1. Make in GAP a free group $F$ on two generators $a$ and $b$. Assign the generators to two variables $a$ and $b$ and produce a few words in $F$. See how inverses are cancelled automatically.
   **Hint 1:** Use `FreeGroup("a","b");`
   **Hint 2:** Use `GeneratorsOfGroup`.

2. Give the presentation
   \[ G := \langle a, b \mid a^2, b^3, (ab)^{11}, [a, b]^6, (abab^{-1})^6 \rangle \]
   to GAP. Find the order of $G$.
   **Hint 1:** Type in the relations in a list $R$ and use the $F/R$ operation to form $G$.
   **Hint 2:** Simply try the `Size` command.

3. Compute an isomorphism to a permutation group.
   **Hint:** `?IsomorphismPermGroup` and `?Image`

4. Perform a coset enumeration of
   \[ H := \langle a, b \mid a^2, b^3, abab \rangle \]
   on the cosets of the trivial group.
   **Hint 1:** `?TrivialSubgroup` and `?CosetTable`.

5. Perform a coset enumeration of $H$ on the cosets of the group generated by $a$. Derive from this a group homomorphism into a symmetric group (without using `FactorCosetAction`).
   **Hint 1:** `?CosetTable` and `?PermList`.

6. Enter the group
   \[ K := \langle s, t \mid s^3, t^2 \rangle \]
   into GAP and determine its size.
   **Hint 1:** Hit “Ctrl-C” on the keyboard to interrupt GAP.
   **Hint 2:** Compute the `?AbelianInvariants`.
   **Hint 3:** Use `?LowIndexSubgroupsFpGroup` and then `AbelianInvariants` for some of the subgroups.

7. Investigate the Fibonacci group
   \[ F(5) := \langle a, b, c, d, e \mid ab = c, bc = d, cd = e, de = a, ea = b \rangle \]

8. Investigate the Fibonacci group
   \[ F(6) := \langle a, b, c, d, e, f \mid ab = c, bc = d, cd = e, de = f, ef = a, fa = b \rangle \]

9. Use the following program to make an FP group:
   ```gap
   n:=10; f:=FreeGroup(10); g:=GeneratorsOfGroup(f); rels:=[ ];
   for i in [1..n] do Add(rels,g[i]^2); od;
   for i in [1..n-2] do for j in [i+2..n] do Add(rels,Comm(g[i],g[j])); od; od;
   for i in [1..n-1] do Add(rels,(g[i]*g[i+1])^3); od;
   G := f/rels;
   
   Determine the order of $G$.
   **Hint 1:** Try to enumerate the cosets of a subgroup of $G$.
   **Hint 2:** Once you have the group homomorphism, compute its `?Kernel`.```