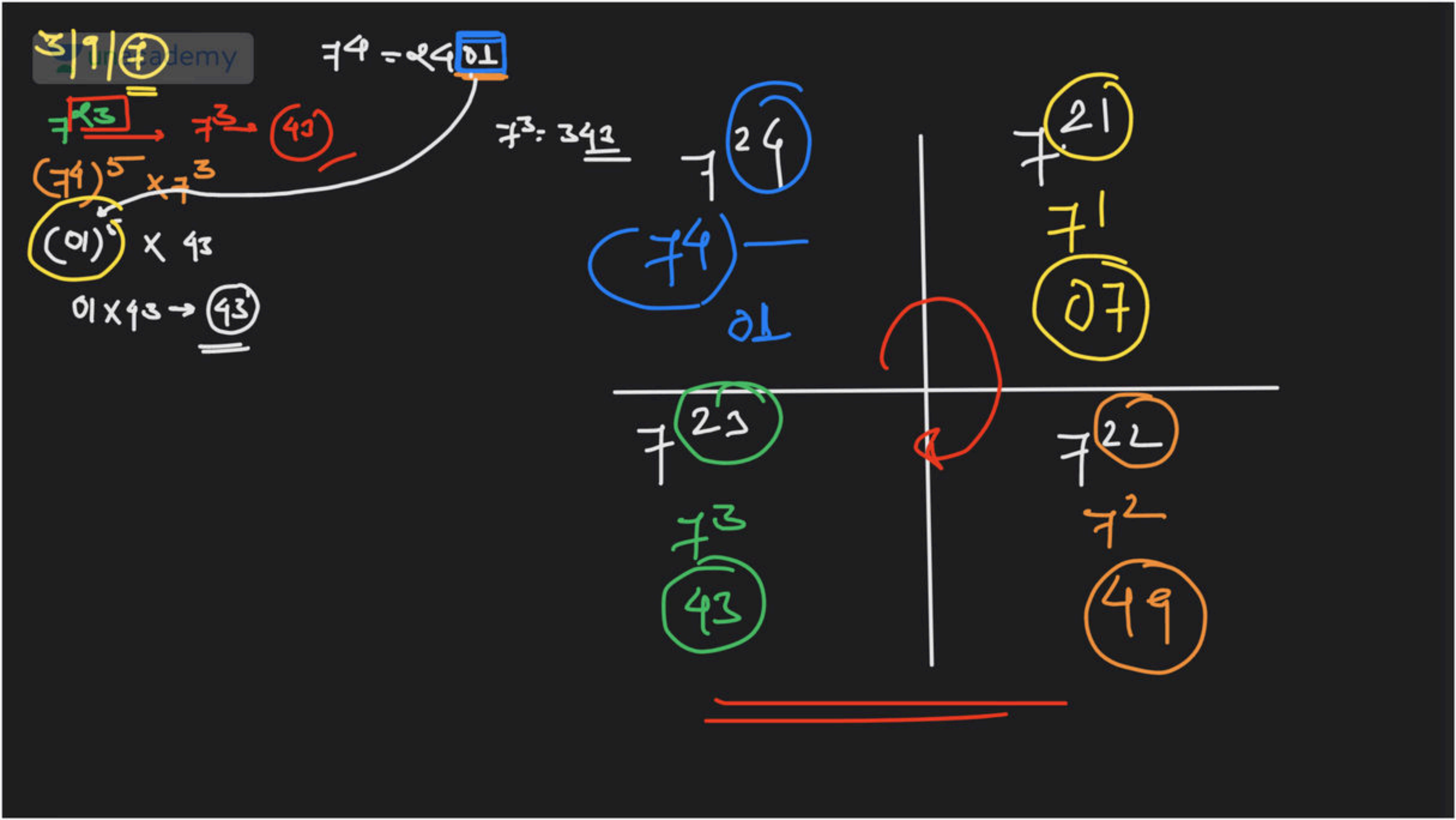
$7^4 = 2401$

$7^3 = 343$

$(74)^5 \times 7^3$

$(01)^5 \times 43$

$01 \times 43 \rightarrow 43$


3 | 9 | 7
7^{43}
7^3
43
$(7^4)^5 \times 7^3$
$(01)^5 \times 43$
$01 \times 43 \rightarrow 43$
$7^4 = 2401$
$7^3 = 343$
7^{24}
74
01
7^{23}
7^3
43
7^{21}
7^1
07
7^{22}
7^2
49

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TEST.

1. 7^{99}

$7^3 \rightarrow (43)$

2. 7^{9093} $\quad$ 7^{9091}

$7^3 \quad + \quad 7^1$

$43 + 51 = (94)$ ←

Quiz 4. Steel.

(3)

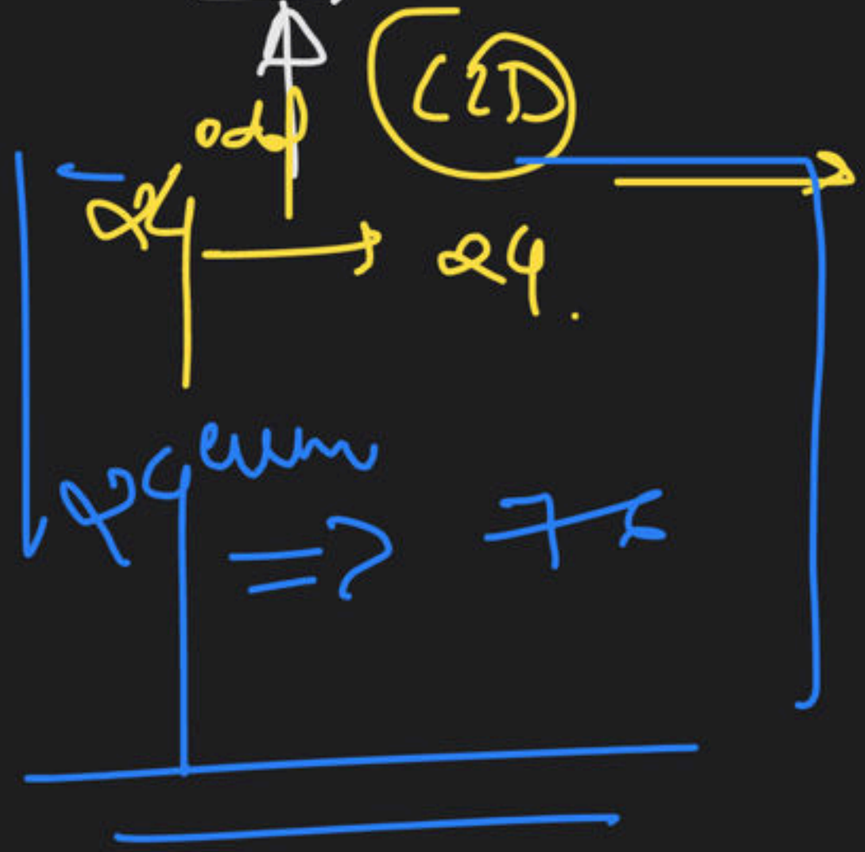
7^{2008}

$(74)^{-}$

(01)

2 | 4 | 8 | 6

$2^{10} = 1024$



$2^4 \Rightarrow 2^4 \rightarrow 2^4 = 128$

$2^2 = 576 \Rightarrow 2^4 = \_\_\_$

Q21

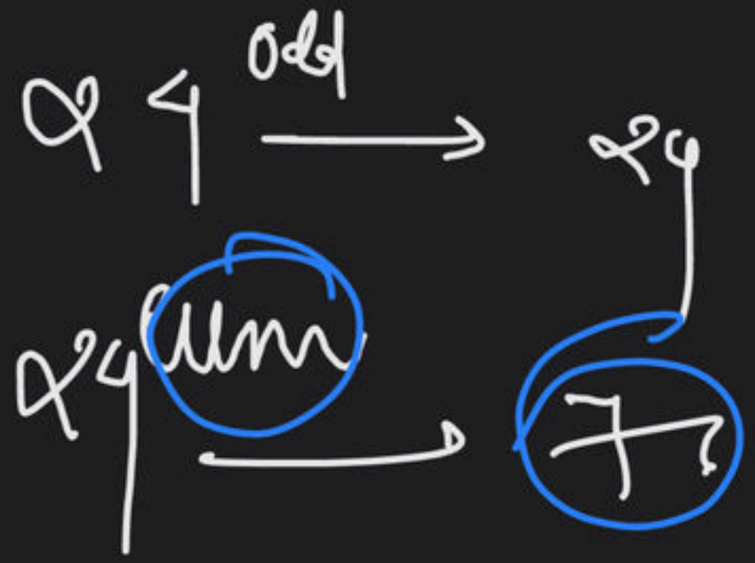
$(16)^2 \times 2^2$

$2^4 \times 2$

76 x 2

52.

Q 4 odd



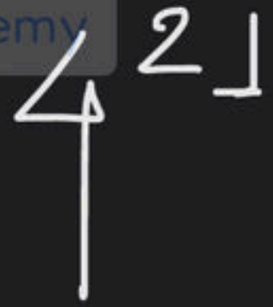
q^{92}

$(q^{10})^9 \times 2^2$

$(q^4)^9 \times 4$

$q^{4 \times 4}$

q^{16}



$(q^2) \rightarrow 1$

q^{42}

$(q^{10})^9 \times 2^2$

Ceeeee

$q^4 \times 9$

76×9

04

8^{x^2}

$(x^3)^{x \cdot 2}$

66

x

$(x^{10})^6 \times 2^6$

$(x4)^6 \times 64$ → Ans

$7x \times 64$

64

$$6^{25}$$

$$(9 \times 3)^{25}$$

$$2^{25} \times 3^{25}$$

$$\left[(9^{10} \times 2^5) \times 2^5\right] \times \left[(3^4)^6 \times 3^1\right]$$

$$(81)^6$$

$$\frac{76 \times 32}{32} \times 43$$

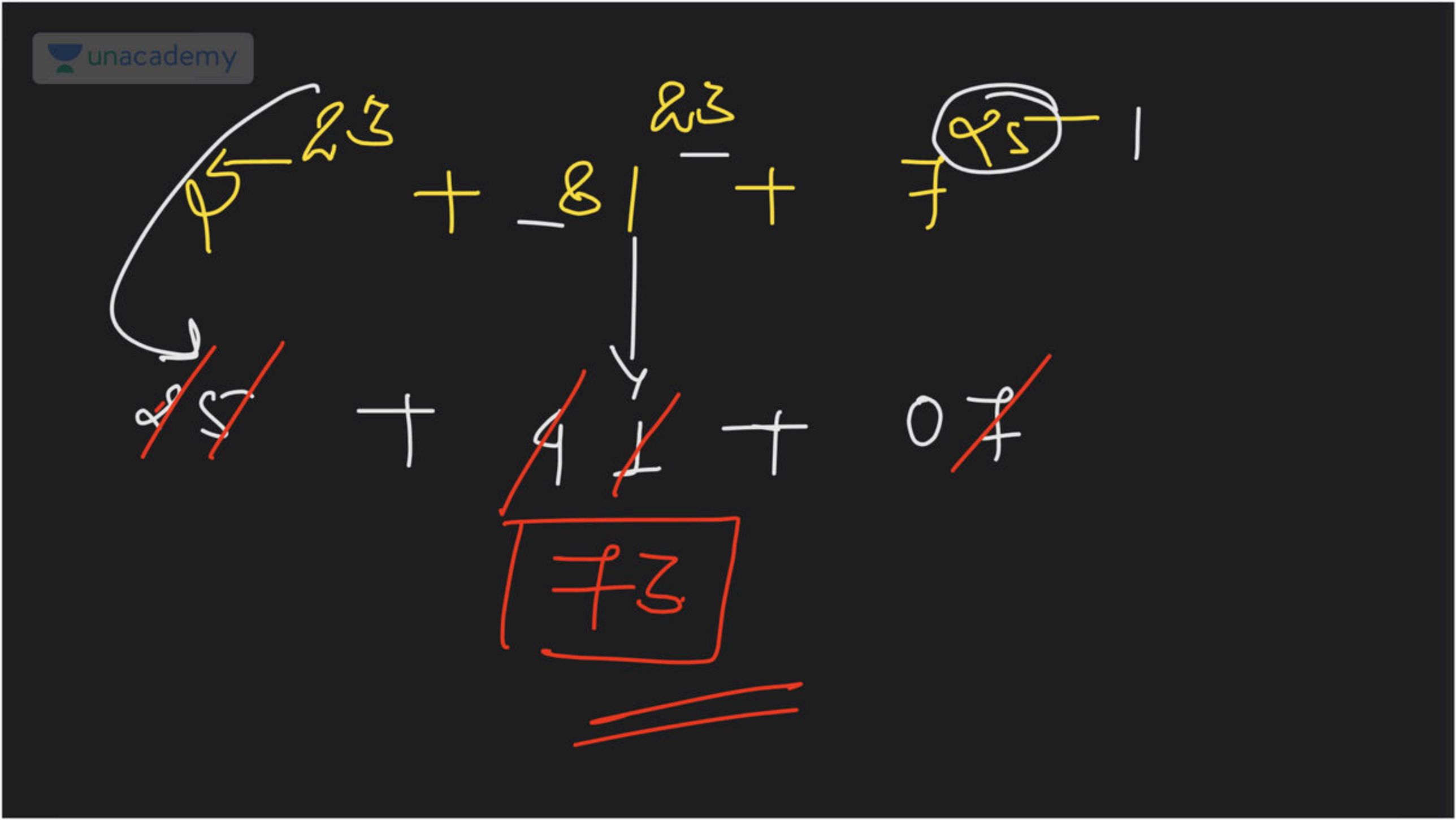
$$(81 \times 3) \Rightarrow 76$$

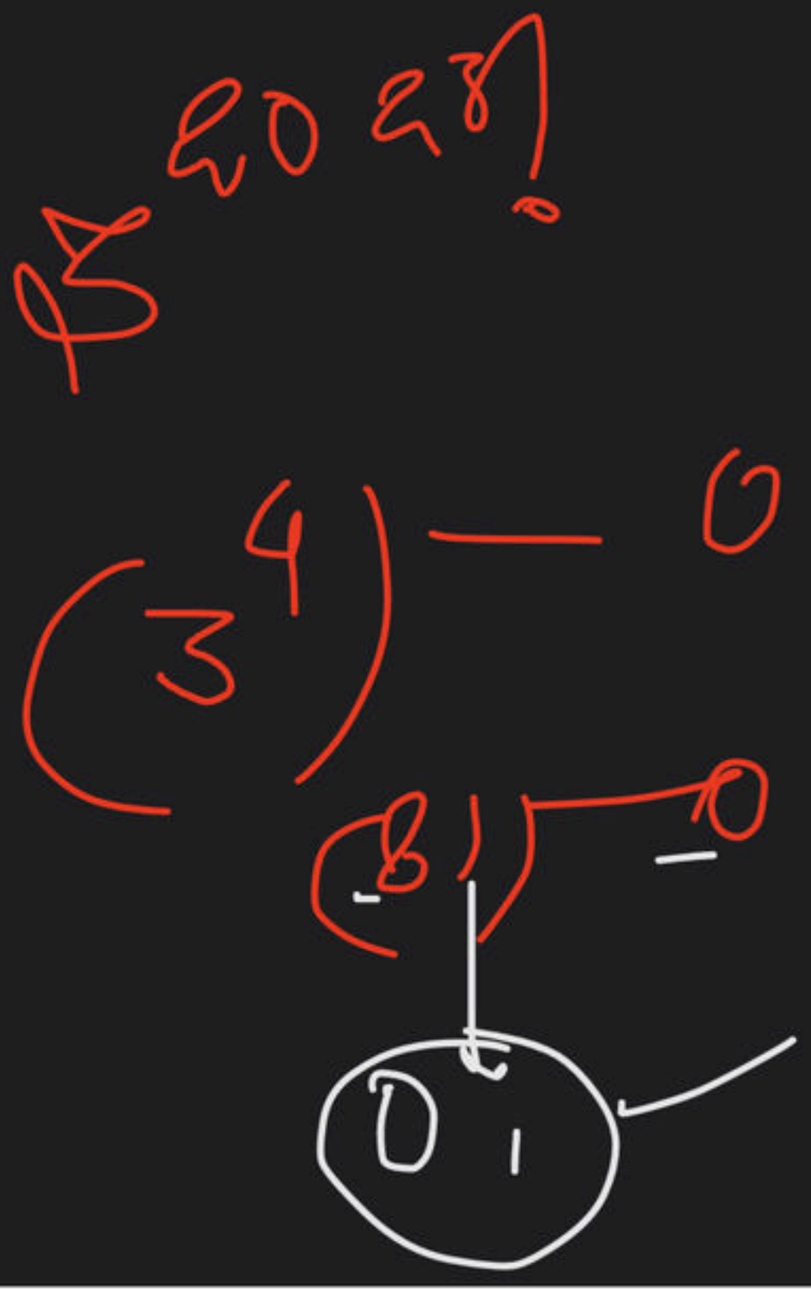
NOTE:

$S - 2 = 2S$

$S - 3 = 2S$

$S - 9 = 6S$



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01

100!,150!, 250!


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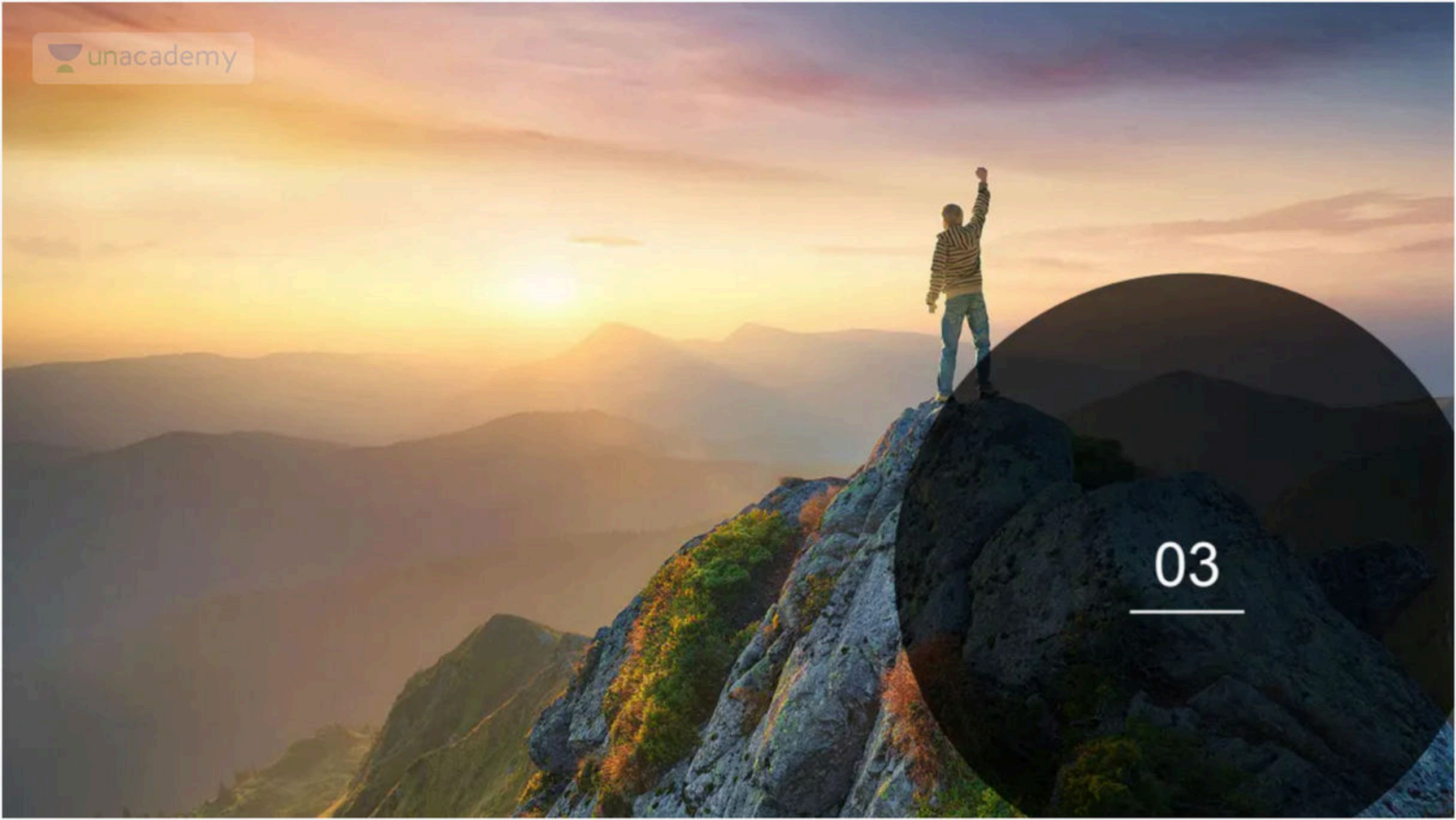
05

$2^{23}, 2^{51}, 3^{59}, 4^{99}, 3^{171}, 7^{208}$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03

$12^{71}, 16^{51}, 21^{99}, 39^{235}, 17^{999}, 37^{897}, 127^{200899}$


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04

$$13^{666} \times 44^{777} \times 616^{333} \times 777^{444}, 8898^{222} \times 999^{555},$$


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05

$$1^2 + 2^2 + 3^2 + \ldots\ldots\ldots\ldots\ldots + 99^2 + 100^2$$


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06

$$1^1 + 2^2 + 3^3 + \ldots\ldots\ldots + 9^9 + 10^{10}$$


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07

The numeral in the units position of

$211^{870} + 146^{127} + 3^{424}$ is.....

[GATE 2016 : IISc Bangalore (EE Set - 2)]


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08

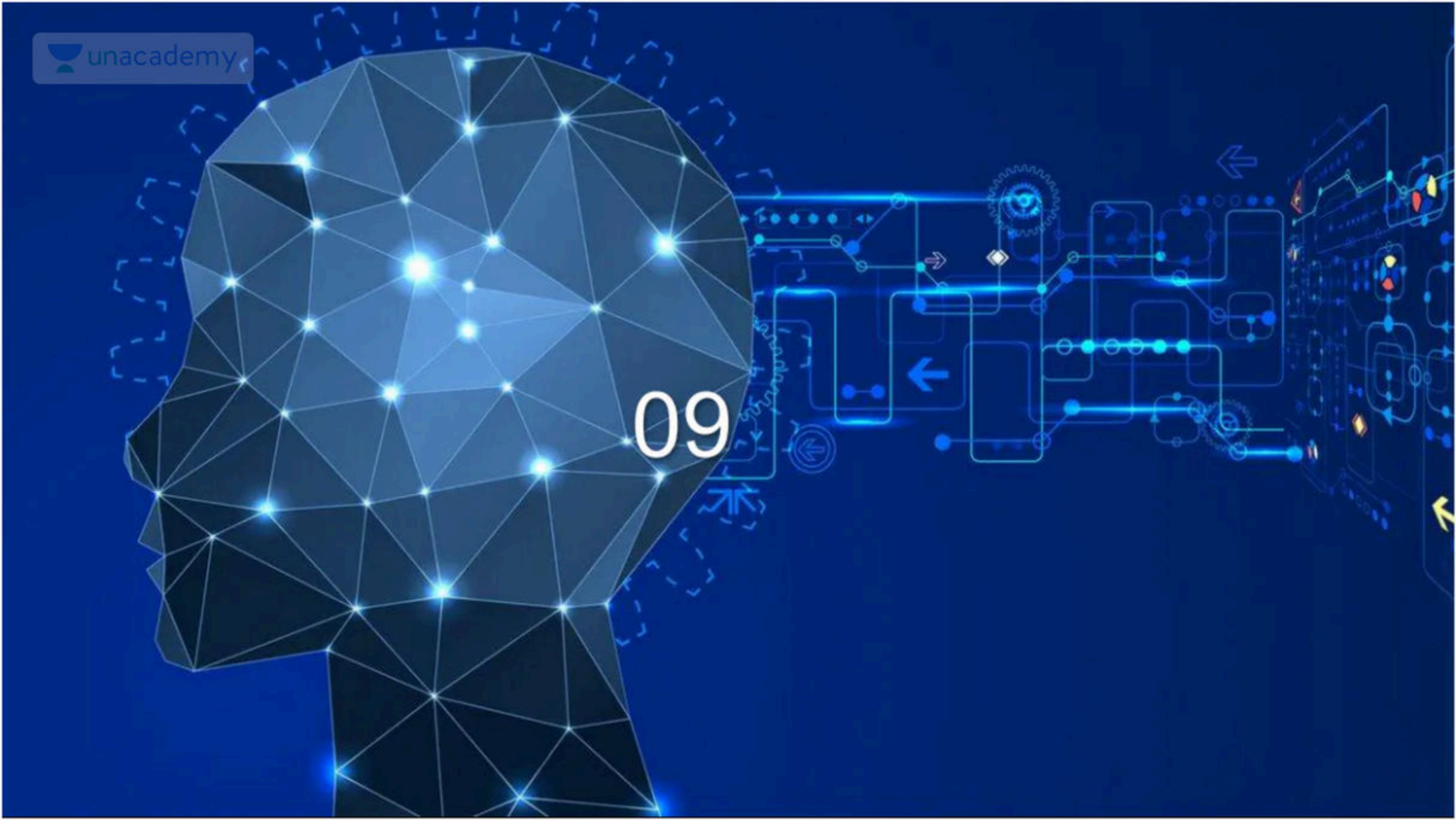
The last digit of

$(2171)^7 + (2172)^9 + (2173)^{11} + (2174)^{13}$ is

(A) 2 (B) 4

(C) 6 (D) 8

[GATE 2017 : IIT Roorkee (CH, CE, Set - 1)]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09

$21^{23}, 31^{53}, 51^{93}$


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10

$3^{53}, 7^{53}, 9^{93}$


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11

$2^{53}, 4^{83}, 8^{93}$


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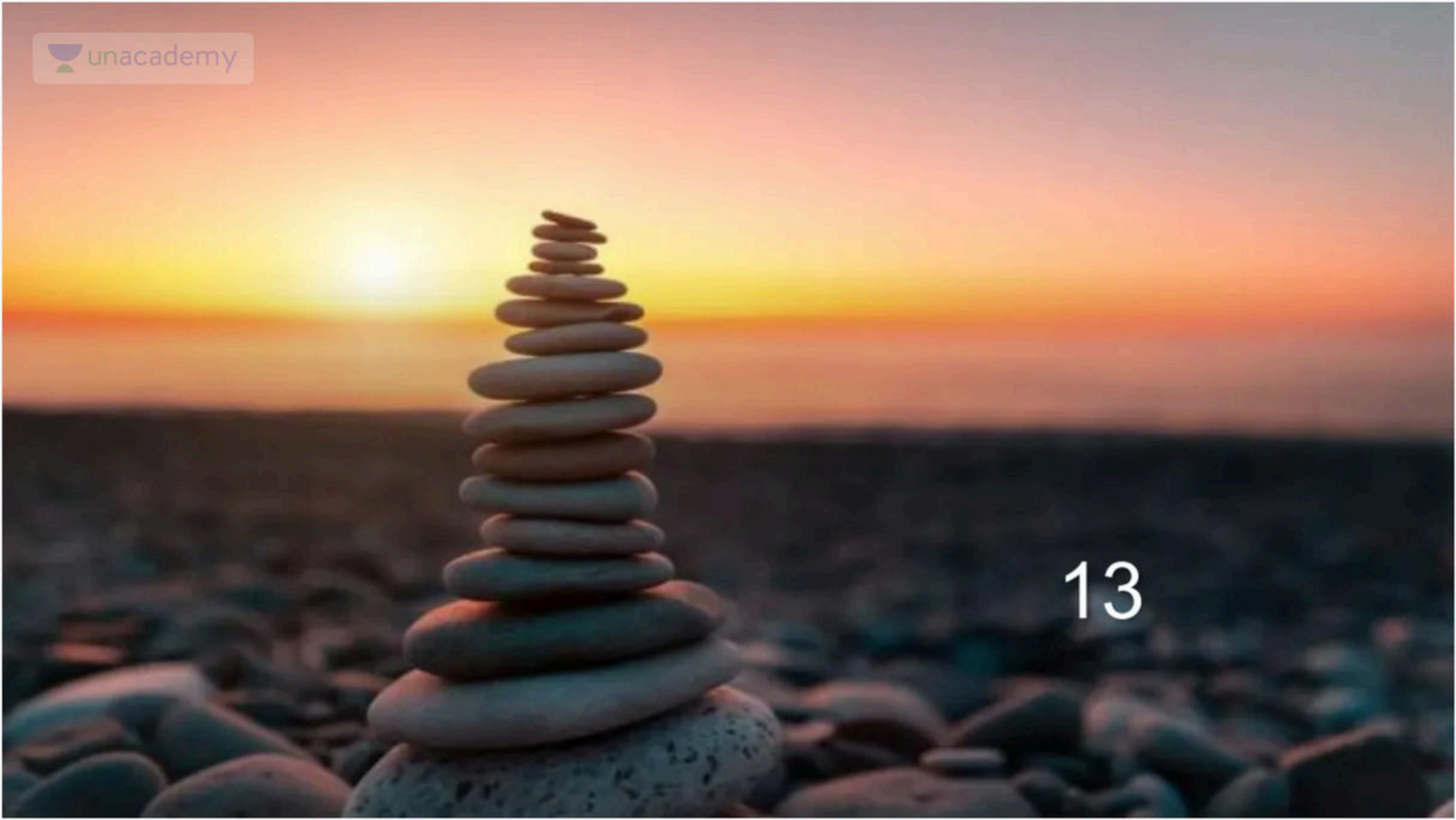
1
12

$$\frac{(123\ 1234)}{15}$$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13

$(1218 \times 1220 \times 1222 \times 1224) \div 9$


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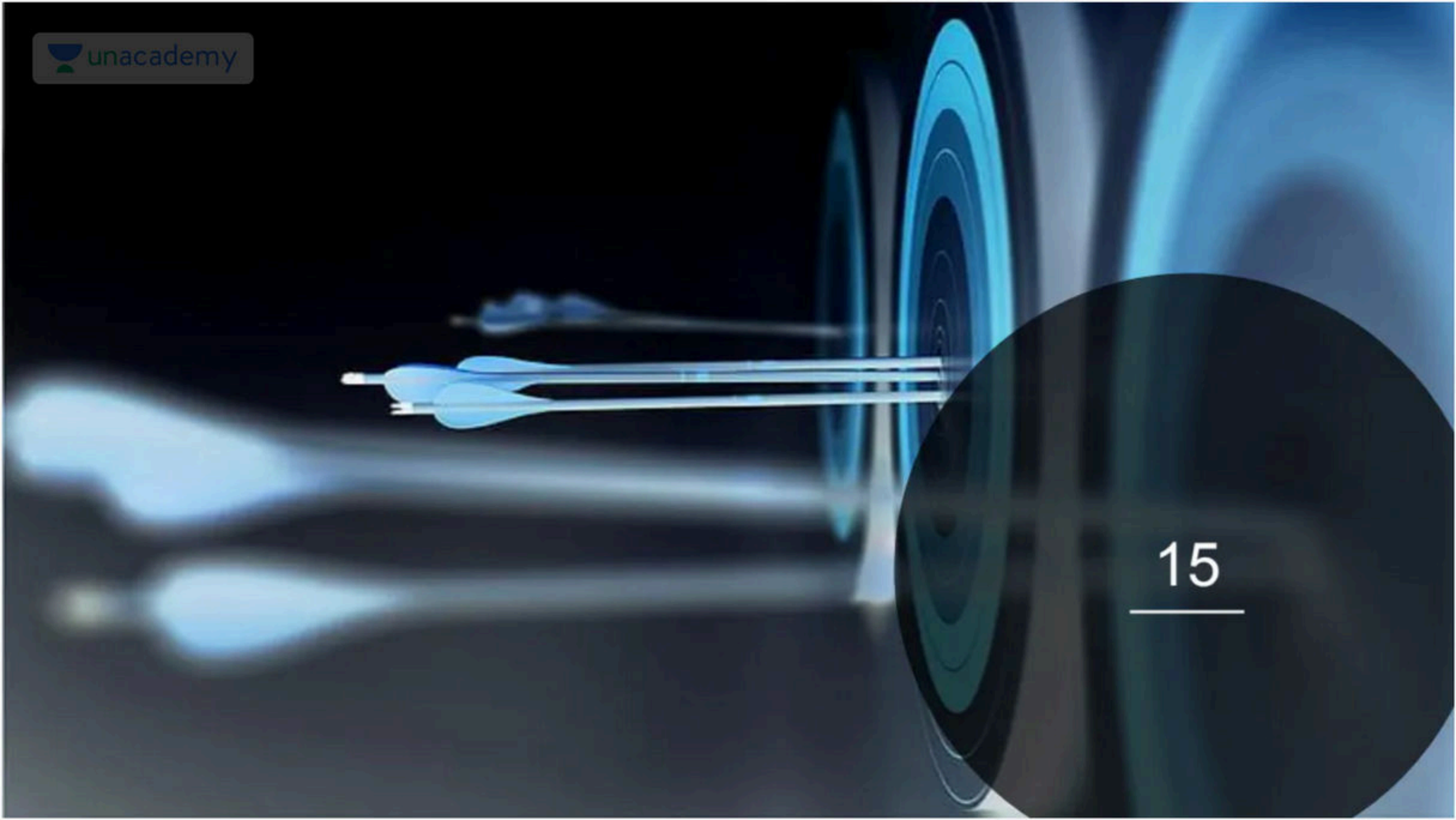
14

$$(1719 \times 1721 \times 1723 \times 1725 \times 1727) \div 18$$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15

The remainder when S is divided by 20 ,

where $S = 1! + 2! + 3! + 4! + 5! + 6! + \ldots\ldots\ldots + 19! + 20!$


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16

The rightmost non- zero digit of the number 30^{2720}.


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17

$7^{77} \div 4$


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18

$11^{88} \div 7$


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19

$5^{123} \div 7$


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20

$$7^{84} \div 342$$


21

Find : Number of factors, Sum of factors and Product of factors of the following :

12, 24, 288.


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22

How many factors of 12 are divisible by : 2, 3 , 4, 6 , 12.


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23

How many factors of 24 are divisible by : 2, 3 , 4, 6 , 8.


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24

Find the smallest number y such that : $y \times 162$ is a perfect cube.

(A) 24 (B) 27
(C) 32 (D) 36

[GATE 2017 : IIT Roorkee (EE, CS, Set - 1)]


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25

If all the natural numbers starting from 1 are written side by side then find the :

25^{th}, 50^{th}, 100^{th}, digit of the sequence.


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26

In the above question find the remainder when the sequences are divided by : 2, 4,8,16 , 5 , 25 , 125 , 3 ,9


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27

If the number $715 \blacksquare 423$ is divisible by 3 ($\blacksquare$ denotes the missing digit in the thousandths place), then the smallest whole number in the place of $\blacksquare$ is _____.

A. 0
B. 2
C. 5
D. 6

[GATE 2018 : IIT Guwahati (EC Set – 1)]


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28

How many numbers less than 21 are co-primes to 21?

(A) 24 (B) 96
(C) 11 (D) 12


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29

If a and b are integers and a - b is even, which of the following must always be even?

(A) ab
(B) $a^2 + b^2 + 1$
(C) $a^2 + b + 1$
(D) ab - b

[GATE 2017 : IIT Roorkee (ME Set – 2)]


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30

Given that a and b are integers and $a + a^2 b^3$ is odd then, which one of the following statements is correct?

(A) a and b are both odd
(B) a and b are both even
(C) a is even and b is odd
(D) a is odd and b is eve

[GATE 2018 : IIT Guwahati (ME Set – 1)]


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31

If x = - 0.5, then which of the following has the smallest value?

(A) $2^{1/x}$

(B) $\frac{1}{x}$

(C) $\frac{1}{x^2}$

(D) 2x

The sum of the digits of a two-digit number is 12. If the new number formed by reversing the digits is greater than the original number by 54, find the original number.

(A) 39
(B) 57
(C) 66
(D) 93


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33

A number is as much greater than 75 as it is smaller than 117. The number is:

(A) 91 (B) 93
(C) 89 (D) 96

[GATE 2013 : IIT Bombay (CE)]


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34

A number consists of two digits, the sum of digits is 9. If 45 is subtracted from the number, its digits are interchanged. What is the number?

(A) 63
(B) 72
(C) 81
(D) 90


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SUCCESS
35

The sum of eight consecutive odd numbers is 656. The average of four consecutive even numbers is 87. What is the sum of the smallest odd number and second largest even number?

[GATE 2014 : IIT Kharagpur (EC Set – 2, ME Set - 2)]


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36

In a sequence of 12 consecutive odd numbers, the sum of the first 5 numbers is 425. What is the sum of the last 5 numbers in the sequence?

[GATE 2014 : IIT Kharagpur (EC Set - 4, ME Set - 4)]

Direction (37 – 40) : Given, m = 1! + 2! + 3! + 4! +..... + 99! + 100!


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37
MALIK

Given, $m = 1! + 2! + 3! + 4! + \ldots\ldots\ldots\ldots\ldots\ldots + 99! + 100!$

Find the unit digit of “m”


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38

Given, $m = 1! + 2! + 3! + 4! + \ldots\ldots\ldots\ldots\ldots\ldots + 99! + 100!$

Find the last two digits of ‘m’


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39

Given, $m = 1! + 2! + 3! + 4! + \ldots\ldots\ldots\ldots\ldots\ldots + 99! + 100!$

Find the remainder, when 'm' is divided by 168.


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40

Given, m = 1! + 2! + 3! + 4! +..... + 99! + 100!

If N is a natural number such that 10^{12}< N < 1013 and the sum of the digits of n is 2 , then the number of values n take is :


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41

Which among $2^{1/2}$, $3^{1/3}$, $4^{1/4}$, $6^{1/6}$ and $12^{1/12}$ is the largest ?

(A) $2^{1/2}$
(B) $3^{1/3}$
(C) $4^{1/4}$
(D) $6^{1/6}$


42

If $\frac{a}{b} = \frac{1}{3}$, $\frac{b}{c} = 2$, $\frac{c}{d} = \frac{1}{2}$, $\frac{d}{e} = 3$ and $\frac{e}{f} = \frac{1}{4}$, then what is the value of $\frac{abc}{def}$?

(A) $\frac{3}{8}$

(B) $\frac{27}{8}$

(C) $\frac{3}{4}$

(D) $\frac{27}{4}$

(2006)


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43

S is a 6 digit number beginning with 1 . If the digit 1 is moved from the leftmost place to the rightmost place the number obtained is three times of S . Then the sum of the digits of S is-


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44

If N = 15 × 30 × 45 × 60 × ……..× 1500, what will be the number of zeroes at the end of N?

(A) 63
(B) 55
(C) 97
(D) 124

[GATE 2016 : IISc Bangalore (CE Set – 2)]


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45

Let x, y and z be distinct integers, that are odd and positive. Which one of the following statements cannot be true?

(A) xyz^2 is odd
(B) $(x-y)^2 z$ is even
(C) (x+y-z) (x+y) is even
(D) (x-y) (y+z) (x+y-z) isodd
(E) None of these


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Number System


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01

Two numbers are in ratio 3:8 and their HCF is 7. Their LCM is:

- 186
- 56
- 21
- 168

ANS - (D)

Given:

Two numbers are in ratio 3:8

Their HCF is 7

Concept:

Product of numbers = HCF × LCM

Calculation:

Let the two numbers be 3x and 8x respectively

Here 'x' is the HCF (x = 7)

∴ Numbers are:

3 × 7 = 21

8 × 7 = 56

Now,

Product of numbers = HCF × LCM

⇒ 21 × 56 = 7 × LCM

⇒ LCM = 1176/7

⇒ LCM = 168


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1
02

The sum of the digits of a two-digit number is 15 and the difference between the digits is 3. What is the two-digit number? (tens digit is greater than the unit digit)

- 96
- 78
- 128
- 69

ANS - (A)

Let the number be $10x + y$.

According to the question

$x + y = 15$ ----(i)

$x - y = 3$ ----(ii)

Add equation (i) and equation (ii)

$2x = 18$

$\Rightarrow x = 9$

From equation (i)

$\Rightarrow y = 15 - 9$

$\Rightarrow y = 6$

$\therefore$Required number is 96.


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03

Find the least number which should be added to 1456 so that it is divisible by 6, 5 and 4 without leaving a remainder.

- 6
- 61
- 44
- 16

ANS - (C)

Formulae used:

Basic division method.

Dividend = Divisor × Quotient + Remainder.

Calculation:

Least no which is divisible by 4,5 and 6 so LCM of 4,5 and 6 is 60.

So, here we require the least no greater than 1456 which is divisible by 60

⇒ 1456 = 60 × 24 + 16

⇒ to make the number divisible, we will have to add

⇒ (60 - 16) = 44

∴ required number to be added to 1456 so that it is divisible by 6, 5 and 4 without leaving a remainder is 44


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04

If $4320 = 2^a \times 3^b \times 5^c$, then find the value of a, b and c.

- a = 5, b = 3, c = 2
- a = 4, b = 3, c = 2
- a = 5, b = 3, c = 1
- a = 4, b = 3, c = 1

ANS - (C)

Given:

$4320 = 2^a \times 3^b \times 5^c$,

Calculations:

Prime factorisation of 4320:

$4320 = 2^5 \times 3^3 \times 5^1$

On comparing,

$\Rightarrow 2^5 \times 3^3 \times 5^1 = 2^a \times 3^b \times 5^c$

$\Rightarrow a = 5, b = 3, c = 1$


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05

Find the HCF of 2616 and 2289

- 109
- 328
- 327
- 108

ANS - (C)

Concept:

Express the numbers as the product of prime factors. Then HCF will be the common number with least power

Calculation:

$2616 = 109 \times 2^3 \times 3$

$2289 = 109 \times 7 \times 3$

Here Common factor with least power = 109 x 3 = 327

$\therefore$ HCF = 327


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06

If 5678A76 is divisible by 36, then A is _____

- 0
- 9
- 6
- 5

ANS - (C)

Concept used:

1.) Divisibility by 4: If the last two digits of a number are divisible by 4, then the number is completely divisible by 4.
2.) Divisibility by 9: If the sum of the digit is divisible by 9, then the result must be divisible by 9.

Calculation:

For 5678A76 to be divisible by 36, it must be divisible by 4 and 9.

76 is divisible by 4

Sum of digit = 5 + 6 + 7 + 8 + A + 7 + 6

⇒ 39 + A

For divisibility of 9

⇒ 39 + 6 = 45

45 is completely divisible by 9 so the value of A = 6

∴ The value of A is 6


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07

HCF of 12/5, 21/6, 9/4 and 18/3 is:

- 1/20
- 3/2
- 3/5
- 3/7

ANS - (A)

Given:

12/5, 21/6, 9/4 and 18/3

Formula used:

HCF of fractions = HCF of numerators/LCM of denominators

Calculation:

HCF of fractions = HCF of numerators/LCM of denominators

⇒ HCF of fractions = HCF of (12, 21, 9, 18)/LCM of (5, 6, 4, 3)

⇒ Since, 12 = 2 × 2 × 3, 21 = 3 × 7, 9 = 3 × 3, 18 = 2 × 3 × 3

⇒ HCF of 12, 21, 9, 18 = 3

⇒ 5 = 1 × 5, 6 = 2 × 3, 4 = 2 × 2, 3 = 1 × 3

⇒ LCM of 5, 6, 4, 3 = 60

⇒ HCF of (12, 21, 9, 18)/LCM of (5, 6, 4, 3) = 3/60

∴ HCF of 12/5, 21/6, 9/4 and 18/3 = 1/20


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08

What will be the remainder when the largest two digit prime number is divided by 6?

- 1
- 5
- 2
- 3

ANS - (A)

Calculation:

The largest two-digit prime number is 97

⇒ remainder when 97 is divided by 6 = (6 × 16 + **1**)

⇒ remainder = 1

∴ required remainder when the largest two digit prime number is divided by 6 = 1


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09

An internet bill costs Rs. 6 for 2 minutes 30 seconds. What is the cost (in rupees) for 3 minutes 20 seconds? (Round up to one decimal)

- ○ 8
- ○ 7.9
- ○ 8.1
- ○ 8.2

ANS - (A)

Given:

An internet bill costs Rs. 6 for 2 minutes 30 seconds.

Concept:

2 minutes 30 seconds = 150 seconds

3 minutes 20 seconds = 200 seconds

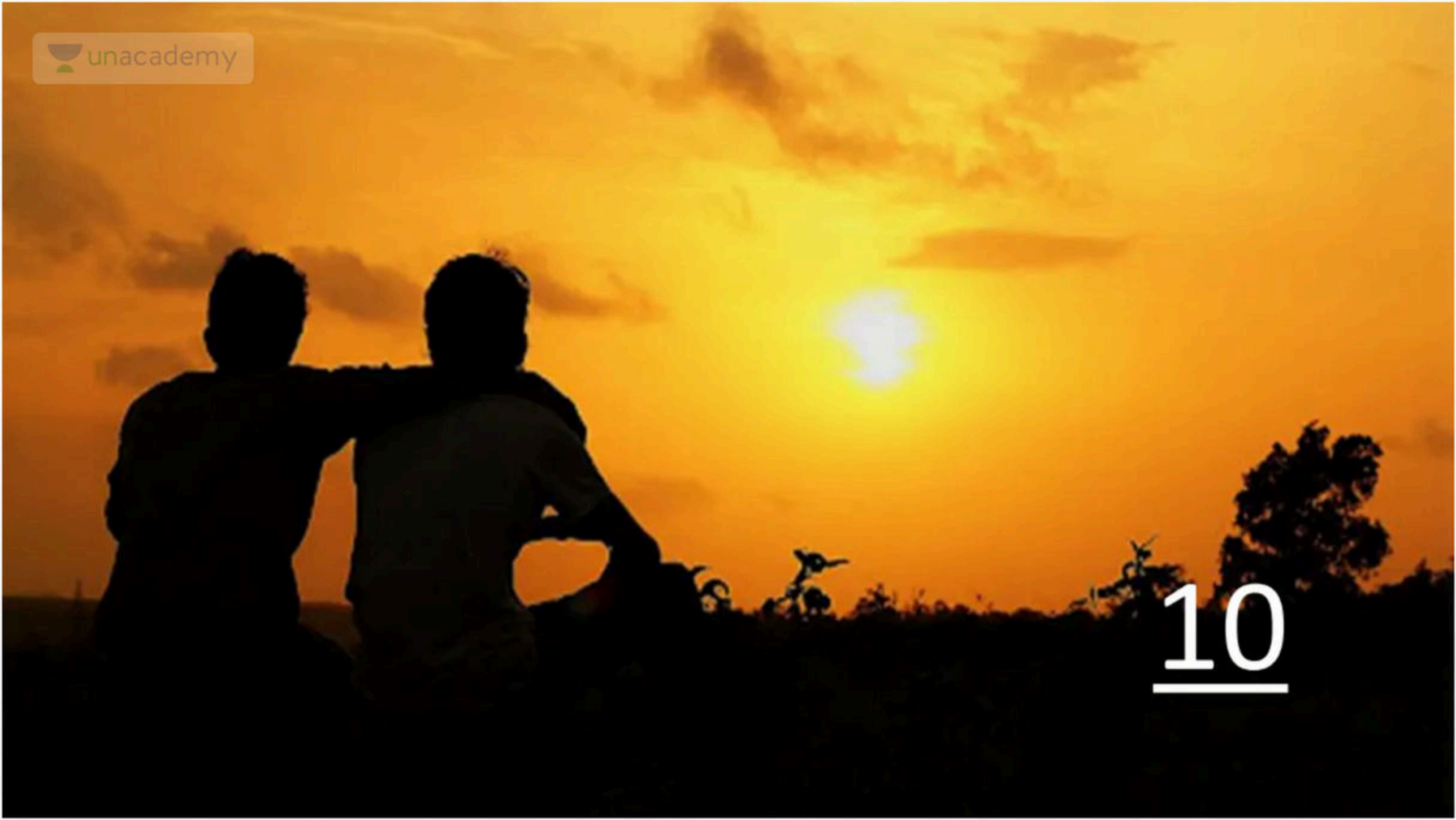
Calculation:

150 seconds → Rs. 6

1 sec →Rs. 6/150

200 seconds → (6/150) × 200 = Rs. 8

∴ The cost (in rupees) for 3 minutes 20 seconds = 8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10

Four bells ring at 16, 24, 36, 42 minute intervals. If they ring together at 6.00 a.m. after how long would they next ring together?

- 842 minutes
- 964 minutes
- 886 minutes
- 1008 minutes

ANS - (D)

Given:

Four bells ring at 16, 24, 36, 42 minute intervals

They ring together at 6.00 a.m

Concept:

Next time when the bells ring together will be the LCM

Calculation:

To find LCM (16, 24, 36, 42) use prime factorization method:

$16 = 2^4$

$24 = 2^3 \times 3$

$36 = 2^2 \times 3^2$

$42 = 2 \times 3 \times 7$

$LCM = 2^4 \times 3^2 \times 7 = 1008$

∴ After 1008 minutes the four bells would next ring together