UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

MODELLING OF THE RUBIK'S CUBE'S SOLUTION USING GROUP THEORY

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IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

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ABSTRACT

Group theory is one of the area in the abstract algaebra. The concept of group theory is complicated to understand and difficult to relate the real situation. The group theory have been applied into the famous toy in the century, the Rubik's cube. In this research, the group theory are explained in detailed. The researcher from mathematical computing have founded the lowest step to solve the Rubik's cube by using upper bound and lower bound.However, the solution of the Rubik's cube can be done by using the group theory. The application of the group theory in the movements of the Rubik's cube are discussed through the concept and properties of group theory in the properties of the Rubik's cube. As a result, the Rubik's cube are explained in simple way by using the group theory as the connection between them is clear and easy to understand.

1 INTRODUCTION

1.1 Research Background

According to Webster (2012), the Rubik's cube is a cube consisting of 6 sides with 9 individuals pieces on each. The cube consist of 26 unique miniature cubes which is known as "cubies" or "cubelets". The cubies include a concealed inward extension that interlocks with the other cubes, while permitting them to move different location. However, the centre of the cube is a single square. The Rubik's cube is originally known as "Hungarian Cube" and the was change to "Magic Cube" during 1975. In 1980, the Magic cube was change to "Rubik's Cube" by Tom Kremer.

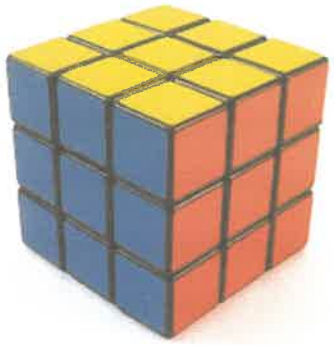

Figure 1.1: The Rubik's Cube

The rubik's cube is the name of its creator, Erno Rubik. Erno Rubik is a professor architecture in Budapest(Hungary) and he creates the rubik's cube during 1974. He took one month to solve the rubik's cube. He use the rubik's cube to teach his student about spatial relationships. His aim is to engage students in science, mathematics and problem solving at a young age.