3

and so $|G|/|N|$ is the order of the quotient group)

(hence abelian)
H is cyclic, generated by a single element, and $K \leq H$, so K is normal in H, and by the argument above

✓ $|H/K| = |H|/|K| = 6/2 = 3$

By the 3rd isomorphism theorem

3/2 ✓ $(G/K)/(H/K) \simeq G/H \Rightarrow |(G/K)/(H/K)| = 4$

or just $|G/K|/|H/K| = 4$ (you need) to use a [illegible] to create a [illegible]

c) $G/H = \{H, aH, bH, abH\}$

You were meant to write out $H = \{e, a, a^2, a^3, a^4, a^5\}$ etc.

$G/K = \{K, aK, a^2K, a^3K, a^4K, a^5K,$
$bK, abK, a^2bK, a^3bK, a^4bK, a^5bK\}$.

$H/K = \{K, a^2K, a^4K\}$

2/4 $(G/K)/(H/K) = \{K(H/K), aK(H/K), bK(H/K), abK(H/K)\}$

d) $\phi(K(H/K)) \to H$

$\phi(aK(H/K)) \to aH$

$\phi(bK(H/K)) \to bH$

✓ $\phi(abK(H/K)) \to abH$.

No this is not the only isomorphism. $(G/K)/(H/K)$ is abelian, isomorphic to the Klein group, so we can define an automorphism so:
All the elements of $K(H/K)$ and G/H have order 2 (except for H/K and H resp., the identities). The only restriction is that the order of elements is unchanged (this must be so, since $(G/K)/(H/K)$ and ✓ G/H have the same order), so that elements of order 2 are