

EGG DROP PROJECT

INTEGRATED LEARNING EXPERIENCE



Junaliza Ishak

Jessie Grace Goh Poh Ling Nur Maisarah Abdullah

Mohd Saiful Pahrudin

Junaliza Ishak, 1975-

EGG DROP PROJECT : INTEGRATED LEARNING EXPERIENCE / Junaliza Binti Ishak, Jessie Grace Goh Poh Ling Nur Maisarah Bt. Abdullah, Mohd Saiful Bin Pahrudin.

Mode of access: Internet

eISBN 978-967-2897-51-4

1. Experiential learning.
2. Active learning.
3. Government publications--Malaysia.
4. Electronic books.

I. Goh, Jessie Grace Poh Ling Nur Maisarah Abdullah, 1983-.

II. Mohd Saiful Pahrudin, 1981-. III. Title.

370.1523

Published by:

Politeknik Port Dickson

KM 14, Jalan Pantai 71050, Si Rusa

Port Dickson, Negeri Sembilan

August 2022

Copyright Each Part of this publication may not be reproduced or distributed in any forms by any means or retrieval system without prior written permission

EGG DROP PROJECT

Integrated Learning Experience

DR ISHAK BIN MOHAMAD
Director, Polytechnic Port Dickson

ABDUL RAHIM BIN IBRAHIM
Deputy Director (Academic),
Polytechnic Port Dickson

SALMIAH BINTI HUSAIN
Head of Mathematics, Science & Computer
Department,
Polytechnic Port Dickson

FADHLIANA BINTI MOHAMOD
Head of Mathematics Unit, Polytechnic Port Dickson

NOORAIN BINTI ITHNIN
Head of Science Unit, Polytechnic Port Dickson

ADVISOR
Fadhliana binti Mohamod
Noorain binti Ithnin

WRITERS
Junaliza binti Ishak
Jessie Grace Goh Poh Ling Nur Maisarah Abdullah
Mohd Saiful bin Pahrudin

EDITOR
Noorain binti Ithnin

GRAPHIC DESIGNER
Noorain binti Ithnin

Acknowledgement

First of all, we would like to express our gratitude to Allah the Almighty for granting us knowledge, strength, and time to continue our good deeds to complete this book. We also want to express our thanks to all who involved directly or indirectly in making this project successful.

Alhamdulillah, the book Egg Drop Project CDIO: INTEGRATED LEARNING EXPERIENCE is finally published. This book is developed as a manual and guideline for both lecturers and students who are involved in teaching and learning for integrated courses of DBM10013: ENGINEERING MATHEMATICS 1 and DBS10012: ENGINEERING SCIENCE in Mathematics, Science, and Computer Department of polytechnics.

This book contains guidelines that would help lecturers and students to understand upon conducting the Science Mini Project and Engineering Mathematics 1 Presentation for the whole semester in a structured way. It also provides notes of guidance, integrated course mapping, project briefing, and design needs in producing a creative and better product. The rubric included in this book can also be used as a marking scheme that should be given during the assessment process and develop a better understanding of the syllabus requirements.

As additional information, this drawbridge project is our first integrated learning project. Hence, there are some shortcomings in our efforts. Yet we will not give up and will continue to improve it in the future. May our efforts bring benefits to polytechnic students and lecturers and also be a continuous process towards achieving our vision to become an excellent academy center.

2

ACKNOWLEDGEMENT

3

FOREWORD

4

TABLE OF CONTENT

5

INTRODUCTION

7

INTEGRATED LEARNING EXPERIENCE

9

COURSE MAPPING

10

COURSE OUTLINE

17

NOTES OF GUIDANCE

30

RUBRICS

39

OUTCOME

49

REFERENCE

Table of Content

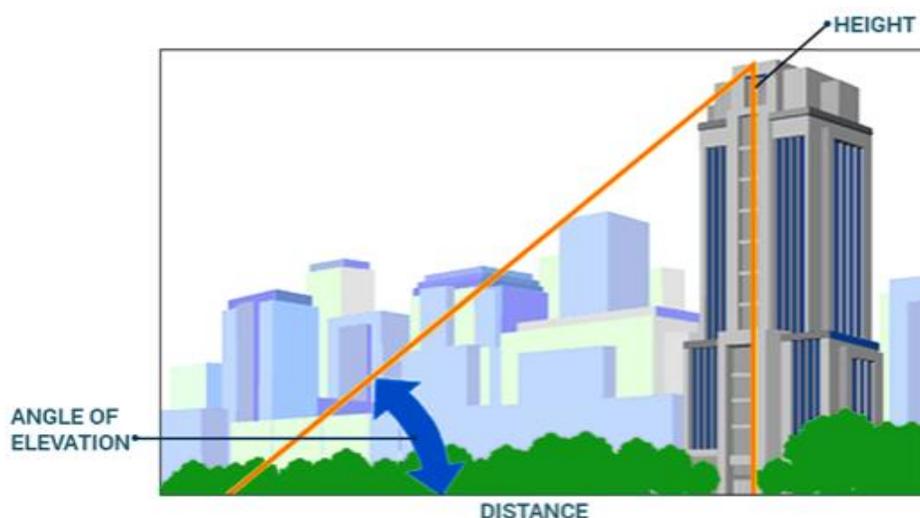
INTRODUCTION

Integrated learning as part of the consolidation of study programmes was one of the key performance indicators from *Jabatan Pengajian Politeknik*. Integrated learning is a method of education that combines the important links between concepts or abilities that are typically covered by a variety of subject areas. The goal is to link ideas and abilities while offering an experience that is relevant to particular courses or programmes.

The implementation of an Integrated Learning Experience (ILE) gives students from various backgrounds of courses or programmes the chance to strengthen their interpersonal, technical, and personal skills, respectively, in the process of creating a system, service, or product. Implementation will include integrated learning experiences, teaching and learning activities, and student assessment from numerous programmes or courses into one project.

Based on student assessments for the Mini Project in DBS10012: ENGINEERING SCIENCE and Presentation 1 for DBM10013: ENGINEERING MATHEMATICS 1, the Mathematics, Science, and Computer Department at Polytechnic Port Dickson designed an integrated learning project. The science mini project's topic involves work, energy, and power. Regarding presentation 1, the topic is trigonometry. An egg drop project has been chosen as the project to integrate the two assessments. The objective is for the students to create their own parachute, drop the egg from atop of a building using it, and then use their understanding of physics and mathematics to address a given challenge.

Students must use the trigonometry concept in this project by resolving trigonometric equations and identities. Complicated formulas are made simpler by using trigonometric identities. In simplifications like expansion, factorization, and discovering common factors, the algebraic concepts are also applied. The fundamental of trigonometric identities are right-angle triangle-related Pythagorean identities.



Students must also include into this project the ideas of work, energy, and power from engineering science. Energy is the capacity to perform work, whereas work is the movement of an object from one location to another when a force is applied. Power can be defined as the rate at which work is done and the amount of energy used. These are the fundamental concepts that students need to be aware of in order to proceed with the egg drop project and complete the task given.

INTEGRATED LEARNING EXPERIENCE

SEMESTER 1

MATHEMATICS, SCIENCE & COMPUTER DEPARTMENT

PROJECT DESCRIPTION

In Integrated Learning Experience, we integrate 2 courses in semester 1 which are DBM10013-Engineering Mathematics 1 and DBS10012-Engineering Science involving Engineering students. The project has integrated learning outcomes that infuse the CDIO skill sets of 21st-century skills.

SKILLS DEVELOPMENT

- Apply knowledge of Buoyancy to build a parachute. (Design Skill)
- Apply the concept of Trigonometry and Energy in data analysis. (Calculation Skill)
- Deliver an effective verbal, graphic (PowerPoint slides), and video presentation. (Communication Skill)

COURSES	TOPICS	ASSESSMENT
DBM10013 Engineering Mathematics 1	Topic 2 Trigonometry	Presentation 1 7.5 %
DBS10012 Engineering Science	Topic 4 Work, Energy & Power	Mini Project 25 %

INTEGRATED LEARNING EXPERIENCE

DESIGN OF INTEGRATED LEARNING EXPERIENCE PROJECT

PROJECT CLOS

At the end of the project, students will be able to:

1. Solve trigonometry equations and identities
2. Apply the concept of Energy

COURSES	RELATED CLOS	ASSESSMENT	IMPLEMENTATION WEEK
DBM10013 Engineering Mathematics 1	CLO 3 Use mathematical expression in describing real engineering problems precisely, concisely and logically	Presentation 1 7.5 %	Week 4 - 7
DBS10012 Engineering Science	CLO 2 Apply knowledge of fundamental physics in activities to mastery physics concept	Mini Project 25 %	Week 5 - 12

COURSE MAPPING

Week	DBS10012	DBM10013
W1 (27/9/2021 - 3/10/2021)	Session I: 2021/2022 First Week Lecture	
W2 (4/10/2021 - 10/10/2021)		
W3 (11/10/2021 - 17/10/2021)		
W4 (18/10/2021 - 24/10/2021)		DBM10013 lecturer brief to students on Integrated Learning for Presentation 1 & Mini Project.
W5 (25/10/2021 - 31/10/2021)	DBS10012 lecturer explained to the students the requirements of the Mini Project (refer to Appendix 3)	DBM10013 lecturer explained to students on the requirement of Presentation 1 (refer to Appendix 2)
1/11/2021-7/11/2021	MID TERM BREAK	
W6 (8/11/2021 - 14/11/2021)	DBS10012 lecturer monitor & guide on Mini Project. Students have to fulfill five (5) times discussion and meeting with lecturer.	DBM10013 lecturer monitor & guide on Presentation 1
W7 (15/11/2021-21/11/2021)		Final week for student to submit Presentation 1
W8 (22/11/2021 - 28/11/2021)		
W9 (29/11/2021 - 5/12/2021)		
W10 (6/12/2021 - 12/12/2021)		
W11 (13/12/2021 - 19/12/2021)		
W12 (20/12/2021 - 26/12/2021)	Final week for student to submit Mini Project	



COURSE OUTLINE

DBM10013- Engineering Mathematics 1
DBS10012- Engineering Science

**JABATAN MATEMATIK, SAINS DAN KOMPUTER /
DEPARTMENT OF MATHEMATICS, SCIENCE AND COMPUTER
RANGKA KURSUS/ COURSE OUTLINE
SESI 1-2021/2022 / 1-2021/2022 SESSION**

1.	NAME OF COURSE	ENGINEERING MATHEMATICS 1																
	COURSE CODE	DBM10013																
2.	SYNOPSIS	ENGINEERING MATHEMATICS 1 exposes students to the basic algebra including resolve partial fractions. This course also covers the concept of trigonometry and the method to solve trigonometry problems by using basic identities, compound angle and double angle formulae. Students will be introduced to the theory of complex number and concept of vector and scalar. Students will explore advanced matrices involving 3x3 matrix.																
3.	CREDIT VALUE	3																
4.	PREREQUISITE/ CO-REQUISITE (IF ANY)	None																
5.	COURSE LEARNING OUTCOMES (CLO): Upon completion of this course, students should be able to:																	
	CLO1	Use mathematical statement to describe relationship between various physical phenomena.(C3, CLS 1)																
	CLO2	Show mathematical solutions using the appropriate techniques in mathematics.(C3, CLS 3c)																
	CLO3	Use mathematical expression in describing real engineering problems precisely, concisely and logically. (A3, CLS 3b)																
	PROGRAMME LEARNING OUTCOMES (PLO):																	
PLO 001: Apply knowledge of applied mathematics, applied science, engineering fundamentals and engineering specialization as specified in DK1 to DK4 respectively to wide practical procedures and practices. PLO 005: Apply appropriate techniques, resources and modern engineering and IT tools to well-defined engineering problems, with an awareness of the limitations (DK6) PLO 010: Communicate effectively on well-defined engineering activities with the engineering community and with society at large, by being able to comprehend the work of others, document their own work, and give and receive clear instructions																		
6.	ASSESSMENT METHOD: The course assessment consist of:																	
	i. Continuous Assessment (CA) –60% ii. Final Examination (FE) – 40%																	
<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Assessment</th> <th>Quantity</th> <th>Percentage (%)</th> </tr> </thead> <tbody> <tr> <td>Quiz</td> <td>2</td> <td>10%</td> </tr> <tr> <td>Test</td> <td>1</td> <td>15%</td> </tr> <tr> <td>Presentation</td> <td>2</td> <td>15%</td> </tr> <tr> <td>End Of Chapter</td> <td>3</td> <td>20%</td> </tr> </tbody> </table>				Assessment	Quantity	Percentage (%)	Quiz	2	10%	Test	1	15%	Presentation	2	15%	End Of Chapter	3	20%
Assessment	Quantity	Percentage (%)																
Quiz	2	10%																
Test	1	15%																
Presentation	2	15%																
End Of Chapter	3	20%																

7. TEACHING SCHEDULE:				
Topic No.	Topic/ Content	Recommended Contact Hours	Assessment Method	Week
	Basic Algebra 1.1 Simplify basic algebra 1.2 Solve quadratic equations 1.3 Procedures to find partial fraction	6 hours Lecture 4 hours Tutorial	Quiz 1 End of Chapter 1	W2 W3
	Trigonometry 2.1 Solve the fundamental of trigonometry functions 2.2 Solve trigonometry equations dan identities 2.3 Apply sine and cosine rules	6 hours Lecture 5 hours Tutorial	Presentation 1 Test 1 (Q1)	W4 W11-12
	Complex Numbers 3.1 Explain the concept of a complex number 3.2 Demonstrate the operation of complex number 3.3 Demonstrate graphical representation of a complex number through Argand Diagram 3.4 Write complex number in other forms	5 hours Lecture 4 hours Tutorial	End of Chapter 2 Test 1 (Q2)	W8 W11-12
	Matrices 4.1 Construct Matrices 4.2 Demonstrate the operation of Matrices 4.3 Demonstrate simultaneous linear equations	4.5 hours Lecture 4.5 hours Tutorial	Quiz 2 End of Chapter 3	W10 W11
	Vector And Scalar 5.1 Express vector 5.2 Demonstrate the operation of vector 5.3 Apply scalar (dot) product of two vectors 5.4 Apply vector (cross) product of two vectors	5 hours Lecture 5.5 hours Tutorial	Presentation 2	W13

8.	<p>REFERENCES</p> <p>Main reference supporting the course Bird, J. (2017). <i>Higher Engineering Mathematics. (8th Edition)</i>. New York, NY: Routledge.</p> <p>Additional references supporting the course Croft A. and Davison R. (2019). <i>Mathematics for Engineers (5th Edition)</i>. London, UK: Pearson.</p> <p>Larson, R. and Edwards, B. (2018). <i>Calculus. (11th Edition)</i>. Boston, MA. Cengage Learning.</p> <p>P. M. Cohn (2017). <i>Algebraic Numbers and Algebraic Functions</i>. Taylor & Francis Ltd.</p> <p>Zuraini Ibrahim, Suria Masnin, Fatin Hamimah, Mohamed Salleh, Myzatul Mansor dan Baharudin Azit (2018). <i>Engineering Mathematics 2</i>. Shah Alam: Oxford Fajar Sdn. Bhd</p>
----	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Prepared by:



.....
(NORHALIDAH BINTI YUNUS)

Date :21 /9/2021

Verified by :



.....
(FADHLIANA BINTI MOHAMOD)

Date : 21/9/2021

**JABATAN MATEMATIK, SAINS DAN KOMPUTER /
DEPARTMENT OF MATHEMATICS, SCIENCE AND COMPUTER
RANGKA KURSUS/ COURSE OUTLINE
SESI 1:2021/2022 / SESSION 1:2021/2022**

1.	NAME OF COURSE	ENGINEERING SCIENCE												
	COURSE CODE	DBS10012												
2.	SYNOPSIS	ENGINEERING SCIENCE course introduces the physical concepts required in engineering disciplines. Students will learn the knowledge of fundamental physics in order to identify and solve engineering physics problems. Students will be able to perform experiments and activities to mastery physics concepts.												
3.	CREDIT VALUE	2												
4.	PREREQUISITE/ CO-REQUISITE (IF ANY)	None												
5.	COURSE LEARNING OUTCOMES (CLO): Upon completion of this course, students should be able to:													
	CLO1	Use basic physics concept to solve engineering physics problems. (C3, PLO1)												
	CLO2	Apply knowledge of fundamental physics in activities to mastery physics concept (C3, PLO1)												
	CLO3	Perform appropriate activities related to physics concept. (P3, PLO5)												
	PROGRAMME LEARNING OUTCOMES (PLO): PLO 1 : Apply knowledge of applied mathematics, applied science, engineering fundamentals and engineering specialization as specified in DK1 to DK4 respectively to wide practical procedures and practices.													
PLO 5 : Apply appropriate techniques, resource, and modern engineering and IT tools to well-defined engineering problems, with an awareness of the limitations (DK6).														
6.	ASSESSMENT METHOD: The course assessment consist of:													
	<ul style="list-style-type: none"> i. Continuous Assessment (CA) – 60% ii. Final Examination (FE) – 40% 													
<table border="1"> <thead> <tr> <th>Assessment</th> <th>Quantity</th> <th>Percentage (%)</th> </tr> </thead> <tbody> <tr> <td>Test</td> <td>1</td> <td>20%</td> </tr> <tr> <td>Lab Work</td> <td>3</td> <td>15%</td> </tr> <tr> <td>Mini Project</td> <td>1</td> <td>25%</td> </tr> </tbody> </table>			Assessment	Quantity	Percentage (%)	Test	1	20%	Lab Work	3	15%	Mini Project	1	25%
Assessment	Quantity	Percentage (%)												
Test	1	20%												
Lab Work	3	15%												
Mini Project	1	25%												

TEACHING SCHEDULE:					
Topic No.	Topic/Content	Recommended Contact Hours	Assessment Method	Week	
7.	1.0	PHYSICAL QUANTITIES AND MEASUREMENT 1.1 Define the physical quantities 1.2 Define measurement and errors in measurement 1.3 Solve problems of unit conversion 1.4 Interpret readings of measurement Tools	4 hours Lecture		W1 - W2
	2.0	LINEAR MOTION 2.1 Apply the concept of linear motion 2.2 Solve problems of linear motion from velocity-time graph 2.3 Carry out an experiment related to linear motion of an object	3 hours Lecture 1 hour Practical 1 hour Assessment	Lab Work 1	W2 - W3
	3.0	FORCE 3.1 Apply the concept of force 3.2 Apply the concept of moment of force	5 hours Lecture 1 hour Assessment	Test	W4 - W5
	4.0	WORK, ENERGY AND POWER 4.1 Apply the concept of work 4.2 Explain the renewable energy 4.3 Apply the concept of energy 4.4 Apply the concept of power 4.5 Carry out an activity related to work, energy and power.	5.5 hours Lecture 3.5 hours Practical 3 hours Assessment	Mini Project	W6 – W9
	5.0	SOLID AND FLUID 5.1 Apply the concept of solid and fluid 5.2 Apply the concept of Pascal's Principle 5.3 Apply the concept of Archimedes' Principle 5.4 Carry out an experiment related to buoyant force	6.5 hours Lecture 2.5 hours Practical 1 hour Assessment	Lab Work 2	W10 - W13
	6.0	TEMPERATURE AND HEAT 6.1 Define the concept of temperature and heat 6.2 Apply the concept of heat energy 6.3 Carry out an experiment related to thermal equilibrium	3 hours Lecture 1 hour Practical 1 hour Assessment	Lab Work 3	W13 - W14

8. REFERENCES	<p>Main reference supporting the course Azia Idayu Awang, Azhari Zakaria, Hardyta Bujang Pata, Khairani Yaakub, Noor Affande Abdul (2015). <i>Engineering Science, Polytechnic Series</i>. Shah Alam: Oxford Fajar Sdn. Bhd</p> <p>Additional references supporting the course Lee, B.H and Poh L.Y (2016). <i>Physics for Matriculation Semester 1 Fifth Edition</i>. Shah Alam: Oxford Fajar Sdn. Bhd</p>
---------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Prepared by:



MOHD SAIFUL BIN PAHRUDIN
Penyelaras Kursus DBS10012
Jabatan Matematik, Sains dan Komputer
Politeknik Port Dickson

(MOHD SAIFUL BIN PAHRUDIN)

Date :22/9/2021

Verified-by :



Noorain binti Ithnin
Ketua Kursus Sains
Jabatan Matematik, Sains & Komputer
Politeknik Port Dickson

(KJ/KPro/KK Name & Signature)

Date :22/9/2021



NOTES OF GUIDANCE

DBM10013- Engineering Mathematics 1
DBS10012- Engineering Science

DBM10013 – ENGINEERING MATHEMATICS 1
DBS10012 – ENGINEERING SCIENCE
SESSION: 1 - 2021/2022
CDIO - INTEGRATED LEARNING EXPERIENCE
PRESENTATION 1/MINI PROJECT

EGG DROP PROJECT

INTRODUCTION

The **Egg Drop Project** is a classic science class experiment. Essentially, students are asked to construct a parachute and some type of container that will keep a raw egg from cracking when dropped from ever-increasing elevations.

Students are challenged to build a structure that will prevent a raw egg from breaking when dropped from a significant height. Students should improvise their structure in whatever ways they can think of in order to prevent the egg from breaking when it hits the ground.

The experiment is not just for fun, although students do enjoy it. It is intended to teach students about the trigonometry involved and the relationships between work, energy and power.

Upon completion of this **Egg Drop Project**, the students will be able to:

- a) Build a parachute and a container that can prevent a raw egg from breaking when dropped from a certain height.
- b) Demonstrate curiosity and show inventiveness.
- c) Brainstorm in a team to generate ideas.
- d) Use problem-solving strategies in building simple structures.
- e) Work with interesting and engaging tools and materials.

This **Egg Drop Project** is to be carried out in order for the students to produce a project that can be measured by two assessments simultaneously. This project will be evaluated as follows:

DBM10013: Engineering Mathematic 1

Presentation 1

Topic: Trigonometry

7.5%

Use mathematical expression in describing real engineering problems precisely, concisely and logically.

(Affective)

DBS10012: Engineering Science

Mini Project

Topic: Work, energy, power

25%

Apply knowledge of fundamental physics in activities to mastery physics concept.

(Cognitive)

Learning Outcomes:

Upon completion of this Presentation, students will be able to:

- 1) use mathematical expression in describing real engineering problems precisely, concisely and logically (CLO3, A3).
- 2) enhance interpersonal & communications skills (CLS 3b)

Upon completion of this Mini Project, students will be able to:

- 1) apply knowledge of fundamental physics in activities to mastery physics concept (CLO2, C3)

Instructions:

Students need to design and build an **egg drop parachute** using **recycle materials**. Students then need to carry out an egg drop experiment. Please abide the following constraints and criteria:

Building and releasing the egg parachute is **an individual activity**.

For general information and what need to be done, please follow the instruction in **Appendix 1: General Instructions**.

For Presentation 1 DBM10013- Engineering Mathematics 1 information and what need to be done, please follow the instruction in **Appendix 2:**

Presentation 1 Instructions.

For Mini Project DBS10012-Engineering Science information and what need to be done, please follow the instruction in **Appendix 3: Mini Project Instructions**.

Present your findings based on **ALL** instructions in the respective Appendix.

Consult your class lecturer for details of your finding, data collection and report.

Evaluation is based on **DBM10013 ENGINEERING MATHEMATICS 1 Presentation Rubric** as shown in **Appendix 4** and **DBS10012 ENGINEERING SCIENCE Mini Project Evaluation Form** as shown in **Appendix 5**.

EGG DROP PROJECT

General Instructions: Please read **ALL the instruction** before you start your project.

1. What Student Need to Know First?
 - a) Student need to design and build an egg parachute **individually**.
 - b) The design and the size of the egg drop parachute is based on students' creativity and knowledge.
 - c) The parachute **must** be built by using **ONLY** recycle materials.
2. Things needed for the **Egg Drop Project**:
 - a) Recycle materials (to build the parachute and casing)
 - b) Measuring tape
 - c) Weight scale
 - d) Raw egg
3. When designing and building the egg drop parachute:
 - a) State and take pictures of **ALL** the recycle materials that are used to build the egg parachute.
 - b) Take pictures/record **ALL** the process involved while building the egg parachute.
 - c) Take a picture of the **final** egg parachute (finished product).
4. What Student Need to Do?
 - a) Construct a set of parachutes and its casing to place an egg.
 - b) Weight the case, together with the egg, and record the mass, m_1 .
 - c) Then conduct the egg drop project. While conducting the egg drop, please ensure that:
 - i. The parachute **must** be dropped from a height. The **minimum height** is at least 3 meters from the ground.
 - ii. Find your own location to run this project. Student are encouraged to stand in a tall building and at an open area/space.

- iii. Record the **time taken**, t_1 by the parachute when it reached the ground.
 - iv. Measure the **distance**, s_1 from the point of releasing the parachute to its landed ground.
 - v. Repeat the same step (no. i until no. iv) for trial 2 and 3.
 - vi. The process of releasing the parachute must be **recorded (video)**, regardless of whether the egg is broken or not. Get a person to help you to film the egg drop project.
 - vii. Please ensure safety first.
- d) Important: Please take note
- i. Make sure that the parachute is open upon release from the height given.
 - ii. The parachute must not fall as a free fall. (**Make sure** that the egg parachute is **gliding** and **NOT dropping**)
 - iii. If it fails, student needs to adjust the parachute until it is open before it hits the ground.
 - iv. If your egg is broken when the parachute hits the ground, student needs to record again the weight of the case, together with the egg, and record the new mass, m_2 .
- e) Therefore, each experiment will have an individual set of data.
- f) After **ALL** the experiments are completed, break the egg to prove that the egg is raw. Make sure you use a container to hold the contents of the egg when you break it. (take a picture or record the process).

5. Data collection

Students need to measure and record the followings:

Trial	mass, m		height, h		time, t		distance, d	
1 st trial	m_1		h_1		t_1		d_1	
2 nd trial	m_2		h_2		t_2		d_2	
3 rd trial	m_3		h_3		t_3		d_3	

Table 1: Raw Data

Indicator:

Mass of the raw egg and egg case, m

Height of the building, h

Time taken upon landed on the ground, t

Distance taken from the initial point to the final point of the egg drop, d

DBM10013- ENGINEERING MATHEMATICS 1

PRESENTATION 1

Instructions: Please read **ALL the instruction** before you start your Presentation 1 report.

Students need to write and submit a report in the form of **Slide PowerPoint** and **Video** by using the following constraints and criteria:

1. Form a group of up to 4 members.
2. Prepare 7-10 minutes of a **video presentation** to discuss:
 - i. all member findings and results of the **Egg Drop Project** and explain either each of the parachute work well or not and give the reasons
 - ii. then make a comparison to which parachute works better and give the reason.
 - iii. the advantages and disadvantages of the **Egg Drop Project**.
 - iv. how useful is the knowledge of trigonometry in this **Egg Drop Project**?
 - the importance to get higher value of angle (θ).
 - give an idea how to increase the value of the angle and drop point
 - v. which of the fundamental trigonometric concepts has been applied in your **Egg Drop Project**?
3. Write a report using **Microsoft PowerPoint** based on the following format. Your slide presentation must consist at **least six (6)** PowerPoint slide **NOT included** the Group members slide.
 - a) **Group members**
 - Title of your Presentation 1
 - Group Name/Number
 - Student's Full Name (Group member)
 - Matrix Number

b) Introduction

- write **background information** about the egg drop experiment.
- **field of studies related** to egg drop experiment.
- **aims/objectives** of your egg drop experiment.
- write each of the group member experience of designing and building it.

c) Demonstration

- attach each of the group member demonstration photos or videos throughout the **Egg Drop Project** experiment process taken place.

d) Data collection

- briefly explain how each of the group member collect the data.
- attach each of the group member collected data. (Table 1- Appendix 1)

e) Diagram and Calculation

- the trigonometry diagram and label the diagram accordingly.
- attach each of the group member calculation of the collected data. (Table 2)

Trial	height, h	distance, d	hypotenuse	angle, θ	area, A
1 st trial	$h_1 =$	$d_1 =$	$h_1 =$	$\theta_1 =$ $\theta_2 =$	$A_1 =$
2 nd trial	$h_2 =$	$d_2 =$	$h_2 =$	$\theta_1 =$ $\theta_2 =$	$A_2 =$
3 rd trial	$h_3 =$	$d_3 =$	$h_3 =$	$\theta_1 =$ $\theta_2 =$	$A_3 =$

Table 2: Calculation of the Data

Indicator:

Height of the building, h

Distance taken from the initial point to the final point of the egg drop, d

Calculation of the hypotenuse, **hypotenuse**

Calculation of **ALL** the angle, **angle, θ**

Calculation of the area generated by the movement of the parachute,
area, A

f) Discussion

- List down all member findings and results of the **Egg Drop Project** and explain either each of the parachute works well or not and give the reasons.
- Which parachute works better and give the reason.
- State/Give your suggestion to which types of recycle material used that works well and gives better result.

g) Conclusion and Impact

- The advantages and disadvantages of the **Egg Drop Project**.
- How useful is the knowledge of trigonometry in this **Egg Drop Project**?
- Which of the fundamental trigonometric concepts has been applied in your **Egg Drop Project**?

DBS10012- ENGINEERING SCIENCE

MINI PROJECT

Instructions: Please read **ALL the instruction** before you start your Mini Project report.

a) Students need to prepare **a Poster** in the **Slide PowerPoint**, which pertaining the egg drop project. Students also need to **video (record)** all the process of making the egg parachute and running the egg drop project. Below is the task descriptive:

1. **CLO2** : Apply knowledge of fundamental physics in activities to mastery physics concept.
2. **Weightage** : 25%
3. **Task** : Individual
4. **Discussion with lecturer** : Minimum 5 times
5. **Topic** : Work, Energy and Power (Chapter 4)
6. **Method of submission** : Project poster in slide presentation
7. **Method of evaluation** : Based on rubrics (refer Appendix 5)

b) Students need to prepare and present **a poster** referring to Appendix 6

- c) Data collection: Please refer *Table 1* in *Appendix 1*.
- d) Students are required to record (make a video) every process of preparing and making the egg parachute, and running the egg drop experiment. All the recorded process must be uploaded together with the poster slide presentation.
- e) Calculation: From the data collection (Table 1), students are required to find the value of **Potential Energy**, E_p and **Kinetic Energy**, E_k . The **data analysis** is as shown below.

ANALYSIS NEED TO BE DONE BY STUDENT

Find the value of Potential Energy , E_p ?	Find the value of Kinetic Energy , E_k ?
<p>Potential Energy,</p> <p>Data :</p> <p>Gravity, $g = 9.81 \text{ m/s}^2$</p> <p>Mass , $m = \text{mass (egg + case)}$</p> <p>Height, $h = \text{from measurement (in table)}$</p> <p>With all the data , calculate the Potential Energy</p>	<p>Kinetic Energy,</p> <p>Data :</p> <p>Gravity, $g = 9.81 \text{ m/s}^2$</p> <p>Mass , $m = \text{mass (egg + case)}$</p> <p>Time taken, $t = \text{from measurement}$</p> <p>Displacement = Hypotenuse from measurement (in table)</p> <p>1st : Find value of velocity, v by using equation of motion</p> <p>2nd : With the value of velocity, calculate the Kinetic Energy</p>

DBS0012 MINI PROJECT POWERPOINT TEMPLATE

SLIDE 1:
PROJECT DESCRIPTION – (Group)

- Describe the purpose of the project supporting physics concept (must be related to the theme)

SLIDE 2:
OBJECTIVE(s) – (Group)

- Based on the objectives prepared
- Measurables & achievable

SLIDE 3:
DIAGRAM – (Individual)

- Sketch the structure design and label each part completely
- Include the dimension of the design

*Different slide for each students:
 Student 1, Student 2, Student 3, Student 4

SLIDE 4:
MATERIAL AND COST – (Individual)

- List the material used in the project
- State the quantity and cost for each material
- Apply green technology

No.	Material	Quantity				Cost (RM)			
		S1	S2	S3	S4	S1	S2	S3	S4
Total Cost:									

* S1-Student 1, S2-Student 2, S3-Student 3, S4-Student 4

SLIDE 5:
RESULT AND DISCUSSION – (Individual)

- Finding based on objective and supported with data/evidence
 - Table of raw data (Refer: Appendix 1, Table 1:Raw Data)
 - Analysis of data (Refer: Appendix 3)
- State and discuss any problems occurred while conducted the project.

*Different slide for each students:
 Student 1, Student 2, Student 3, Student 4



RUBRIC

DBM10013- Engineering Mathematics 1
DBS10012- Engineering Science

RUBRIC PRESENTATION	
	JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI, KEMENTERIAN PENGAJIAN TINGGI
CODE & COURSES	DBM10013 ENGINEERING MATHEMATICS 1
ASSESSMENT	PRESENTATION (15%)
CLO	<i>Use mathematical expression in describing real engineering problems precisely, concisely and logically. (A3, CLS 3b)</i>

CRITERIA	Very Good	Good	Fair	Weak	WEIGHT AGE	STUDENT MARKS
	4 marks	3 marks	2 marks	1 mark		
APPLICATION OF IDEAS (GROUP)	Comply with all these points in presentation: 1) Clear explanation of real engineering problems with the correct mathematical terms. 2) Use correct calculation steps. 3) Use correct mathematics formula in solving	Comply any 3 of these points in presentation: 1) Clear explanation of real engineering problems with the correct mathematical terms. 2) Use correct calculation steps. 3) Use correct mathematics formula in solving	Comply any 2 of these points in presentation: 1) Clear explanation of real engineering problems with the correct mathematical terms. 2) Use correct calculation steps. 3) Use correct mathematics formula in	Comply any 1 of these points in presentation: 1) Clear explanation of real engineering problems with the correct mathematical terms. 2) Use correct calculation steps. 3) Use correct mathematics formula in	30%	$\frac{x}{4} \times 30\%$

CRITERIA	Very Good	Good	Fair	Weak	WEIGHT AGE	STUDENT MARKS
	4 marks	3 marks	2 marks	1 mark		
	mathematical problems. 4) Correct usage of diagram/graph.	mathematical problems. 4) Correct usage of diagram/graph.	solving mathematical problems. 4) Correct usage of diagram/graph.	solving mathematical problems. 4) Correct usage of diagram/graph.		
SOCIAL SKILLS (GROUP) <ul style="list-style-type: none"> Interaction Conversation 	Maintain positive interaction and conversation with audience all the time during presentation and Q&A session.	Positive interaction and conversation with audience are shown most of the time during presentation or Q&A session.	Interaction and conversation with audience sometimes shown during presentation and Q&A session.	Interaction and conversation cannot be maintained during presentation and Q&A session.	10%	$\frac{x}{4} \times 10\%$
TEAMWORK (GROUP) <ul style="list-style-type: none"> Work together 	Follows all these points: 1) Each member must contribute and present 2) Each member must work together during presentation 3) Presentation slide contents well organized 4) Each member must involve in Q&A session.	Follows any 3 of these points: 1) Each member must contribute and present 2) Each member must work together during presentation 3) Presentation slide contents well organized 4) Each member must involve in Q&A session.	Follows any 2 points in presentation: 1) Each member must contribute and present 2) Each member must work together during presentation 3) Presentation slide contents well organized 4) Each member must involve in Q&A session.	Follows any 1 point in presentation: 1) Each member must contribute and present 2) Each member must work together during presentation 3) Presentation slide contents well organized 4) Each member must involve in Q&A session.	20%	$\frac{x}{4} \times 20\%$

CRITERIA	Very Good	Good	Fair	Weak	WEIGHT AGE	STUDENT MARKS
	4 marks	3 marks	2 marks	1 mark		
CREATIVITY (GROUP)	Present effective presentation with most creativity elements.	Present effective presentation with some creativity elements.	Present effective presentation with less creativity elements.	Present a presentation.	20%	$\frac{x}{4} \times 20\%$
APPEARANCE (INDIVIDUAL) <ul style="list-style-type: none"> • Proper Attire • Greetings • Confidence • Clarity 	Demonstrate all the following criteria during presentation: 1) Formal attire. 2) Start with warm greetings. 3) Answer questions with confidence. 4) Deliver with clarity in English language.	Demonstrate 3 from the following criteria during presentation: 1) Formal attire. 2) Start with warm greetings. 3) Answer questions with confidence. 4) Deliver with clarity in English language.	Demonstrate 2 from the following criteria during presentation: 1) Formal attire. 2) Start with warm greetings. 3) Answer questions with confidence. 4) Deliver with clarity in English language.	Demonstrate only 1 from the following criteria during presentation: 1) Formal attire. 2) Start with warm greetings. 3) Answer questions with confidence. 4) Deliver with clarity in English language.	20%	$\frac{x}{4} \times 20\%$
TOTAL MARKS						/100



MALAYSIAN POLYTECHNIC
MATHEMATICS, SCIENCE AND COMPUTER DEPARTMENT

DBS10012 - ENGINEERING SCIENCE

MINI PROJECT

(To be filled up by Student)

No	Registration Number	Student's name
S1		
S2		
S3		
S4		
Title		
Class		
Lecturer's Name		

(To be filled up by Lecturer)

Criteria		S1	S2	S3	S4
A	Content (50%) $\left(\frac{\text{marks}}{20} \times 50\right)$				
B	Physic Concept (30%) $\left(\frac{\text{marks}}{4} \times 30\right)$				
C	End Product (20%) $\left(\frac{\text{marks}}{4} \times 20\right)$				
Total Marks		/100	/100	/100	/100
Date of Submission					
Lecturer's Comment					

RUBRIC OF MINI PROJECT	
	JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI, KEMENTERIAN PENGAJIAN TINGGI
CODE & COURSE	DBS10012 ENGINEERING SCIENCE
ASSESSMENT	MINI PROJECT

TASK DESCRIPTION

CLO	INSTRUMENT	WEIGHTAGE	DETAILS
<p>CLO 2 (C3):</p> <p>Apply knowledge of fundamental physics in activities to mastery physics concept</p>	RUBRIC	25%	<ul style="list-style-type: none"> • Conduct in a group consist of three (3) to four (4) students. • Minimum 5 times discussion with lecturer • The evaluation mainly focuses on the process, not only the end product of mini project. • Cover either topic 4 (Work, Energy and Power) or topic 5 (Solid and Fluid). • Recommended Method: Students need to prepare either one (1) of: <ul style="list-style-type: none"> - Project Poster - Recorded Video - Presentation - Project Report • Students are encouraged to apply green

			technology concept and cost-effective product.
--	--	--	------------------------------------------------

RUBRIC MINI PROJECT (25%)

CRITERIA	Excellent [4]	Good [3]	Satisfactory [2]	Unsatisfactory [1]	Student Marks			
A. CONTENT (50%)					S1	S2	S3	S4
Project Description	Demonstrate clear and correct information with supporting physics concept.	Demonstrate clear and correct information.	Demonstrate clear information.	Demonstrate unclear information.				
Objective	Show measurable and achievable objective with appropriate method.	Show measurable and achievable objective.	Show objective generally.	Show unclear/inappropriate objective.				
Diagram	Show clear diagram with correct label and complete information.	Show clear diagram with correct label information.	Show diagram generally.	Show unclear/inappropriate diagram.				
Material and Cost	Apply suitable materials according to green technology concept and cost effective (less than RM20).	Apply suitable materials and cost effective (less than RM20).	Apply any materials and cost effective (less than RM20). or Apply suitable materials according to green technology concept but not cost effective (more than RM20).	Apply any materials and not cost effective (more than RM20).				

CRITERIA	Excellent [4]	Good [3]	Satisfactory [2]	Unsatisfactory [1]	Student Marks			
Results and Discussion	Construct finding based on objective and supported with data/ evidence .	Construct finding based on objective .	Construct weak finding based on objective.	Construct finding which not match the objective.				
Total Marks (Content) – 20 marks								
B. PHYSIC CONCEPT (30%)					S1	S2	S3	S4
Apply physic concept	Apply related physic concepts correctly with supporting references/examples.	Apply related physic concepts correctly .	Apply related physic concepts incorrectly .	Not applying related physic concepts.				
C. END PRODUCT (20%)					S1	S2	S3	S4
- Functionality - Creativity	Display well function product. Student adapts own ideas to create own design .	Display well function product. Student adapts others' ideas to create own design .	Unable to function well. Student adapts others' ideas to create own design .	Unable to function well. Student fully adapts others' ideas .				



OUTCOME

Student's Sample

Slide 1

PROJECT DESCRIPTION:

- The science behind solving the falling egg problem is found in Sir Isaac Newton's laws of motion. Egg drop projects help students explore basic concepts such as gravity, force and acceleration.
- In this egg drop project also contain about mathematics, such as we measure from a point of elevation, we also applied trigonometry and Pythagorean theorem into the experiment.

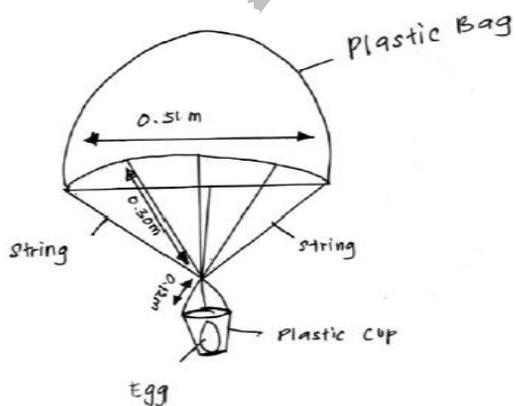
Slide 2

OBJECTIVES:

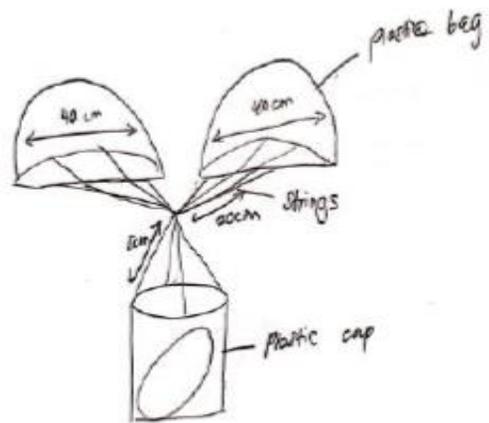
- To design a most suitable parachute that has less impact on the egg.
- To find a way to successfully land an egg from a height of 3 meters and above without cracking or breaking using only recycled materials.
- To calculate angle and distance by using trigonometry identity.
- To calculate the potential energy and kinetic energy.

Slide 3

DIAGRAM:



FAKHRUL



MIKAIL

Slide 4

MATERIAL & COST:

MATERIAL	FAKHRUL	MIKAIL
String	RM 2.00	RM 2.00
Eggs	RM 1.50	RM 1.50
Plastic Cup	RM 0.60	-
Paper Cup		RM 0.30
Plastic Bag	RM 0.20	RM 0.20
TOTAL COST	RM 4.30	RM 4.00

Slide 5

RESULT & DISCUSSION:

- The data of the experiment were gathered by the members using various apparatus. The data collected are; height and distance measured using measuring tape, time using stopwatch and mass using a scale.
- Hypothesis: The longer it takes for the parachute to reach the ground, the lesser are the chances of the egg breaking.

FAKHRUL

Data Tabulation	Trial 1	Trial 2	Trial 3
Mass, m	0.06 kg	0.06 kg	0.06 kg
Height, h	4.30 m	4.30 m	4.30 m
Time, t	2.39 s	2.45 s	2.40 s
Distance, d	0.95 m	1.52 m	1.10 m

Hypotenuse, s	4.40 m	4.56 m	4.44 m
Area	2.04 m ²	3.27 m ²	2.37 m ²
Angle	$\theta_1 = 77.5^\circ$ $\theta_2 = 12.5^\circ$	$\theta_1 = 70.5^\circ$ $\theta_2 = 19.5^\circ$	$\theta_2 = 75.65^\circ$ $\theta_2 = 14.35^\circ$

CALCULATION- DBM10013 (MATHEMATICS ENGINEERING 1)

Trial	Hypotenuse, s	Area	Angle
1	$a^2 + b^2 = c^2$ $c^2 = 4.30^2 + 0.95^2$ $= 19.4$ $c = \sqrt{19.4} = 4.4 \text{ m}$	$\frac{1}{2} \times 4.30 \times 0.95$ $= 2.04 \text{ m}^2$	$\theta_1 = \tan^{-1} \left(\frac{4.30}{0.95} \right)$ $= 77.5^\circ$ θ_2 $= 180^\circ - 90^\circ - 77.5^\circ$ $= 12.5^\circ$
2	$c^2 = 4.30^2 + 1.52^2$ $= 20.8$ $c = \sqrt{20.8} = 4.56 \text{ m}$	$\frac{1}{2} \times 4.30 \times 1.52$ $= 3.27 \text{ m}^2$	$\theta_1 = \tan^{-1} \left(\frac{4.30}{1.52} \right)$ $= 70.5^\circ$ θ_2 $= 180^\circ - 90^\circ - 70.5^\circ$ $= 19.5^\circ$
3	$c^2 = 4.30^2 + 1.10^2$ $= 19.7$ $c = \sqrt{19.7} = 4.44 \text{ m}$	$\frac{1}{2} \times 4.30 \times 1.10$ $= 2.37 \text{ m}^2$	$\theta_1 = \tan^{-1} \left(\frac{4.30}{1.10} \right)$ $= 75.65^\circ$ θ_2 $= 180^\circ - 90^\circ - 75.65^\circ$ $= 14.35^\circ$

CALCULATION- DBS10012 (ENGINEERING SCIENCE)

Quantity	Trial 1	Trial 2	Trial 3
Potential Energy, E_p $E_p = mgh$	$E_p = 0.06 \times 9.81 \times 4.30 = 2.53 \text{ J}$		
Velocity, v $s = \frac{1}{2}(u + v)t$	4.40 $= \frac{1}{2}(0 + v) 2.39$ $4.40 = 1.195v$ $v = \frac{4.40}{1.195}$ $v = 3.68 \text{ m/s}$	4.56 $= \frac{1}{2}(0 + v)2.45$ $4.56 = 1.225v$ $v = \frac{4.56}{1.225}$ $v = 3.72 \text{ m/s}$	4.44 $= \frac{1}{2}(0 + v)2.40$ $4.44 = 1.2v$ $v = \frac{4.44}{1.2}$ $v = 3.70 \text{ m/s}$
Kinetic Energy, E_k $E_k = \frac{1}{2}mv^2$	$= \frac{1}{2}(0.06)(3.68)^2$ $= 0.406 \text{ J}$	$= \frac{1}{2}(0.06)(3.72)^2$ $= 0.415 \text{ J}$	$= \frac{1}{2}(0.06)(3.70)^2$ $= 0.411 \text{ J}$

DISCUSSION:

- The egg drop project is successful and not crack and scratch the egg even a bit.
- The design play an important role for this project and it glide smoothly and land slowly.

Slide 5

RESULT & DISCUSSION:

MIKAIL

Data Tabulation	Trial 1	Trial 2	Trial 3
Mass, m	0.059 kg	0.059 kg	0.059 kg
Height, h	7.5 m	7.5 m	7.5 m
Time, t	3.7 s	3.5 s	4 s
Distance, d	0.5 m	0.48 m	0.56 m

Hypotenuse, s	7.51m	7.51m	7.52m
Area	1.875 m ²	1.8 m ²	2.1 m ²
Angle	$\theta_1 = 86.1^\circ$ $\theta_2 = 3.9^\circ$	$\theta_1 = 86.3^\circ$ $\theta_2 = 3.7^\circ$	$\theta_2 = 85.7^\circ$ $\theta_2 = 4.3^\circ$

CALCULATION- DBM10013 (MATHEMATICS ENGINEERING 1)

Trial	Hypotenuse, s	Area	Angle
1	$c^2 = 7.50^2 + 0.50^2$ $= 56.5$ $c = \sqrt{56.5} = 7.51 \text{ m}$	$\frac{1}{2} \times 7.50 \times 0.50$ $= 1.875 \text{ m}^2$	$\theta_1 = \tan^{-1} \left(\frac{7.5}{0.5} \right)$ $= 86.1^\circ$ θ_2 $= 180^\circ - 90^\circ - 86.1^\circ$ $= 3.9^\circ$
2	$c^2 = 7.50^2 + 0.48^2$ $= 56.4$ $c = \sqrt{56.4} = 7.51 \text{ m}$	$\frac{1}{2} \times 7.50 \times 0.48$ $= 1.8 \text{ m}^2$	$\theta_1 = \tan^{-1} \left(\frac{7.5}{0.48} \right)$ $= 86.3^\circ$ θ_2 $= 180^\circ - 90^\circ - 86.3^\circ$ $= 3.7^\circ$
3	$c^2 = 7.50^2 + 0.56^2$ $= 56.5$ $c = \sqrt{56.5} = 7.52 \text{ m}$	$\frac{1}{2} \times 7.50 \times 0.56$ $= 2.1 \text{ m}^2$	$\theta_1 = \tan^{-1} \left(\frac{7.5}{0.56} \right)$ $= 85.7^\circ$ θ_2 $= 180^\circ - 90^\circ - 85.7^\circ$ $= 4.3^\circ$

CALCULATION- DBS10012 (ENGINEERING SCIENCE)

Quantity	Trial 1	Trial 2	Trial 3
Potential Energy, E_p $E_p = mgh$	$E_p = 0.059 \times 9.81 \times 7.5 = 4.34 J$		
Velocity, v $s = \frac{1}{2}(u + v)t$	7.51 $= \frac{1}{2}(0 + v)3.7$ $7.51 = 1.85v$ $v = \frac{7.51}{1.85}$ $v = 4.06 m/s$	7.51 $= \frac{1}{2}(0 + v)3.5$ $7.51 = 1.75v$ $v = \frac{7.51}{1.75}$ $v = 4.29 m/s$	7.52 $= \frac{1}{2}(0 + v)4$ $7.52 = 2v$ $v = \frac{7.52}{2}$ $v = 3.76 m/s$
Kinetic Energy, E_k $E_k = \frac{1}{2}mv^2$	$= \frac{1}{2}(0.059)(4.06)^2$ $= 0.486 J$	$= \frac{1}{2}(0.059)(4.29)^2$ $= 0.543 J$	$= \frac{1}{2}(0.059)(3.69)^2$ $= 0.402 J$

DISCUSSION:

- All of the parachute launched was not successful and all of the egg cracked.
- When the parachute was deployed, the it was not gliding and fall straight to the ground but with the medium force and lead to the cracking of the eggs

END PRODUCT & EGG DROP PARACHUTE LAUNCHING

FAKHRUL



End product of parachute



Parachute launching



Verification of raw egg used

MIKAIL



End product of parachute



Parachute launching



Verification of raw egg used

REFERENCE

Azizul Izham Abdul Rahim, Fara Nur Asma Mohd Basri, Nur Maisarah Abdullah, Shamsul Mazalan, Siti Morni Ab Rahman, & Zamzarina Daud @ Bukhari. (2018). *Engineering Science for Polytechnics*. PORT DICKSON, Malaysia: Mathematics, Science & Computer Department, Polytechnic Port Dickson.

Aznul Rafizul Ramli, Norhalidah Yunus, Noor Azizah Ibrahim, Ruhana Mat Kia, Lee, K. T., & Jamaliah Ahmad. (2017). *Engineering Mathematics 1 for Polytechnics* (2nd Edition). Port Dickson, Malaysia: Mathematics, Science & Computer Department, Polytechnic Port Dickson.

Champ, S. (2017, December 31). *Egg dropped with parachute, without cracking* [Video file]. Retrieved from https://www.youtube.com/watch?v=lcTopO6_P6c&feature=youtu.be

Education.com. (2014, April 4). Egg Parachute. Retrieved from <https://www.education.com/science-fair/article/egg-parachute/>

Masrulanita Mohamed, Nur Haslinda Mohd Sailan, Nurul Zaitul Aizan Mohamad Jahis, Shahima Mohd Nadzri, Nabihan Mohd Hamid, Mohd Anwar Mohd Yasin, . . . Noor Afziha Ngarisan. (2020). *Garis Panduan Amalan Baik: Pembinaan Rubrik*. Putrajaya, Malaysia: Jabatan Pendidikan Politeknik Dan Kolej Komuniti, Kementerian Pengajian Tinggi.

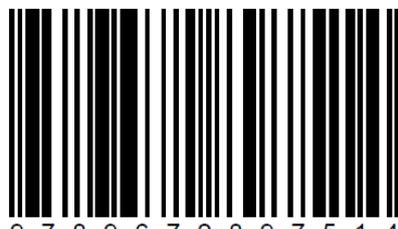
P. (2014, March 26). *How to make a parachute for Egg Drop Competition* [Video file]. Retrieved from https://www.youtube.com/watch?v=VO_GCtpk0YE&feature=youtu.be

T. (2021, March 15). *Parachute Egg Drop Experiment- Physics Project | THEA* [Video file]. Retrieved from <https://www.youtube.com/watch?v=npngRjBwdYQ&feature=youtu.be>

The Armidale School. (2021, August 17). Egg Drop Challenge. Retrieved from <https://www.as.edu.au/national-science-week/egg-drop/>



e ISBN 978-967-2897-51-4



9 7 8 9 6 7 2 8 9 7 5 1 4