

MINISTRY OF EDUCATION AND HIGHER EDUCATION

GRADE 12 EXAMS, 2024

# MATHEMATICS



P/LAND NATIONAL EXAMINATION BOARD





MINISTRY OF EDUCATION AND HIGHER EDUCATION SOM EXAMS  
PUNTLAND NATIONAL EXAMINATIONS BOARD

Name of Student			
Roll Number			
Name of School			
Region:		District:	

FORM FOUR EXAMINATION, 2024  
TIME: 2 HOURS PLUS 10 MINUTES FOR READING

# MATHEMATICS

**Instructions to candidates**

- Answer all the Questions
- This paper consists of 9 pages, count it and if any is missing inform your invigilator
- Write your name and roll number on the exam paper
- No extra paper is allowed.
- If you make a mistake, cross out the incorrect answer and write your correct answer.

This exam paper consists of following Parts

Parts	Marks
Part one: Multiple questions	10 marks
Part two: Structured questions	90 marks
<b>Total:</b>	<b>100 Marks</b>

For the markers only

PARTS	MARKS
Part one:	
Part two:	
<b>Total:</b>	<b>100 marks</b>



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**part one: multiple choice Questions (10 marks)**

circle the correct option in the below Questions

- 1) the common ratio of this geometric sequence. 3, 9, 27, ..... is
  - a) 2
  - b) 3
  - c) 4
  - d) 6
- 2) the point on which a figure rotates is known as:
  - a) center of rotation
  - b) clockwise rotation
  - c) angle of rotation
  - d) direction of rotation
- 3) a coin is tossed at ones. The probability of getting head or tail is
  - a) 0
  - b) 1
  - c)  $\frac{1}{2}$
  - d) 2
- 4)  ${}^7C_2$  is equal to
  - a) 42
  - b) 35
  - c) 22
  - d) 21
- 5) if  $y = x^3 + 3x^2$ , when  $x = 1$  the value of  $\frac{dy}{dx}$  is
  - a) 1
  - b) 3
  - c) 9
  - d) 6
- 6) the expression  $\sin 50^\circ \cos 30^\circ + \sin 30^\circ \cos 50^\circ$  is equivalent to
  - a)  $\sin 50^\circ$
  - b)  $\sin 30^\circ$
  - c)  $\cos 80^\circ$
  - d)  $\sin 80^\circ$
- 7)  $\frac{7!}{4!}$  is equal to
  - a) 210
  - b) 110
  - c) 840
  - d) 320



- 8) if  $\tan\theta = \frac{3}{4}$  then  $\sin\theta$  is equal to
- $\frac{3}{5}$
  - $\frac{5}{4}$
  - $\frac{4}{5}$
  - $\frac{5}{3}$
- 9) the mode of this set of data 2, 3, 4, 3, 5, 6, 5, 7, 5 is
- 3
  - 4
  - 5
  - 2
- 10)  $\frac{d}{dx}\left(\frac{1}{x^2}\right)$  is equal to
- $-2x^{-2}$
  - $-3x^{-2}$
  - $-2x^{-3}$
  - $-2x^{-1}$

**part two: structured Questions****(90 marks)****Question 1 (statistics)**

the table below shows the number of absentees recorded each day of a month in a school.

a) complete the table

**(4 marks)**

class	frequency ( $f$ )	midpoint ( $x$ )	$fx$
1 – 5	3	3	9
6 – 10	5	8	40
11 – 15	7		
16 – 20	6		
21 – 25	4		
	$\Sigma f = \dots\dots$		$\Sigma fx = \dots\dots$

b) which is the modal class

**(1 marks)**

.....

c) calculate the mean number of absentees

**(2 marks)**

b) the end of a term marks of a pupil in 4 subjects are shown below  
 57 55 62 52 , if his mean is 56

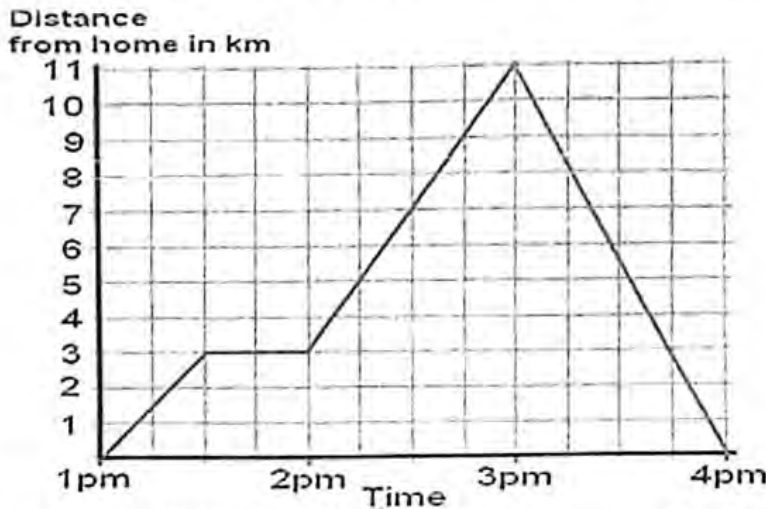
i) complete the table below (2 marks)

deviations (d)	1	-1		
absolute deviations  d	1	1		

ii) calculate the absolute mean deviation of his marks (2 marks)

**Question 2 (graphs in practical situation)**

Warsame cycles from home to the town. He has stopped for a tea. After tea, he cycles back to home. The travel graph below shows his journey.



a) at what time did he begin to cycle? (1 mark)

.....

b) how many minutes did he rest? (1 mark)

.....

c) how far was he from home at 3 pm? (1 mark)

.....

d) how long did it take him to get back home? (1 mark)

.....

e) find his speed as he travels back to home? (2 mark)

**Question 3 (trigonometry)**

a) change into radian

(2 marks)

$270^\circ$

b) find the irrational value of  $\sin 75^\circ$ 

(3 marks)

c) solve this trigonometric equation

(3 marks)

$\tan^2 \theta - 1 = 0 \text{ for } 0^\circ \leq \theta \leq 360^\circ$

**Question 4 (derivative)**a) find the derivative of  $y = \sqrt{x^5}$ 

(3 marks)

b) differentiate  $y = \frac{3}{x^2} - \frac{2}{x} - 7$ 

(4 marks)

c) if  $y = (x + 2)^5$ , find  $\frac{dy}{dx}$  (use chain rule).

(3 marks)

d) differentiate  $f(x) = e^{3x^2}$  (2 marks)

**Question 5 (application of differentiation)**

a) find the gradient of  $y = x^2 + 3$  at  $x = 2$  (2 marks)

b) find the equation of the tangent of  $y = x^2 + 3$  at  $(2, 7)$  (3 marks)

c) find the stationary points of the following curve  $y = 5 + 2x - x^2$  and determine their types (4 marks)

d) a stone is thrown vertically upwards such that its height  $s$  meters above the ground after  $t$  seconds is given by  $s = 40t - 10t^2$

find:

i) its height above the ground after 1sec (2 marks)

ii) its velocity after 1sec (3 marks)

iii) the vertical height it reached (3 marks)



**Question 6 ( integration)**

a) integrate  $\int \frac{4}{x^3} dx$

(3 marks)

b) find  $\int_1^3 (4x^3 - 6x + 2) dx$

(3 marks)

c) find the area between the curve  $y = x^2$  and the x-axis from  $x = 1$  to  $x = 2$   
( 3 marks)

**Question 7 (proBability)**

a) a six-sided die is rolled.

i) write the sample space

(2 marks)

$$S = \{ \dots \dots \dots \}$$

ii) what is the probability that an even number appears?

(2 marks)

b) in how many ways can you choose 5 out of 10 friends to invite to a dinner party?  
(3 marks)



- c) how many different arrangements can be made from the letters of the word BERBERA? (3 marks)

- d) use binomial theorem to expand  $(x + y)^6$  (4 marks)

### Question 8 (complex numbers)

- a) express  $\sqrt{-\frac{16}{9}}$  in terms of  $i$  (2 marks)

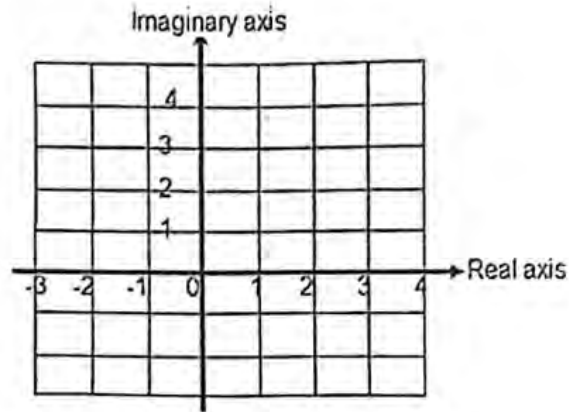
- b) find the product of  $(2 - 3i)(3 + 2i)$  (3marks)



c) represent the following complex numbers on the argand diagram below  
(4 marks)

i)  $Z_1 = 3 + 2i$

ii)  $Z_2 = -3 + 4i$



d) find the argument and modulus of the following complex number  
 $Z = -3 - 3i$  (4 marks)

End



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