MATHEMATICS

Date: 21/ 06/2022
Period: 8:30-11:30

END OF TERM III EXAMINATIONS

GRADE	**SENIOR TWO**
OPTION	**ORDINARY LEVEL**
DURATION:	**3HOURS**
MARKS:	**100**

INSTRUCTIONS

1)This paper consists of **one** section

Section A: Attempt **all** questions. **(100marks)**

2)You may use mathematical instruments and a calculator **where necessary.**

3)Use a **blue or black ink pen only** to write your answers and a **pencil** to draw diagrams.

4)Show clearly all the working steps. **Marks will not be awarded for the answer without all working steps.**

Section A: Answer all questions (100marks)

1)Simplify $\dfrac{15\sqrt{2}\times\sqrt{32}}{\sqrt{50}\times\sqrt{18}}$ (3marks)

2) Given that f(x) and g(x) two polynomials

$f(x) = 5x^4 + 3x^2 + 6x - 79$ and $g(x) = 2x^3 - 4x^2 + 5x - 9$

a) Find $f(-2)$ (2marks)

b) Evaluate $f(x)+g(x)$ (2marks)

3) Given that $a(x + 3)^2 + b(x - 2) + 1 \equiv 3x^2 + 20x + 24$, find the values of a and b. (5marks)

4) Solve the equation

$$\frac{2x}{5}+\frac{3}{4}+5=\frac{1}{20}-\frac{3x}{2}$$ (3marks)

5) The sum of two numbers is 15.Their differences is 1.Find these numbers

(3marks)

6) What is the multiplier for 15% increase?

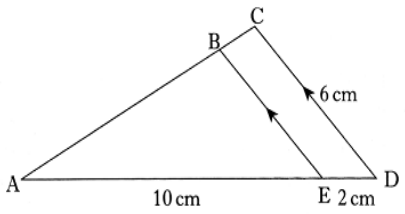
(2marks)

7)A painter places an 11m ladder against a house. The base of the ladder is 3m from the house. How high on the house does the ladder reach?

(3marks)

8) In the diagram shown below the lines BE and CD are parallel.

(3marks)



Calculate the length of BE

9) Given vectors $\vec{v} = \binom{-2}{5}$ and $\vec{w} = \binom{3}{4}$, calculate the vectors.

$2\vec{v} - 3\vec{w}$ (3marks)

10)State properties of parallel projection. (2marks)

11) Define an Isometry (2marks)

12) Enumerate the properties of central symmetry (2marks)

13) Define the following statistical terms

a.Mode (1mark)

b) Range (1mark)

14) Fifty students were asked how many books they each took from the school library. The results are summarized in the table below.

x	0	1	2	3	4	5	6	7
f	10	11	8	3	6	7	4	1

a)Construct the frequence table of the data (3marks)

b) Write down the mode (1mark)

c)Calculate the mean (3marks)

15) Consider a class of 40 students where 20 students don't like potatoes. Find the probability that a student selected at random likes potatoes. (4marks)

END

CASS MATH SENIOR TWO , 2022 MARKING SCHEME

ANSWER 1

$\frac{15\sqrt{2}\times\sqrt{32}}{\sqrt{50}\times\sqrt{18}} = \frac{15\sqrt{2}\times4\sqrt{2}}{5\sqrt{2}\times3\sqrt{2}}$ 1mark

$= \frac{15\times4\times\sqrt{2}\times\sqrt{2}}{5\times3\times\sqrt{2}\times\sqrt{2}}$ 1mark

$= \frac{60\times2}{15\times2} = \frac{60}{15} = 4$ 1mark

answer 2

$a) f(-2) = 5(-2)^4 + 3(-2)^2 + 6(-2) - 79$ 0.5mark

$= 5 \times 16 + 3 \times 4 - 12 - 79$ 0.5mark

$= 80 + 12 - 12 - 79$ 0.5mark

$= 80 - 79 = 1$ 0.5mark

b) Calculate

$f(x) + g(x) = (5x^4 + 3x^2 + 6x - 79) + (2x^3 - 4x^2 + 5x - 9)$ 0.5mark

$= 5x^4 + 3x^2 - 4x^2 + 6x + 5x - 79 - 9 + 2x^3$ 0.5mark

$= 5x^4 - x^2 + 11x - 88 + 2x^3$ 0.5mark

$= 5x^4 + 2x^3 - x^2 + 11x - 88$ 0.5mark

Answer 3

Since the identity is true for all values of x, we substitute sample values like (i) x = –3 and (ii) x = 2, one at a time. When x = –3,

$a(x + 3)2 + b(x - 2) + 1 = 3x^2 + 20x + 24$ 0.5mark

Becomes

$a(-3 + 3)^2 + b(-3 - 2) + 1 = 3(-3)^2 + 20(-3) + 24$ 0.5mark

– 5b + 1 = + 27 – 60 + 24
– 5b + 1 = 51 – 60

0.5mar

k

–5b = –9 – 1
-5b = –10

0.5mar

k

b=$\frac{-10}{-5}$

0.5mar

k

=2
∴ b = 2

0.5mar

k

when x = 2,
a(2 + 3)^2 + 2(2 – 2) + 1 =3(2)^2 + 20(2) + 24

0.5ma

rk

25a + 1 = 12 + 40 + 24

0.5ma

rk

a = $\frac{75}{25}$

0.5ma

rk

= 3

Answer 4

$\frac{2x}{5}+\frac{3}{4}+5=\frac{1}{20}-\frac{3x}{2}$

$\frac{8x+15+100}{20}=\frac{1-30x}{20}$ 1mark

$\frac{8x+115}{20}=\frac{1-30x}{20}$ 0.5mark

$8x+115=1-30x$ 0.5mark

$8x+30x=1-115$ 0.5mark

$38x=-114$ 0.5mark

$x=-3$

Answer 5

$\begin{cases} x+y=15 \\ x-y=1 \end{cases}$ 1marks

$2x=16 \Rightarrow x=\frac{16}{2}$ 1mark

$x=8$

$x=8 \Rightarrow y=15-8=7$ 1mark

Answer6

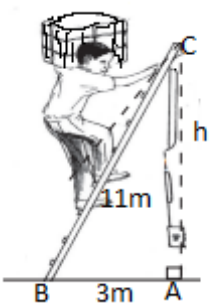
A 15% increase means the final percentage for the quantity will be 100% + 15% 1mark

= 115% as a decimal

= $\frac{115}{100}$ = 1.151mark.....0.5

1.15 is the multiplier.....0.5

Answer 7



From the figure above,

$BC^2 = AB^2 + AC^2$ 1mark

$121 = 9 + AC^2$ 0.5mark

$\sqrt{112} = AC$ 1mark

$AC = 10.583$ 1.5mark

Therefore, the height is 10.6cm0.5mark

Answer 8

$\frac{AD}{AE} = \frac{CD}{BE}$.....0.5mark

$\frac{12}{10} = \frac{6}{BE}$.....0.5mark

$12BE = 60$.....0.5mark

$BE = \frac{60}{12}$.....0.5mark

$= 5cm$.....1mark

ANSWER 9

$2\vec{v} - 3\vec{w} = 2\begin{pmatrix}-2\\5\end{pmatrix} - 3\begin{pmatrix}3\\4\end{pmatrix}$ 1 mark

$= \begin{pmatrix}-4\\10\end{pmatrix} - \begin{pmatrix}9\\12\end{pmatrix}$ 1mark

$= \begin{pmatrix}-13\\-2\end{pmatrix}$ 1mark

Answer 10

- The parallel projection on one line, all images are formed on that line..... 0.5mark
- A point on the line is mapped onto itself under parallel projection on the same line 0.5mark
- Points are those points which lie exactly on the line of projection under parallel projection 0.5mark

If a line segment, say AB to be projected is parallel to the direction of the projection, then the two points have the same image.....0.5mark

Answer 11

An isometry is a transformation that does not affect the size, the shape or area of the object being transformed.

.....2marks

Answer 12

Properties of central symmetry

An object and its image have same shape and size.
.....0.5mark

A point on the object and a corresponding point on the image are equidistant from the centre.....0.5mark
The image of the object is inverted. 0.5mark

Central symmetry is fully defined if the object and the centre are known.....0.5mark

answer 13

The mode is another measure of the centre of a set of observations. The mode of a discrete variate is that value of the variate, which occurs most frequently

The range of a set of observations is the difference between the largest and the smallest observations in a set

answer 14

a. $\text{Mode} = 1$ 1mark

b. $n = 50$, $\frac{n}{2} = 25$ and $\frac{n}{2} + 1 = 26$; the median is the average of the 25th term and the 26th term.
$Median = \frac{2+2}{2} = 2$ 2marks

c. The frequency table 3marks)

xi	Frequ	cum fr	f*x
0	10	10	0
1	11	21	11
2	8	29	16
3	3	32	9
4	6	38	24
5	7	45	35
6	4	49	24
7	1	50	7
Totaux	50	/	126

$The\ mean(\bar{x}) = \frac{\Sigma fx}{n} = \frac{126}{50} = 2.52$ 3marks

Answer 15

Define an event that a student does not like potatoes

Favourable outcomes (number of events) n(x) = 20 1mark

The sample space (total number of trials): n(S) = 40 1mark

So probability that a student selected at random doesn't like potatoes is

Probability (x) = Favourable outcomes/ the total number of trials

n(x)/ n(S) = 20 /40 = 1 /2 2marks

END