

Number System

Unit Digits

Right most digit of a number is called Unit digit.

For e.g. 848×493 what will be the unit digit?

$$8 \times 3 = 24$$

The last digit is 4

Number System

Unit Digits

Question: What is the unit digit in the product $(684 \times 759 \times 413 \times 676)$?

- A] 6 B] 8 C] 2 D] 4

Number System

Unit Digits

All 10 digits are divided into 3 parts

The Master Framework: Three Behavior Buckets



The Constants

0, 1, 5, 6

Cyclicity of 1.
They never change.



The Flippers

4, 9

Cyclicity of 2.
They alternate.



The Cyclers

2, 3, 7, 8

Cyclicity of 4.
They rotate continuously.

Number System

Unit Digits

The Master Framework: Three Behavior Buckets



The Constants

0, 1, 5, 6

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They never change.

Number System

Unit Digits

Bucket 1: The Constants (0, 1, 5, 6)

Numbers ending in 0, 1, 5, or 6 are impervious to powers. Whatever power you raise them to, they output themselves.

$$30^{24} \longrightarrow \text{Ends in } 0$$

$$41^{36} \longrightarrow \text{Ends in } 1$$

$$75^{44} \longrightarrow \text{Ends in } 5$$

$$86^{38} \longrightarrow \text{Ends in } 6$$

Number System

Unit Digits

Find the unit digit of 80^{457}

Number System

Unit Digits

Find the unit digit of 3761^{2375}

Number System

Unit Digits

Find the unit digit of 95435^{453413}

Number System

Unit Digits

Find the unit digit of 4676^{45349}

Number System

Unit Digits

The Master Framework: Three Behavior Buckets



The Constants

0, 1, 5, 6

Cyclicity of 1.
They never change.



The Flippers

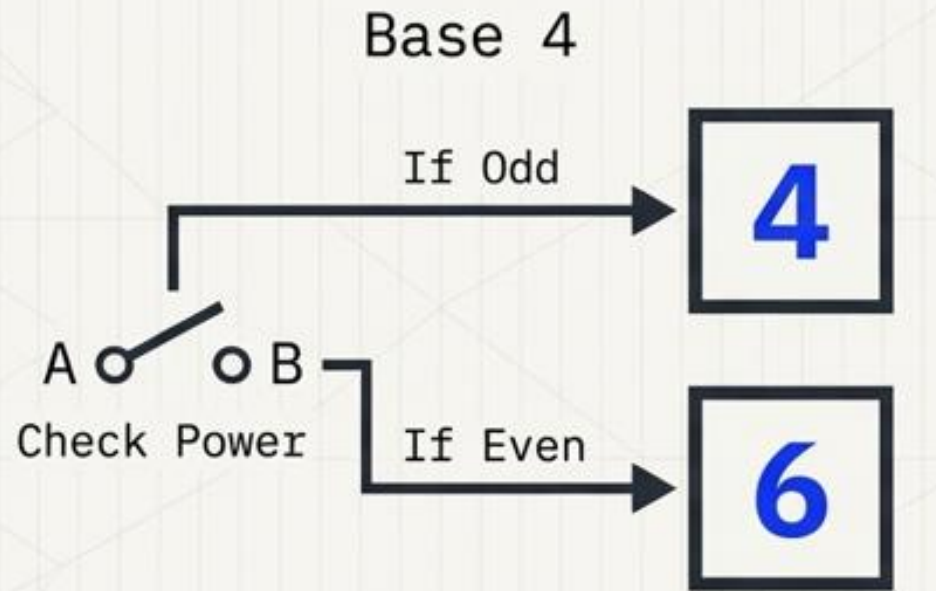
4, 9

Cyclicity of 2.
They alternate.

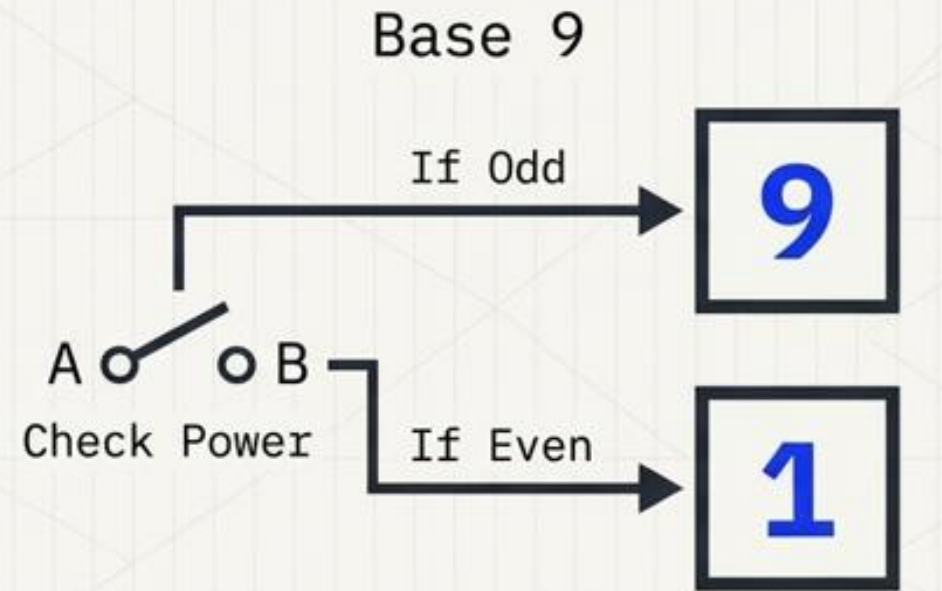
Number System

Unit Digits

Bucket 2: The Flippers (4, 9)



564⁴⁸ Even Power → Outputs 6



8759⁸³ Odd Power → Outputs 9

Number System

Unit Digits

Find the unit digit of 4679^{4534}

Number System

Unit Digits

Find the unit digit of 474^{45349}

Number System

Unit Digits

Question: Find the unit digit of $(2354)^{1048}$

[A] 4

[B] 6

[C] 8

[D] None of these

Number System

Unit Digits

The Master Framework: Three Behavior Buckets



The Constants

0, 1, 5, 6

Cyclicity of 1.
They never change.



The Flippers

4, 9

Cyclicity of 2.
They alternate.



The Cyclers

2, 3, 7, 8

Cyclicity of 4.
They rotate continuously.

Number System

Unit Digits

The Remainder Mapping Matrix

	R=1	R=2	R=3	R=0
Base 2	$2^1 = \mathbf{2}$	$2^2 = \mathbf{4}$	$2^3 = \mathbf{8}$	$2^4 = \mathbf{6}$
Base 3	$3^1 = \mathbf{3}$	$3^2 = \mathbf{9}$	$3^3 = \mathbf{7}$	$3^4 = \mathbf{1}$
Base 7	$7^1 = \mathbf{7}$	$7^2 = \mathbf{9}$	$7^3 = \mathbf{3}$	$7^4 = \mathbf{1}$
Base 8	$8^1 = \mathbf{8}$	$8^2 = \mathbf{4}$	$8^3 = \mathbf{2}$	$8^4 = \mathbf{6}$

Note: If R=0, treat it as raising the base to the power of 4. The cycle has completed its loop.

Number System

Unit Digits

Find the unit digit of 472^{54}

Number System

Unit Digits

Question: What is the unit digit of $(123)^{42}$?

Number System

Unit Digits

Find the unit digit of 472^{45349}

Number System

Unit Digits

Question: Find the unit digit of $(248)^{1587}$

[A] 2

[B] 4

[C] 8

[D] 6

Number System

Unit Digits

Question: Find the unit digit of $(127)^{223}$

[A] 7

[B] 9

[C] 3

[D] 1

Number System

Unit Digits

Find the unit digit of 472^{564}

Number System

Unit Digits

The Constants (0, 1, 5, 6)	The Flippers (4, 9)	The Cyclers (2, 3, 7, 8)						
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Number System

Unit Digits

Question: Find the unit digit of $(456)^{87} \times (307)^{42}$

[A] 1

[B] 4

[C] 5

[D] 7

Number System

Unit Digits

Find the unit digit of $479^{5434} + 4727^{7657}$