الجامعة الوطنية
National University
Science & Technology للعلوم والتكنولوجيا
كلية عمان البحرية الدولية
International Maritime College Oman

ACADEMIC YEAR 2023 - 2024

Program	Semester	Term	Paper
FOUNDATION	1	1	MIDTERM

MODULE NAME:	**PURE MATHEMATICS**		
MODULE CODE:	**FMTH005**	**EXAM DATE:**	**22/10/2023**
INSTRUCTOR's NAME:	**Muhammad Kazam**	**DURATION:**	**90 mins.**

Questions to be answered on:	**Allowed tools:**	**Number of pages**
✓ Space provided on the question paper	Pen, Pencil & Calculator	(Incl. cover page)**:** **07**

Points of attention:

- For each question, the maximum earned points are mentioned between brackets at the end of each question.
- Write very clearly! Answers that are not readable are not marked and don't get points!
- Make sure your answers are written to the point.
- All answers must be written **in English**.
- Write all the answers **in blue or black pen only**.
- When finished, submit the question paper, together with the answer scripts and the signed cover page to the invigilator.
- Cheating / copying is not allowed and will result in failing the exam.

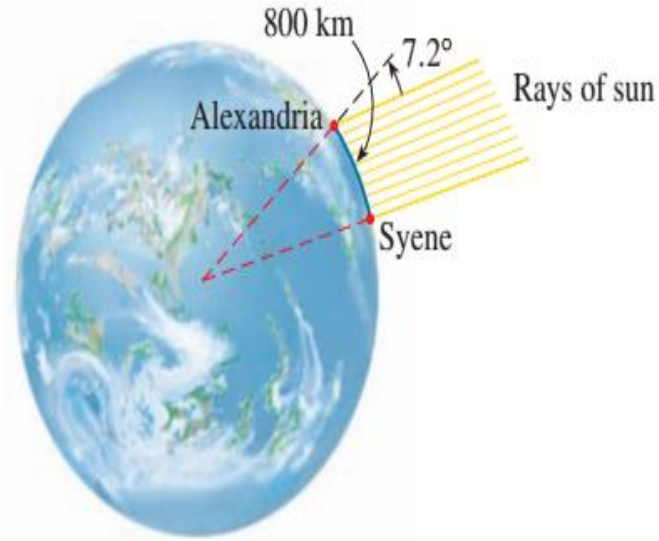
		FINAL MARKS
STUDENT NAME:		
STUDENT ID:		**20**
CLASS:		

Number of answer scripts:……..…….. **Invigilator:**……..……..…..

Student's signature: …… **Time of receipt:**……..…..

Question 1 [3 Marks]

Eratosthenes measured the circumference of the earth from the following observations. He noticed that on a certain day the sun shone directly down a deep well in Syene. At the same time in Alexandria, 800 km north on the same meridian, the rays of the sun shone at an angle of 7.2° to the zenith. Find the radius of the earth.



(Stewart, Redlin and Watson, 2017)

Question 2 [5 Marks]

Solve the triangle with the measurements given below.

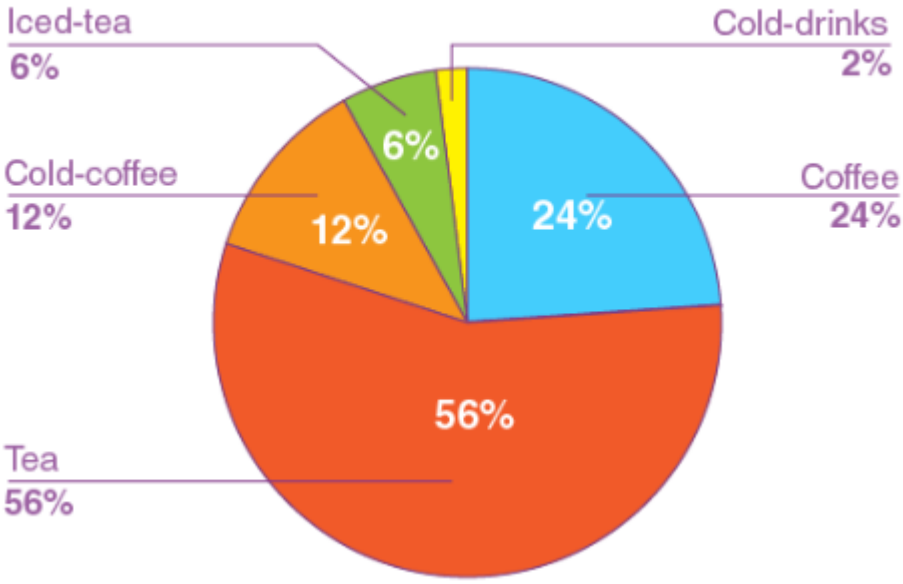
$\angle B = 29°, \quad \angle C = 51°, \quad b = 44$

Question 3 [4 Marks]

Prove that $\cot^2 x - \cos^2 x = \cos^2 x \ \cot^2 x$.

Question 4 [4 Marks]

In summer, a survey was conducted among 400 people about their favourite beverages. Look at the following pie chart which shows the data and do the tasks given below.



(Pierce and Rod, 2018)

a. Calculate the number of people who like tea. **(2 marks)**

b. Calculate the total central angle for iced tea and cold-drinks. **(2 marks)**

Question 5 [4 Marks]

When two coins are tossed, do the tasks given below.

a. List all the elements of sample space. **(2 marks)**

c. Find the probability of getting at least 1 head. **(2 marks)**

Formula Sheet

Quadratic formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Law of Sines	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
Law of Cosines	$a^2 = b^2 + c^2 - 2bc\ cosA$ $b^2 = a^2 + c^2 - 2ac\ cosB$ $c^2 = a^2 + b^2 - 2ab\ cosC$

References:

Pierce and Rod (2018) 'Pie chart'. Available at: https://www.mathsisfun.com/geometry/circle.html.
Stewart, J., Redlin, L. and Watson, S. (2017) *Precalculus Mathematics for Calculus*. 7th edn. Cengage.