

**CHRISTIAN SOCIAL SERVICES COMMISSION (CSSC) NORTHERN ZONE JOINT
EXAMINATIONS SYNDICATE (NZ-JES)**



FORM TWO PRE – NATIONAL EXAMINATION AUGUST 2025

ADDITIONAL MATHEMATICS

MARKING SCHEME

1. a) requires to show whether 47187 is divisible by 3, 9, or 7

ans

A number is divisible by 3 if the sum of its digits is divisible by 3

$$\frac{4+7+1+8+7}{3} = \frac{27}{3} = 9$$

∴ 47187 is divisible by 3..... (marks 02)

Divisible by 9

The number is divisible by 9 if the sum of its digits is divisible by 9

$$\frac{4+7+1+8+7}{9} = \frac{27}{9} = 3$$

∴ 4+7+1+8+7 is divisible by 9(marks 02)

Divisible by 7

A number is divisible by 7 if the difference between twice the last digit and the remaining part of the given number is either 0 or multiple of 7

$$4718 - 2(7) = 4704$$

$$470 - 2(4) = 452$$

$$46 - 2(4) = 42$$

Since 42 is multiple of 7 then 47187 is divisible by 7 (marks 02)

- b) i) Fibonacci sequence will be

3, 4, 7, 11, 18, 29(02 marks)

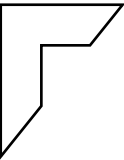
ii) 3, 4, 7, 11, 18, 29, 47, 76, 123, 199, 322, 521, 843

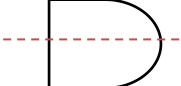
the sum of 1st ten term is 517

$$11 \times 47 = 517 \text{(02 marks)}$$

∴ Amina was correct

2. a) i) A square has a rotational symmetry of order 4.(01 marks)
ii) Circle has a rotational symmetry at every angle of the circle..... (02 marks)
iii) Hexagon has rotational symmetry of order 6(02 marks)
iv) Equilateral triangle has rotational symmetry of order 3(01 marks)

b) (i)  (02 marks)

(ii)  (02 marks)

3. a) Required to find n^{th} term and next two term of the sequence

$\frac{1}{2}, \frac{4}{3}, \frac{9}{4}, \frac{16}{5}, \frac{25}{6}, \frac{36}{7}$ (02 marks)

$n^{th} \text{ term} = \frac{n^2}{n+1}$ (02 marks)

b) given

lecture hall has 20 rows

difference between rows = 2 seats.

last row = 100 (2marks)

the sequence will be

100, 98, 96, 94, 92, 90, 88, 86, 84, 82,

80, 78, 76, 74, 72, 60, 58, 56, 54, 52, (02 marks)

$\therefore$ Number of seat = 1152 seats (02marks)

4. a) $5(x+2)-3x \leq 4+2x+3(x-1)$

$$5x+10-3x \leq 4+2x+3x-3$$

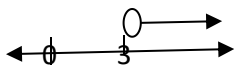
$$2x+10 \leq 5x+1$$

$$2x-5x \leq 1-10$$

$$\frac{-3x}{-3} \leq \frac{-9}{-3}$$

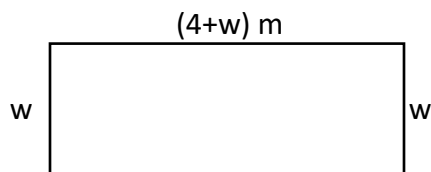
$$x \geq 3 \text{ (03 marks)}$$

Solution on a numberline.



..... (02mrks)

(b) consider the rectangle below



(4+w) m

Area of rectangle = $w \times (w + 4)$

$$221 = w^2 + 4w \text{ (01 marks)}$$

$$w^2 + 4w - 221 = 0$$

by general formular

$$w = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \text{ (01 marks)}$$

$$w = \frac{-4 \pm \sqrt{4^2 + 4(221)x1}}{2x1}$$

$$w = \frac{-4 \pm \sqrt{16 + 884}}{2} \dots\dots\dots (01 \text{ marks})$$

$$w = \frac{-4 \pm 30}{2}$$

$$w = \frac{26}{2} = 13 \dots\dots\dots (01 \text{ marks})$$

$$L = w + 4 = 13 + 4 = 17$$

Dimensions of floor are

Width = 13

Length = 17 $\dots\dots\dots (01 \text{ marks})$

5. a) given one of exterior angle 36°
required to find

- i) interior angle

from $i + e = 180^\circ$ (straight angle

$$i + 36^\circ = 180^\circ \dots\dots\dots (02 \text{ marks})$$

$$i + 180^\circ - 36^\circ = 144^\circ$$

- ii) Number of sides

From $ne = 360^\circ$

$$\frac{36n}{36} = \frac{360^\circ}{36} \dots\dots\dots (02 \text{ marks})$$

$$n = 10$$

$\therefore \text{number of sides} = 10$

- iii) Sum of interior

$$S_n = (n-2)180^\circ$$

$$= (10 - 2)180^\circ = 8 \times 180^\circ \dots\dots\dots (02 \text{ marks})$$

$$= 1440^\circ$$

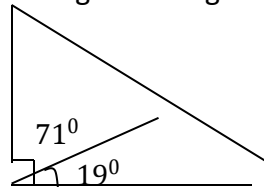
$\therefore \text{sum of interior angle} = 1440^\circ$

- b) i) complementary angles are two angles whose sum are 90°

$$71^\circ + x = 90^\circ$$

$$x = 90^\circ - 71^\circ = 19^\circ \dots\dots\dots (02 \text{ marks})$$

- ii. Diagram showing both angles



6. a) required to find slope of a line with an x – intercept of 4 and y – intercept pf 3

A (4,0)

B (0,3)

$$M = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 0}{0 - 4} = \frac{-3}{4} \dots\dots\dots (02 \text{ marks})$$

b) required to find equation

given point A (2,4)

for x – axis, slope = 0

from $y = m(x - x_1) + y_1$

$y=0(x-2) +4$

$y = 4$ (02 marks)

required to show A (4,0), B (7,-3), C(-2,-2) and D(-5,1) are the vertices of a parallelogram

slope between point:

$$\overline{AB}: m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - 0}{7 - 4} = \frac{-3}{3} = -1$$

$$m = \frac{1 - 2}{-5 - 2} = \frac{3}{-3} = -1$$

$$\overline{DC}; m = \frac{1 - -2}{-5 - -2} = \frac{3}{-3} = -1$$

$\therefore \overline{AB} // \overline{DC}$ (02 marks)

$$\overline{DA}: m = \frac{1 - 0}{-5 - 4} = \frac{1}{-9}$$

$$\overline{CB}: m = \frac{-3 - -2}{7 - 2} = \frac{-1}{5}$$

$\overline{DA} // \overline{CB}$ (02 marks)

$\therefore ABCD$ is parrallelogram because opposite sides are parrallel.

7. (a) give $x \rightarrow$ earning

$y \rightarrow$ tax

then A(2,000,100)

B(4000, 300)(01 marks)

Required to find the relationship between x and Y

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{300 - 100}{4000 - 2000} = \frac{200}{2000} = \frac{1}{10}$$

from $y = m(x - x_1) + y_1$

$$y = \frac{1}{10}(x - 200) + 100$$

$$y = \frac{1}{10}x - 200 + 100$$

$\therefore y = \frac{1}{10}x - 100$ (01 marks)

i. Required it find tax (y) when earning (x) =3,500

$$y = \left(\frac{1}{10} \times 3,500 \right) - 100$$

$= 350 - 100 = 250$ (01 marks)

ii. Required to find earning when tax =600

$$\text{From } y = \frac{1}{10}x - 100$$

$$600 = \frac{1}{10}x - 100$$

$$700 = \frac{1}{10}x$$

$$x = 7000.$$

$\therefore \text{earning } (x) = 7000$(02mark)

(b) a) let $m \rightarrow$ Technicians, Weeks $\Rightarrow w$ and Computers $\Rightarrow c$

m	16	30
d	24	?
c	32	200

$$m \propto \frac{c}{d} \dots\dots\dots(01 \text{ marks})$$

$$t = \frac{kc}{w}, \dots\dots\dots(01 \text{ marks})$$

$$16 = k \frac{(32)}{24} \dots\dots\dots(01 \text{ marks})$$

$$k = 12$$

$$30 = \frac{12 \times 200}{d} \dots\dots\dots(02 \text{ marks})$$

$$w = 80$$

$\therefore \text{number of weeks} = 80$

8. a) i) 2 is not an even number(01 mark)

ii) Rachel is short(01 mark)

b)truth table(06marks)

$$(P \rightarrow q) \wedge (\sim P \rightarrow q)$$

P	q	$P \rightarrow q$	$\sim P$	$\sim P \rightarrow q$	$(P \rightarrow q) \wedge (\sim P \rightarrow q)$
T	T	T	F	T	T
T	F	F	F	T	F
F	T	T	T	T	T
F	F	T	T	F	F

;- The proposition is contradiction.....(02marks)

9. (a) given point B(x,y) D(3,1) and line $x = 5$

$$\overline{DB} = \sqrt{(x-3)^2 + (y-1)^2} = d_1 \dots\dots\dots(01 \text{ mark})$$

distance of the point B(x,y) from line $x = 5$ is given by $d_1 = \sqrt{(x-5)^2}$

but $d_1 = d_2$(01 mark)

$$(x-3)^2 + (y-1)^2 = (x-5)^2$$

$$(x-3)^2 + (y-1)^2 = (x-5)^2 \dots\dots\dots(01 \text{ mark})$$

$$x^2 - 6x + 9 + y^2 - 2y + 1 = x^2 - 10x + 25$$

$$y^2 + 4x - 15 - 2y = 0$$

$$y^2 - 2y + 4x - 15 = 0 \dots\dots\dots(01 \text{ mark})$$

$\therefore$ Equation of locus is $y^2 - 2y + 4x - 15 = 0$(01 mark)

- b) given the lines

$$\begin{cases} x - 2y = 4 \\ 2x + 3y = 15 \end{cases}$$

Their point of intersection is C(6,1)

P(x,y), S(2,-3), C(6,1).....(01 mark)

$$\overline{PS} = \sqrt{(x-2)^2 + (y+3)^2}$$

$$\overline{PC} = \sqrt{(x-6)^2 + (y-1)^2} \dots\dots\dots(01 \text{ mark})$$

But $\overline{PS} = \overline{PC}$

$$(x-2)^2 + (y+3)^2 = (x-6)^2 + (y-1)^2$$

$$x^2 - 4x + 4 + y^2 + 6y + 9 = x^2 - 12x + 36 + y^2 - 2y + 1 \dots\dots\dots(01 \text{ mark})$$

$$-4x + 6y + 13 = -12x - 2y + 37$$

$$8x + 8y + 13 - 37 = 0 \dots\dots\dots(01 \text{ mark})$$

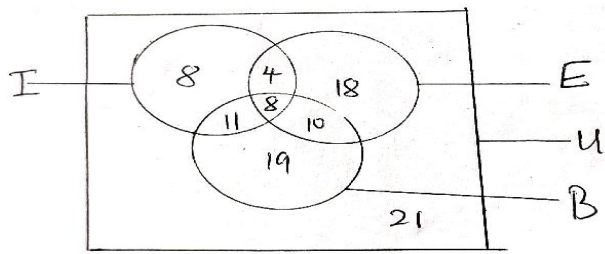
$$8x + 8y - 24 = 0$$

$$x + y - 3 = 0 \dots\dots\dots(01 \text{ mark})$$

10. (a) $E = \{\text{vacation}\}$

$$B = \{\text{Tuition}\}$$

$$I = \text{Chilling at home} \dots\dots\dots(01 \text{ mark})$$

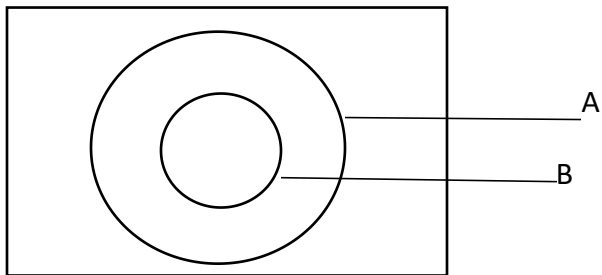


venn diagram.....(02 mark)

b) at least two options =33.....(02 mark)

ii) 99 students patriated(02mark)

iii) A is a proper subject of B



.....(03mark)

.....end.....