④ 4 G_i's
$\{G_1, G_2, G_3, G_4, F_{56}, ?\}$ not possible.

As the reader may verify, there is a unique automorphism of the configuration of 27 lines on S (not an automorphism of S) that carries any of these 72 into any other, in any assignment; thus there are $72 \cdot 6! = 51,840$ symmetries of the configuration of lines on S.

☞ Here, the homomorphism from the configuration of 27 lines on S to itself is a map preserving the incidence relations. Let K = the configuration of 27 lines on S. To prove the claim above, first of all note the following observations:
① Given a set of six disjoint lines on S, any five in the set have a unique line intersecting all the five.

② Given any two lines intersecting each other, $\exists$ only one line meeting both lines.

Proof of ②: By the symmetry, we have only to consider the following special cases.
(i) E_1, G_2.
$\Rightarrow$ F_{12} is the unique line
(ii) E_1, F_{12}
$\Rightarrow$ G_2 is the unique line,
(iii) G_1, F_{12}
$\Rightarrow$ E_2 is the unique line
(iv) F_{12}, F_{34}, $\Rightarrow$ F_{56}