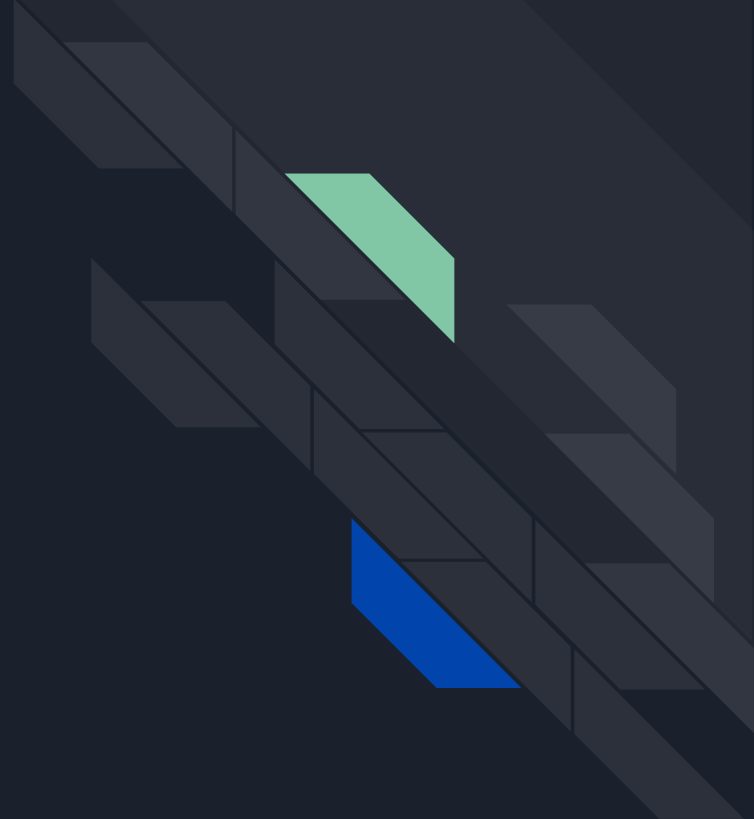




# Cayley Graphs

Max Steinberg working with Riley Thornton

# Algebraic Topology

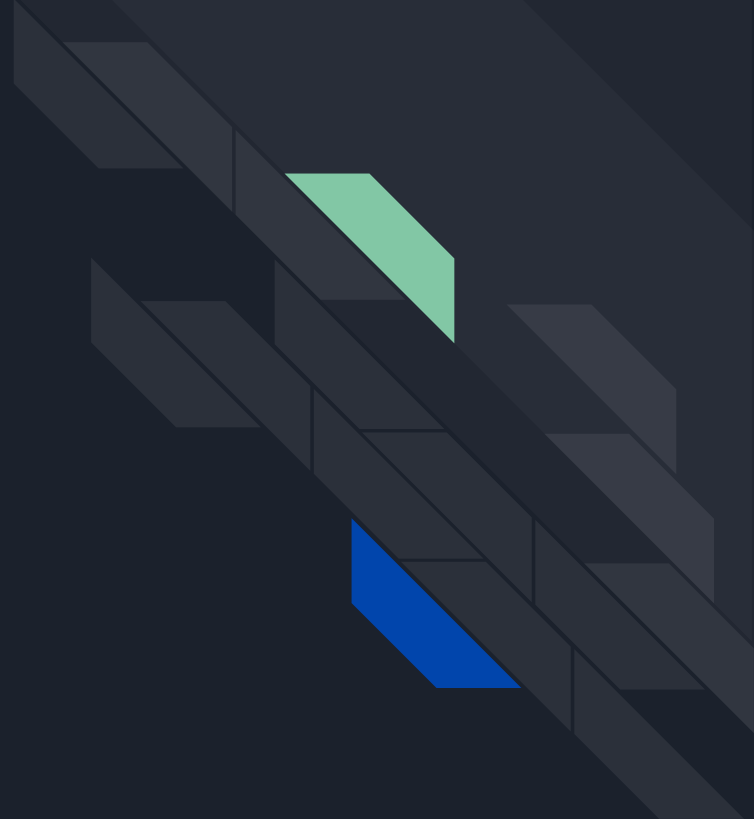




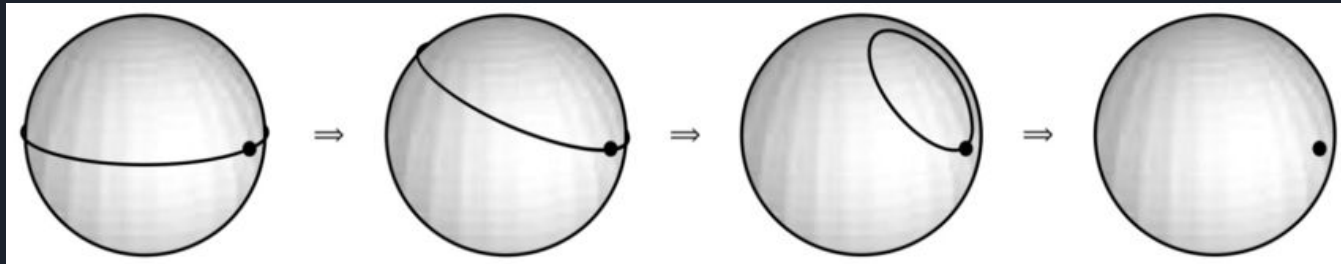
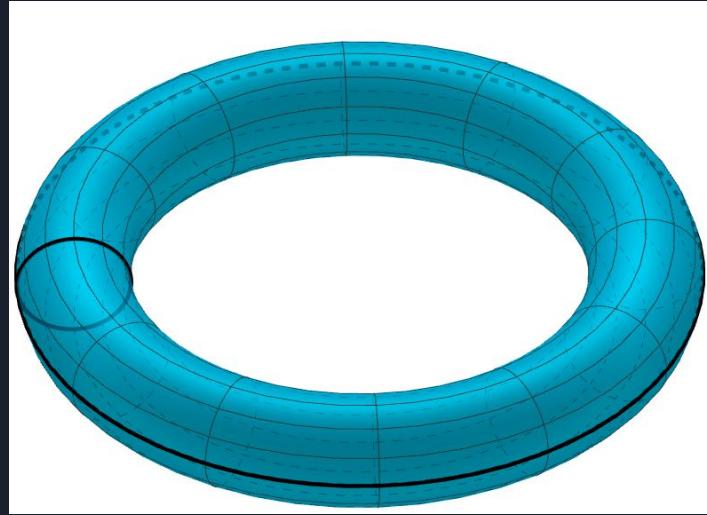
# What is algebraic topology?

How do we know we live on a sphere? What if we lived on a torus and had no idea? Obviously we could go to space and look down on the Earth, but what if we couldn't leave the surface?

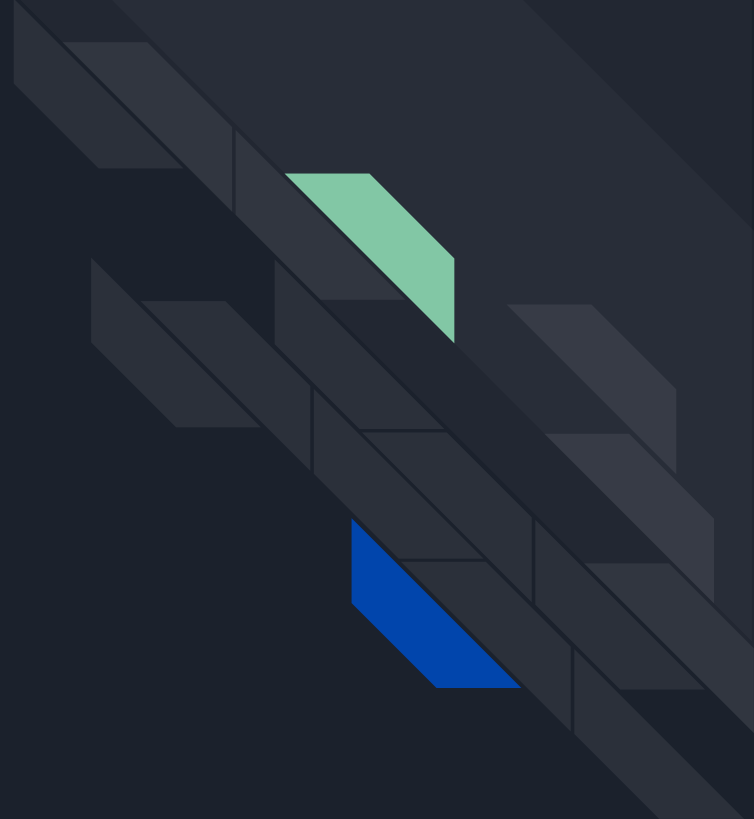
# Fundamental Groups



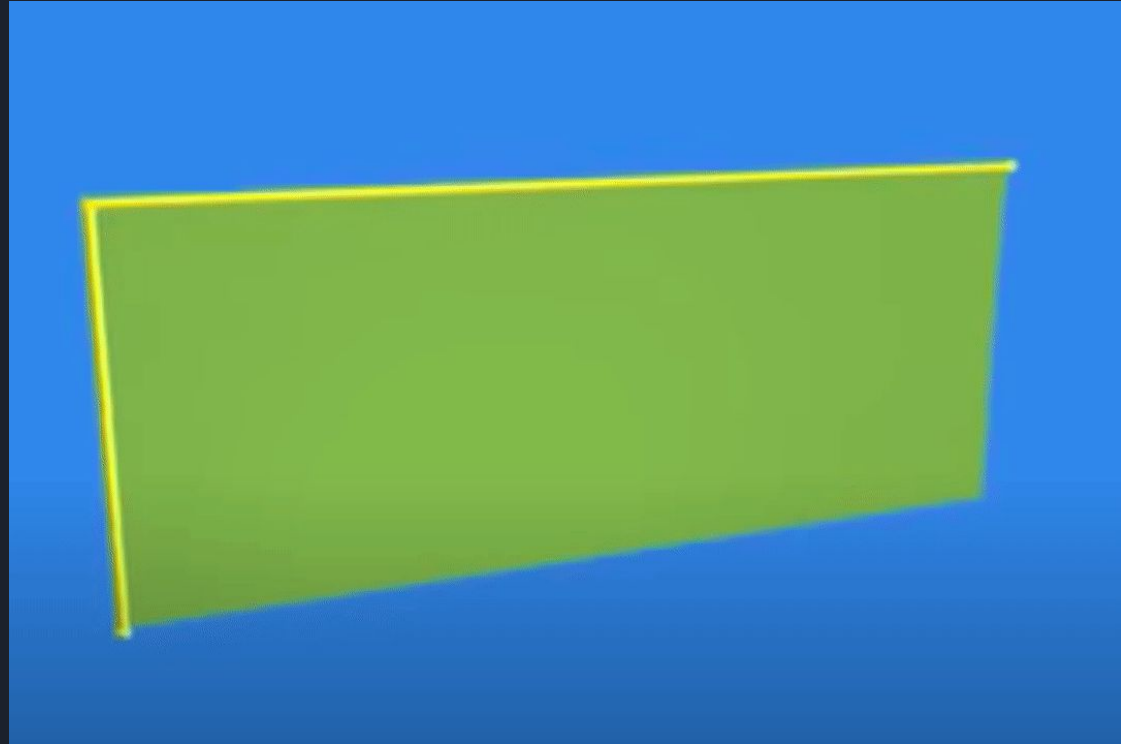
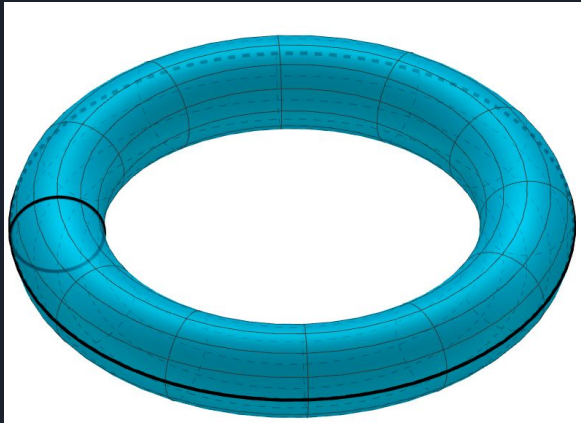
How do we know if there is a hole in the planet?



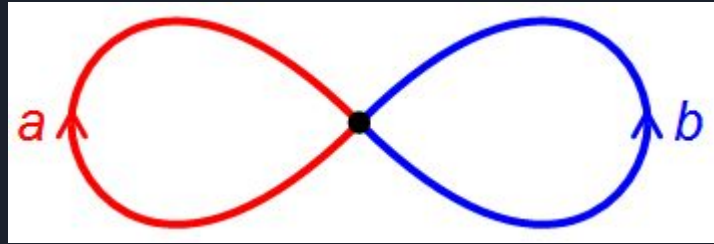
# Cayley Graphs



How do we visualise a fundamental group?



# How do we visualise a fundamental group? II

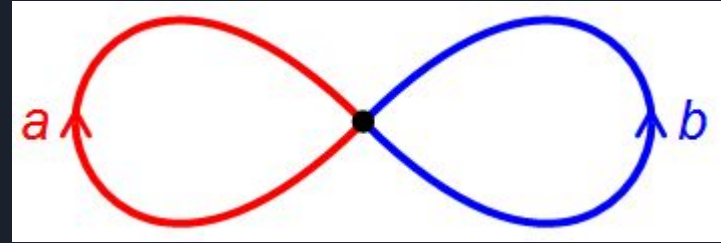
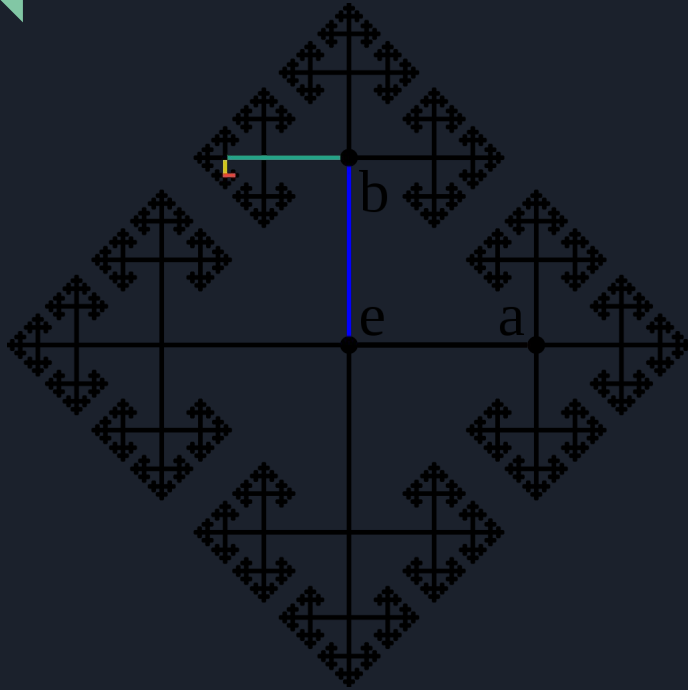


$$a^3 a^{-2} b = ab$$

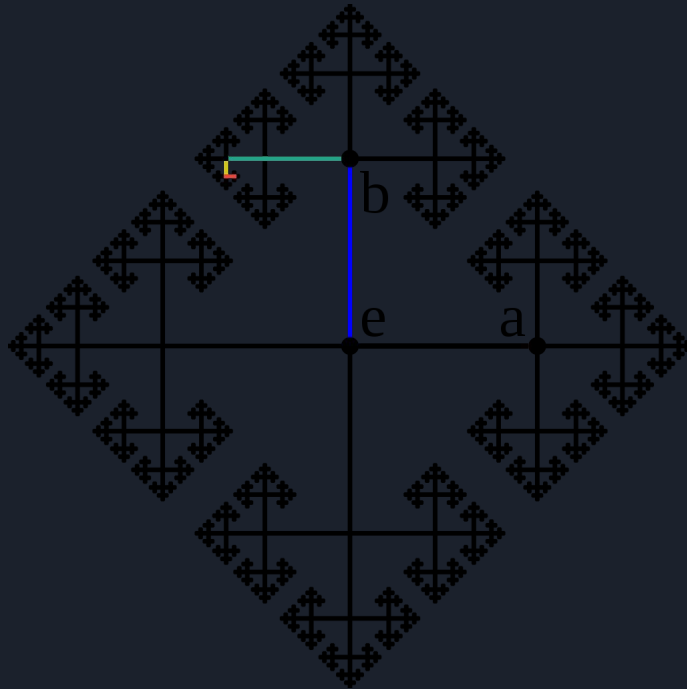
ababababab



# Cayley Graphs



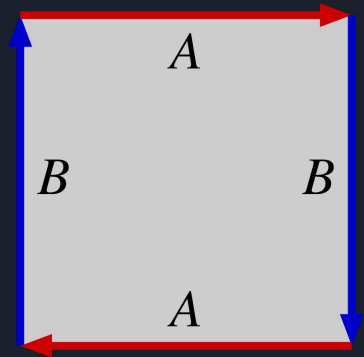
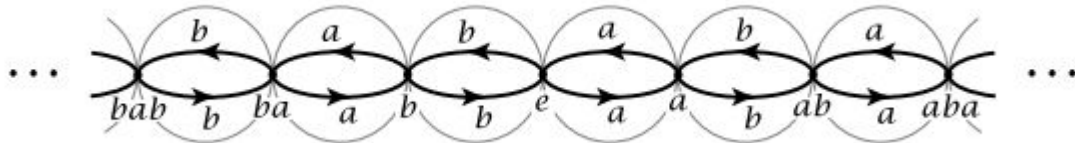
# Cayley Complexes



$$\langle a, b \mid aba^{-1}b^{-1} \rangle$$

# Cayley Complexes II

$$\langle a, b \mid a^2, b^2 \rangle$$



Conclusion

