

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**MATHEMATICAL MODELING FOR 180
DEGREE PAPER FOLDING: PYRAMID POP-UP
CARD**

P39S19

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ABSTRACT

Origami or the art of paper folding is very popular outside of Japan. Generally, origami is the art of folding paper into pieces of sculpture with an absent of an assistance of scissors or glue. Pop-up cards can be categorized into two types, which are the 90-degree and 180-degree pop-up cards. The 90-degree pop-up cards are one of the first pop-up design. Considering that, it is neither complicated to make nor construct. Furthermore, 180-degree pop-up uses many techniques in order to achieve the desired results. It requires multiple of papers and the structures. Although constructing the pop-up has two options, to achieve the desired results can be time consuming, frustrating and complicated. Knowing the fact that, pop-ups are based on trial and error method. Therefore, multiple of papers are needed to test out the folding process of an origami and the process will be repeated until the desired shape is achieved. The objectives of this study are developing the mathematical formulation in designing 180-degree pop-up card by using the paper folding technique and determining the properties of creases in 180-degree paper folding structures. In constructing the pop-up, a pyramid shaped has been chosen as the model. Thus, the paper folding techniques has been applied in constructing the pyramid pop-up. Also, the mathematical concepts have been constructed from the basic formula of binary divisions, Pythagoras Theorem, quadratic surds and trigonometric equations. Once the paper folding techniques and the mathematical concepts has been applied, the pyramid will be constructed with ease. As a result, the constructed pyramid is nicely and beautifully done.