

RPF SI & CONSTABLE 2024

MATHS

रेल रक्षक बैच



RPF SI & CONSTABLE 2024 | MATHS | रेल रक्षक बैच

1. जब $19^{300}$ को 20 से विभाजित किया जाए तो शेषफल ज्ञात कीजिए। [RRB NTPC - 2021]

**When $19^{300}$ is divided by 20, find the remainder.**

(a) 2

(c) 3

(b) 1

(d) 4

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

2. जब $3^{10}$ को 7 से विभाजित किया जाए तो शेषफल ज्ञात कीजिए। [RRB NTPC-2021]

**Find the remainder, when $3^{10}$ is divided by 7.**

(a) 4
(b) 3
(c) 5
(d) 6

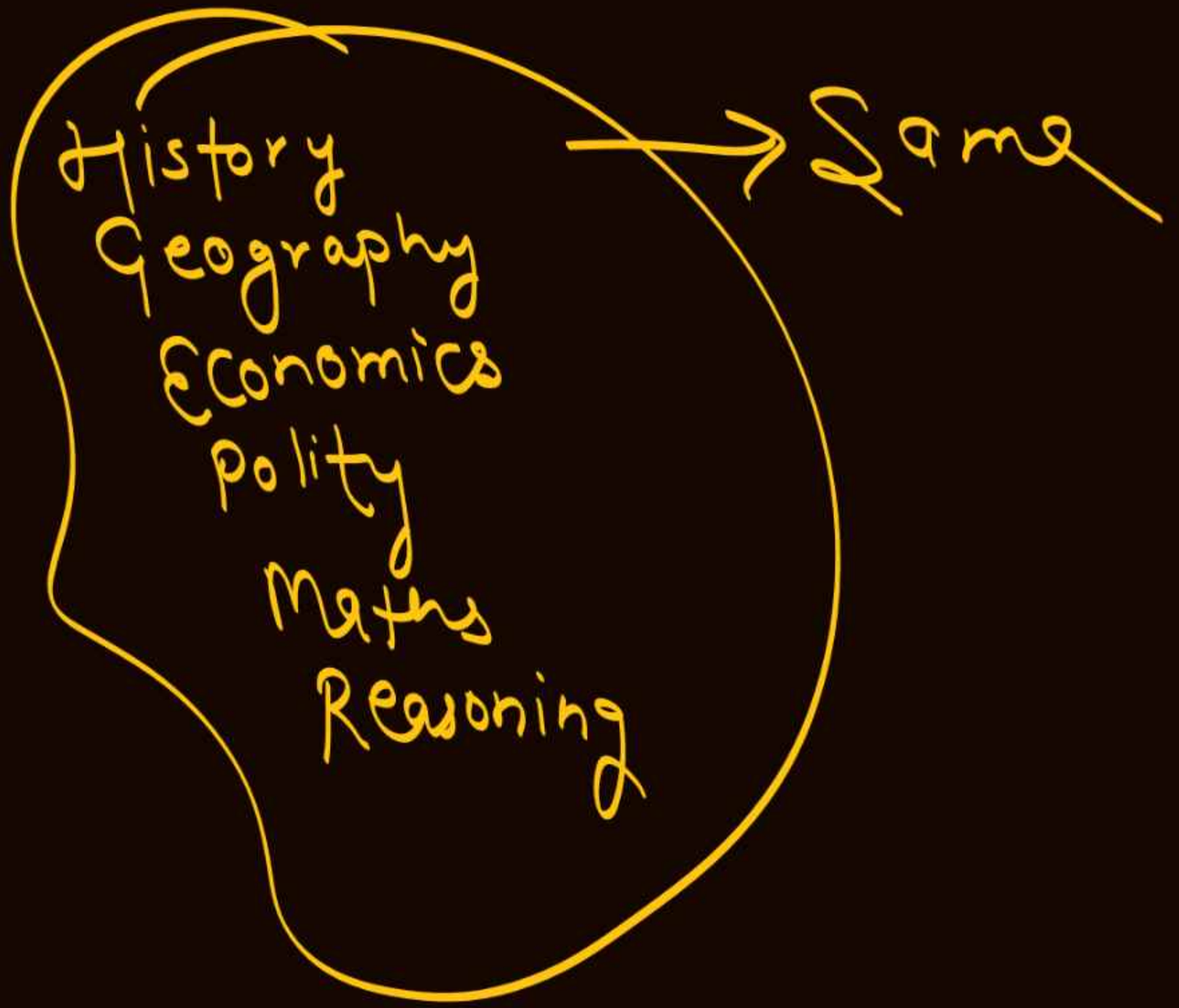
$\frac{3^{10}}{7}$ → 7 prime

$= \frac{3^6 \times 3^4}{7}$

$\frac{3^1 \times 81}{7}$ → 1, 4 → 4

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

$\Rightarrow \frac{-3}{7} \Rightarrow 7-3 \Rightarrow 4$


History
Geography
Economics
Polity
Maths
Reasoning
Same

3. जब संख्या $(5)^{501}$ को 126 से विभाजित किया जाता है तो शेषफल क्या होगा?

$3 \times 167 \Rightarrow 501$ $\quad$ $167 \times 3 \Rightarrow 501$

**When the number $(5)^{501}$ is divided by 126 then the remainder will be?**

(a) 117

(b) 121

(c) 89

(d) 125

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

odd विषम

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

$R \Rightarrow 126 - 1 \Rightarrow 125$

निम्नलिखित में से शेषफल ज्ञात कीजिए:

**Find the Remainder of the followings:**

**4.** $\frac{13^8}{169}$

5. $\frac{2^{432}}{63}$

$2^6 = 64$

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

$6 \times 72 = 432$

$\Rightarrow \frac{64^{72}}{63} \Rightarrow (+1)$

$\Rightarrow 1$ R

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

6. $\frac{3^{52}}{244}$

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

$3^5 = 243$

$5 \times 10 = 50$

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

7. $\frac{13^{188}}{168}$

$\frac{13^{188}}{168} \Rightarrow \frac{(13^2)^{94}}{168}$

$13^2 \Rightarrow 169$

$2 \times 94 \Rightarrow 188$

$\Rightarrow \frac{(+1)^{94}}{168} \Rightarrow 1$

$1^{94} \Rightarrow 1$

8. $\frac{3^{853}}{244}$

$\frac{3^{853}}{244} \Rightarrow \frac{3^{850} \times 3^3}{244}$

$3^5 = 243$

$= \frac{(3^5)^{170} \times 27}{244} \Rightarrow \frac{(243)^{170} \times 27}{244}$

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

$\Rightarrow 1 \times 27$

$= 27$ Ans.

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

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

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

$\Rightarrow \frac{(3^2)^{150}}{10} \Rightarrow \frac{9^{150}}{10} \Rightarrow (-1)^{150}$

$\Rightarrow +1$ Ans

$\frac{2^{402}}{15}$ का $R = ?$

$2^4 \rightarrow 16$

$\frac{2^{400} \times 2^2}{15} \Rightarrow \frac{(2^4)^{100} \times 2^2}{15}$

$\Rightarrow \frac{16^{100} \times 4}{15}$ $1 \times 4$

$4$

$\Rightarrow \frac{4^{403}}{63}$ का R:?

$4^3 = 64$

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

$\Rightarrow \frac{64^{134} \times 4^1}{63} \Rightarrow 1$

9. $\frac{32^{32}}{7}$

10. $\frac{5^{52}}{126}$

# 11. Wilson's thm

$P = Any\ Primer\ No.$

$\frac{(P-1)!}{P} \rightarrow R = -1$ या (P-1)

$\frac{(P-1)}{P}$ , R = -1 या (P-1)

P → अभाज्य सं०

$\frac{4!}{3}$ , R = 4

## Find the Remainder:-

**12.** $\frac{4!}{5}$

R ④

$\frac{4!}{5}$ ⇒ R = -1 या 5-1
⇒ 4
↓
अभाज्य

$4! = 4 \times 3 \times 2 \times 1$
⇒ 24

$5\overline{)24}(4$
$\underline{20}$
$4$

13. $\frac{6!}{7}$ ]

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

7 → अभाज्य

R = (-1) या 7-1

⇒ 6

$6! \Rightarrow 6\times5\times4\times3\times2\times1$

$\Rightarrow 720$

$7\overline{)720}(102$

$\frac{7}{20}$

$\frac{14}{6}$

6

14. $\frac{126!}{127}$

$126 = 126!$

Ans = 126 (R)

$\frac{126!}{127}$, $R = -1$ या $127 - 1$

$= 126$

$$16 = 6 \times 5 \times 4 \times 3 \times 2 \times 1$$

$$17 = 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$$

$$17 = 7 \times 16$$

$$17 = 7 \times 6 \times 15$$

$$17 = 7 \times 6 \times 5 \times 14$$

$$188 = 88 \times 187$$

$$190 = 90 \times 89 \times 88 \times 187$$

15. $\frac{190!}{191}$

$R = 190$ Ans

$\frac{\lfloor 190}{191}$ → अभाज्य संख्या

$\Rightarrow R = -1$ या $191 - 1$

$\Rightarrow 190$

16. $\frac{18!}{19}$

17. $\frac{28!}{29}$

## Find the Remainder:-

18. $\frac{7!}{7}$

$\frac{(P-1)!}{P}$, $R = -1$ या $(P-1)$

$P \rightarrow$ prime

$\frac{7!}{7}$, $R = 0$

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

$7! = 7 \times 6$

$\Rightarrow 7 \times 720$

$5040$

$7 \overline{)5040(720}$

$49$

$14$

$14$

$0$

19. $\frac{19!}{19}$

$\frac{19!}{19}$, R = ? 0

| | Divisible by $(a+b)$ | Divisible by $(a-b)$ |
|---|---|---|
| (i) $a^n+b^n$ ⟶ $n$ = विषम (odd) ⟶ | $(a+b)$ ✓ | $(a-b)$ ✗ |
| (ii) $a^n-b^n$ ⟶ $n$ → odd (विषम) | $(a+b)$ ✗ | $(a-b)$ ✓ |
| (iii) $a^n+b^n$ ⟶ $n$ → even (सम) | $(a+b)$ ✗ | $(a-b)$ ✗ |
| (iv) $a^n-b^n$ ⟶ $n$ → even (सम) | $(a+b)$ ✓ | $(a-b)$ ✓ |

20. $\frac{29!}{29}$

21. $\frac{32!}{31}$