

24. Observe that $|(a, b)| = 2$ if and only if $|a| = 1$ or 2 and $|b| = 1$ or 2 but not both $|a| = 1$ and $|b| = 1$. So, there are $(m + 2)(n + 1) - 1 = mn + m + 2n + 1$ elements of order 2.

32. $\text{lcm}(6, 10, 15) = 30$; $\text{lcm}(n_1, n_2, \dots, n_k)$.

50. S_3

52. $Z_{10} \oplus Z_{12} \oplus Z_6 \approx Z_2 \oplus Z_5 \oplus Z_{12} \oplus Z_6 \approx Z_2 \oplus Z_{60} \oplus Z_6 \approx Z_{60} \oplus Z_6 \oplus Z_2$.

74. $U(144) \approx U(16) \oplus U(9) \approx Z_2 \oplus Z_4 \oplus Z_6$;
 $U(140) \approx U(4) \oplus U(5) \oplus U(7) \approx Z_2 \oplus Z_4 \oplus Z_6$.