1. जब 19^{300} को 20 से विभाजित किया जाए तो शेषफल ज्ञात कीजिए।
When 19^{300} is divided by 20, find the remainder.

$\Rightarrow \frac{19^{300}}{20} \Rightarrow (-1)^{300} \Rightarrow 1$

2. जब 3^{10} को 7 से विभाजित किया जाए तो शेषफल ज्ञात कीजिए।
Find the remainder, when 3^{10} is divided by 7.

$\Rightarrow \frac{3^{10}}{7}$ (7 → Prime)

$\Rightarrow \frac{3^6 \times 3^4}{7} \Rightarrow \frac{3^{6} \times 81}{7} \Rightarrow 4$ (1 × 4)

$\Rightarrow \frac{3^3 \times 3^3 \times 3^3 \times 3^1}{7} \Rightarrow \frac{-3}{7} \Rightarrow 7-3 \Rightarrow 4$ (−1, −1, −1, 3)

3. जब संख्या $(5)^{501}$ को 126 से विभाजित किया जाता है तो शेषफल क्या होगा?
When the number $(5)^{501}$ is divided by 126 then the remainder will be?

$167 \times 3 = 501$

$\Rightarrow \frac{5^{501}}{126} \Rightarrow \frac{(5^3)^{167}}{126} \Rightarrow \frac{125^{167}}{126} \Rightarrow (-1)^{165}$ - विषम (odd)

$\Rightarrow \frac{-1}{126} \Rightarrow 126-1 \Rightarrow 125$

Q. $\frac{2^{432}}{63} \Rightarrow \frac{(2^6)^{72}}{63}$

$2^6 = 64$

$6 \times 72 = 432$

$(a^n)^m \Rightarrow a^{n \times m}$

$\Rightarrow \frac{(+1)^{72}}{63} \Rightarrow 1$ R

Q. $\frac{3^{52}}{244} \Rightarrow \frac{3^{50} \times 3^2}{244}$

$\Rightarrow \frac{(3^5)^{10} \times 9}{244} \Rightarrow \frac{(-1)^{10} \times 9}{244} \Rightarrow \frac{243^{10} \times 9}{244} \Rightarrow 9$ (1 × 9)

Q. $\frac{13^{188}}{168}$ $\Rightarrow \frac{(13^2)^{94}}{168} \Rightarrow \frac{(+1)^{94}}{169} \Rightarrow 1$

$13^2 = 169$

$2 \times 94 \Rightarrow 188$.

Q. $\frac{3^{853}}{244}$ $\Rightarrow \frac{3^{850} \times 3^3}{244} \Rightarrow \frac{(3^5)^{170} \times 27}{244} \Rightarrow \frac{(-1)^{170} \times 27}{244}$

$3^5 = 243$.

$\Rightarrow (-1)^{170} \times 27$

$\Rightarrow 1 \times 27 \Rightarrow (27)$ Ans

Q. $\frac{3^{300}}{10}$, R = ?

$\frac{(3^2)^{150}}{10} \Rightarrow \frac{(-1)^{150}}{10} = (-1)^{150} \Rightarrow (+1)$ Ans

$(-1)^{\text{odd (विषम)}} \rightarrow -1$

$(-1)^{\text{even (सम)}} \rightarrow +1$.

Q. $\frac{2^{402}}{15}$ का R = ?

$2^4 = 16$.

$\frac{2^{400} \times 2^2}{15} \Rightarrow \frac{(2^4)^{100} \times 2^2}{15} \Rightarrow \frac{16^{100} \times 4}{15} = 1 \times 4 \Rightarrow (4)$ Ans

Q. $\frac{4^{403}}{63}$ का R = ?

$4^3 = 64$

$\frac{4^{402} \times 4^1}{63} \Rightarrow \frac{(4^3)^{134} \times 4^1}{63} \Rightarrow \frac{64^{134} \times 4^4}{63} \Rightarrow (4)$

Wilson's theorem

P = Any prime no.

$(P-1)! \rightarrow R = -1 \; 2\pi \; (P-1)$

$\frac{(P-1)}{10}$, $R = -1 \; 2\pi \; (P-1)$

$\rightarrow$ अभाज्य संख्या

Find the Remainder :-

Q. $\frac{4!}{5}$ ⇒ $R = -1 \ 2\pi \ 5 - 1$

⇒ $4 = R$

$4! \Rightarrow 4 \times 3 \times 2 \times 1$

⇒ 24

5)24(4
20
4

$\frac{4!}{5}$ ↓ अभाज्य

Q. $\frac{6!}{7}$, $R = ?$

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

$= 720$

$R = -1 \ 2\pi \ 7 - 1$

⇒ $6 = R$

7)720(102
7
20
14
6

Q. $\frac{126!}{127}$, $R = -1 \ 2\pi \ 127 - 1$

⇒ 126. Ans

$\lfloor 6 \Rightarrow 6 \times 5 \times 4 \times 3 \times 2 \times 1$

$\lfloor 7 \Rightarrow 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$

$\lfloor 7 = 7 \times \lfloor 6$

$\lfloor 7 = 7 \times 6 \times \lfloor 5$

$\lfloor 7 = 7 \times 6 \times 5 \times \lfloor 4$

$\lfloor 88 = 88 \times \lfloor 87$

$\lfloor 90 = 90 \times 89 \times 88 \times \lfloor 87$.

Q. $\frac{\lfloor 190}{191}$ ⇒ $R = -1 \ 2\pi \ 191 - 1$

⇒ 190 Ans

↓ अभाज्य

$R = 190$ Ans

Q. $\frac{7!}{7}$, $R = ?$ $\frac{(P-1)!}{P}$, $R = -1 \ 2\pi \ (P-1)$

P → prime.

$\frac{7 \times \lfloor 6}{7} \Rightarrow 0$

$\lfloor 7 = 7 \times \lfloor 6$

$= 7 \times 720$

⇒ 5040

7)5040(720
49
14
14
0

				divisible by.
* i) $a^n + b^n$	$\xrightarrow{n=\text{विषम}}$ (odd) $\longrightarrow$	$(a+b)$ ✓	$(a-b)$ ✗	
ii) $a^n - b^n$	$\longrightarrow$ n - odd (विषम)	$(a+b)$ ✗	$(a-b)$ ✓	
iii) $a^n + b^n$	$\longrightarrow$ n - even (सम)	$(a+b)$ ✗	$(a-b)$ ✗	
iv) $a^n - b^n$	$\longrightarrow$ n - even (सम)	$(a+b)$ ✓	$(a-b)$ ✓	