(Ans)

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3, 15 (Z1, +> a idag? 1) Is 172.9 carmichael? 11 is prime and 21 is tield we Know, 1729 = 7×13×19 And it satisfies, Here Fach P.1:157292000 (P.A) syllot umma) * * Associative 1728: * 7-1=6 and 6 | 1728 * 13-1=12 and 12 | 1728 * 19-1=18 and 18 | 1728 0 <+ 15> 234 .30 Yes, 1729 ris adversmichael number. 2) Praimitive moiled to the 297 - (+ 1000) The power of 5 modulo 23 generate all non-zerro 5] GT (23) Polynomial elements of Zzz. 5' = 5 (mod 23) let. incredible polynomial 52 = 2 (mod (3) 1(x)= x +x+1 $5^3 \ge 3 \pmod{23}$ field: GF (23)= (0,1,20,271,20,271), x271, x271, x271, x271, x221, 522 = 1 (mod 23) : 5 is the primitive knost of modulo 23.

3. Is <Z11, +> a ring? 11 is prime and Z11 1's field.

And it satisfies And it satisfies, * Commutative under both addition, multiplication * Associative That additive and multiplicative; denticy: 50, yes, < Zu, +> a gang 1 31 bmo 31 = 1-91 * 4) Are (237, +> , < 235) \ malbelian 7551 231 > \Z37, +> -> Yes, its albelian evitimin (2 2, (235, +) - No, all elements invertibles all 5] GF (23) Polynomia 5' = 5 (and 23) Let, irredèlble polynomia! 52 = 2 (mod (3) Flx1= x+x+1 53 3 (mad 23) 543 (mod 23) field: GF (23) = $\begin{cases} 0,1, x, x+1, x^2, x^2+1, x^2+n, x^2+x+1 \end{cases}$ So, $(2+1)(x^2+n) \equiv 1 \mod (2x^2+2x+2)$ and $(2x^2+2x+2)$