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Measurement of Friction Coefficient between Glass and Rubik's Beam on the Sloping Field using Rubik Lubricant

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Abstract

This research is based on a rubik game involving the coefficient of friction. Rubik when difficult to rotate then the coefficient of friction is large. Rubik has several lubricants including Maru Lube, Ellips, and Kit Shampoo. This study aims to determine friction coefficient between the inclined plane of glass and rubik beams with lubricating. The beam is launched on an inclined plane and measured travel time. The results of the measurement of the coefficient of friction of the three lubricants namely Maru Lube lubricant has a coefficient of friction value of 0.4586, Ellips lubricant of 0.4375, and shampoo Kit lubricant of 0.4630. Based on these data it can be concluded that Ellips lubricant is the most slippery and more effective lubricant to use.

Keywords: coefficient of friction, rubik, sloping field

1. Introduction

The frictional force is part of the physics material discussed in Newton's Second Law. Frictional force is divided into two types, namely static friction and kinetic friction. Static friction is friction between two objects that do not move with each other, and is generated from a force just before the object moves (Iriyanto, 2011). While kinetic friction is the frictional force acting on a moving object in the opposite direction to the object to maintain the object at a constant speed (Tipler, 1998; Halliday, Resnick, and Walker, 2010). Friction is one of the symptoms that often appear in every mechanical interaction between two surfaces that touch (Priyono, 2014) (Engineering, Polytechnic, & Padang, 2008).

Friction force research has been carried out including research on friction in steel (Agus & Syafaat, 2012), friction due to Stick-Slip on Reciprocating Wear (Raja & Siregar, 2017), stip slip on viscosity material (Fuadi, 2016), relationship of friction coefficient and pipe

cleaning opportunities (Setyarini et al., 2016), and also research on the relationship of the area of the friction coefficient (Amirudin et al, 2018), and the charcoal composite friction coefficient (Puja, 2010). In the rubik game, there is a frictional force between the components so that rubik lubricant is needed to smooth it. Therefore in this research, we will review the coefficient of friction in the inclined plane which is given rubik lubricant. In previous studies, lubricants used were in the form of oil with variations in viscosity of SAE 20, 90 and 140 (Agus & Syafaat, 2012). Others vary the inclined plane material used with aluminum, glass and wood (Astro et al, 2017). While there are also those who conduct research on the friction force on wood with Matlab calculations (Winingsih, 2017). In this research variations of three lubricants will be carried out using a sloping plane. If previous studies used lubricants from SAE 20, 90 and 140 oils, this rubik (original and alternative) lubricant was used, namely Maru lube, KIT and Ellips. So that later you can choose the best lubricant among the three.

The purpose of this study was to determine the coefficient of friction rubik lubricant, so as to determine which lubricant is best for use.

2. Experimental Section

This research uses a sloping plane with a base length of 41 cm, height 23.5 cm, length of the inclined plane 47 cm, and an angle of 30^0 (Figure 1).

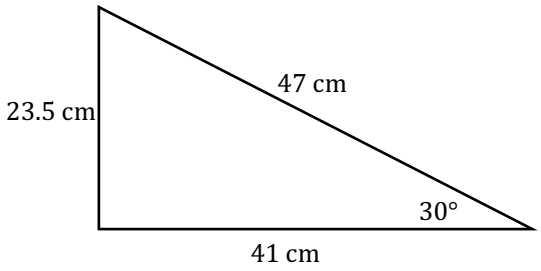

Figure 1. Sloping plane

Three samples of the lubricant used were lubricant A (maru Lube), lubricant B (Ellips) and lubricant C (KIT shampoo). The tool for measuring time is a stopwatch. Before conducting the experiment, the glass was lubricated with lubricants A, B, and C alternately. This measurement takes the time taken by the beam (made of plastic) from top to bottom of the sloping plane of the glass, and this experiment was repeated five times.

3. Result and Discussion

This study uses a method that is often used by many researchers about the friction force, which uses sloping plane media. The coefficient of friction values can be seen in Table 1. However, it is important to know the purpose of lubricating the friction plane to reduce the coefficient of friction. Calculation of the coefficient of friction without lubricating is not included in this study, because researchers only focus on the type of lubricant that most influences the coefficient of friction, so that the lubricant can be applied to rubic games that often experience friction between fields. From the calculations obtained, the Ellips lubricant produces the smallest coefficient of friction. While the Maru Lube lubricant which is a rubik original lubricant, has a greater friction coefficient value than Ellips.

Table 1. Result

	Travel time						Friction coefficient value
	t1	t2	t3	t4	t5	t average	
B	0.51	0.50	0.72	0.67	0.75	0.63	0.4375
A	0.69	0.68	0.70	0.68	0.67	0.684	0.4586
C	0.71	0.68	0.70	0.76	0.67	0.704	0.4630

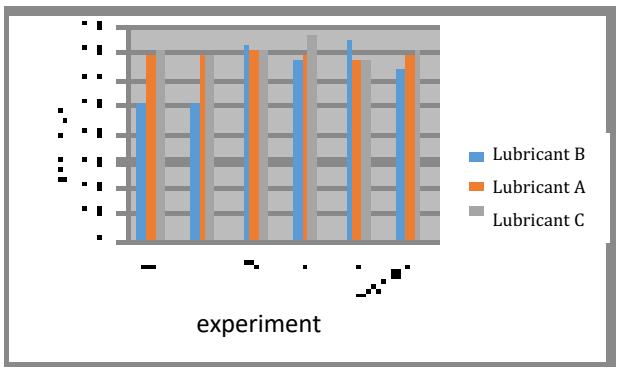

Figure 2. Traveling time

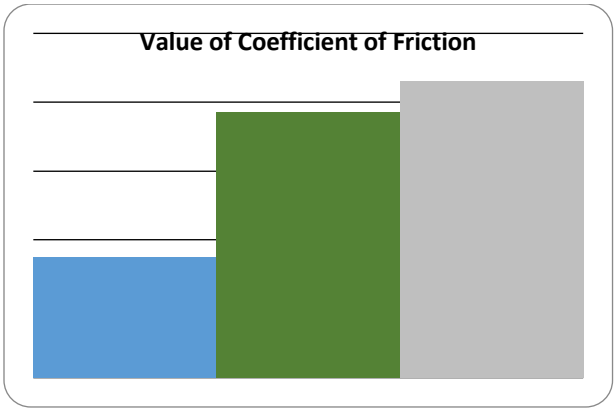

Figure 3. Value of Coefficient of Friction

4. Conclusion

The coefficient of friction value of lubricant A is 0.4586, lubricant B is 0.4375 and lubricant C is 0.463. The slippage of a lubricant from the most slippery to non-slippery are Ellips, Maru Lube and KIT.

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