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

ACADEMIC YEAR 2023 - 2024

Program	Term	Semester	Paper
FOUNDATION	2	FALL	MAIN

MODULE NAME:	**PURE MATHEMATICS**		
MODULE CODE:	**FMTH005**	**EXAM DATE:**	**04/02/2024**
INSTRUCTOR's NAME:	**Muhammad Javed**	**DURATION:**	**2 hrs.**

Questions to be answered on:	**Allowed tools:**	**Number of pages**
✓ Space provided on the question paper	Pen, Pencil & Calculator	(Incl. cover page)**:** **9**

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 should be written **in English.**
- Write all the answers in **blue or black pen only.**
- Use the **pencil** only for **diagrams & graphs.**
- Show all the calculation steps in the given space.
- When finished submit the question paper, together with the answer scripts and the signed cover page to the invigilator.
- Any cheating/copying may result in an instant failing of the examination.

STUDENT NAME:

STUDENT ID:

FINAL MARKS

	40
	10

Number of answer scripts:……..…….

Invigilator:…….……..….

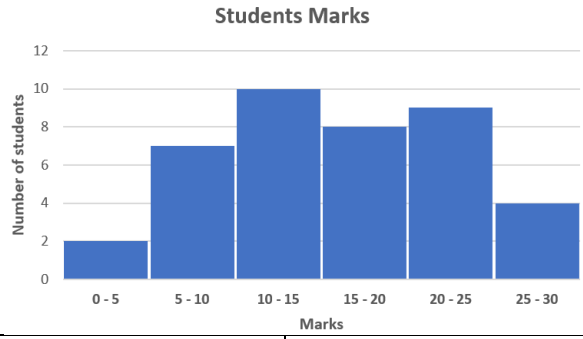
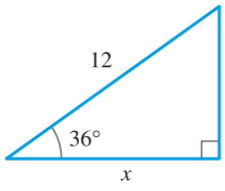
Student's signature: ……

Time of receipt:……..….

Note: Answer all questions

Question 1. **[10 Marks]**

Encircle the correct option.

1.	If $g(x) = \frac{1-x}{1+x}$, then find the value of $g(-1)$.			
	a. 1	b. -1	c. 0	d. Not defined
2.	Evaluate $\log_6 36$.			
	a. 6	b. 3	c. 2	d. 9
3.	Which of the following values does not represent probability of an event.			
	a. 0	b. 0.5	c. 1	d. 1.5
4.	Determine median of following data. 38 39 41 41 42 44 44			
	a. 41	b. 42	c. 44	d. Non of them
5.	The histogram of marks obtained by students in a mathematics quiz out of a total of 30 marks is given below. . How many students obtained 15 or less than 15? 			
	a. 10	b. 19	c. 20	d. 40
6.	If $f(x) = \frac{1}{2}x^2 + 2x - 6$ is the equation of parabola, determine its opening direction.			
	a. Up	b. Down	c. Left	d. Right
7.	What is the logarithmic form of 64?			
	a. $\log_4 64 = 2$	b. $\log_2 64 = 4$	c. $\log_8 64 = 2$	d. $\log_2 64 = 8$
8.	Convert 30^0 into radians.			
	a. $\frac{\pi}{3}$	b. $\frac{\pi}{4}$	c. $\frac{\pi}{5}$	d. $\frac{\pi}{6}$
9.	What is the value of $\boldsymbol{x}$ in the given figure? 			
	a. $x = 12\cos 36^0$	b. $x = \frac{1}{12}\cos 36^0$	c. $x = 12\tan 36^0$	d. $x = \frac{1}{12}\tan 36^0$
10.	$\sec\theta =$ _____			
	a. $\frac{1}{\sin\theta}$	b. $\frac{1}{\cos\theta}$	c. $\frac{1}{\csc\theta}$	d. $\csc\theta$

Question 2. **[5 Marks]**

Assume the following is the weekly grocery consumption cost set in OMR of 30 families in a town.

72	84	61	76	104	76	86	92	80	88
98	76	97	82	84	67	70	81	82	89
74	73	86	81	85	78	82	80	91	83

Construct a frequency distribution for the data set using 8 number of classes.

Question 3. **[5 Marks]**

Answer the following questions if two coins are tossed together.

a. Draw the tree diagram for the experiment. (1 mark)

b. List all the elements of sample space. (1 mark)

c. Determine the event and probability: (3 marks)

i. For getting at least one tail.

ii. For at most one tail and then find the probability.

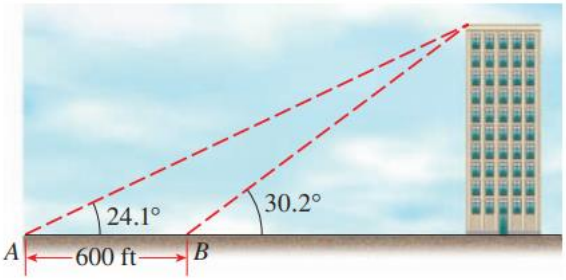
Question 4. **[5 Marks]**

A truck's wheels are 120 cm in diameter. How many kilometers will the truck travel if its wheels revolve 20,000 times without slipping?

Question 5. **[5 Marks]**

From a point A on the ground, the angle of elevation to the top of a tall building is 24.1^0. From a point B, which is 600 ft closer to the building, the angle of elevation is measured to be 30.2^0.

Find the height of the building.



Question 6. **[5 Marks]**

Verify the following identity.

$$(\cot x + \tan x)^2 = \sec^2 x + \csc^2 x$$

Question 7. **[5 Marks]**

A quadratic function ***f*** is given below

$$f(x) = -4x^2 - 12x + 1$$

Determine the intervals on which the function is increasing and on which the function is decreasing.

Laws and formulas

1. $\log_a xy = \log_a x + \log_a y$
2. $\log_a \frac{x}{y} = \log_a x - \log_a y$
3. $\log_a x^n = n\log_a x$
4. $\log_a b = \frac{\log_c b}{\log_c a}$
5. $\log_a b = \frac{1}{\log_b a}$
6. $\frac{1}{n-1}\left[\sum x^2 - \frac{(\sum x)^2}{n}\right]$
7. $\sqrt{\frac{1}{n-1}\left[\sum x^2 - \frac{(\sum x)^2}{n}\right]}$