

August 27, 2019

Find the Last Digit of 2^{100}

Note:

$$2^0 = 1$$

$$2^1 = \boxed{2}$$

$$2^2 = \boxed{4}$$

$$2^3 = \boxed{8}$$

$$2^4 = \boxed{16}$$

Sequence of
2, 4, 8, 6 repeats
after (4) iterations,

$$2^5 = 32$$

$$2^6 = 64$$

$$2^7 = 128$$

$$2^8 = 256$$

$$2^9 = 512$$

$$2^{10} = 1024$$

$$2^{11} = 2048$$

$$2^{12} = 4096$$

Question: what is the
remainder when the
exponents are divided
by (4)?

	Last Digit
$4 \div (4) = 1 \text{ r } 0$	$\rightarrow 6$
$5 \div (4) = 1 \text{ r } 1$	$\rightarrow 2$
$6 \div (4) = 1 \text{ r } 2$	$\rightarrow 4$
$7 \div (4) = 1 \text{ r } 3$	$\rightarrow 8$
$8 \div (4) = 2 \text{ r } 0$	$\rightarrow 6$
$9 \div (4) = 2 \text{ r } 1$	$\rightarrow 2$
$10 \div (4) = 2 \text{ r } 2$	$\rightarrow 4$
$11 \div (4) = 2 \text{ r } 3$	$\rightarrow 8$
$12 \div (4) = 3 \text{ r } 0$	$\rightarrow 6$

Now, what is the remainder when 100 is
divided by (4)? $100 \div (4) = 25 \text{ r } 0 \rightarrow \boxed{6}$