



**AHMAD IBRAHIM SECONDARY SCHOOL**  
**GCE N-LEVEL PRELIMINARY EXAMINATION 2024**

**SECONDARY 4 NORMAL (ACADEMIC)**

Name:	Class:	Register No.:
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**MATHEMATICS SYLLABUS A**

Paper 2

**4045/02**

**31 July 2024**

**2 hours**

Candidates answer on the Question Paper.

**READ THESE INSTRUCTIONS FIRST**

Write your name, class and index number on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

**Section A**

Answer **all** questions.

**Section B**

Answer **one** question.

The number of marks is given in brackets [ ] at the end of each question or part question.

If working is needed for any question it must be shown with the answer.

Omission of essential working will result in loss of marks.

The total number of marks for this paper is 70.

The use of an approved scientific calculator is expected, where appropriate.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For  $\pi$ , use either your calculator value or 3.142.

<b>For Examiner's Use</b>
/ 70

**Mathematical Formulae***Compound Interest*

$$\text{Total amount} = P \left( 1 + \frac{r}{100} \right)^n$$

*Mensuration*

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3} \pi r^3$$

$$\text{Area of triangle } ABC = \frac{1}{2} ab \sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

*Trigonometry*

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

*Statistics*

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left( \frac{\sum fx}{\sum f} \right)^2}$$

**Section A** (62 marks)

Answer **all** the questions in this section.

- 1 (a) By rounding the numbers to 1 significant figure, estimate the value of

$$\frac{82.98 \times \sqrt{8.93}}{4.45}.$$

You must show your working.

*Answer* ..... [2]

- (b) The number of coronavirus cases as of June 2022 in Singapore is 1 397 074.

The total number of coronavirus cases in the world is 548 million.

Calculate the percentage of coronavirus cases in Singapore compared to the cases in the world.

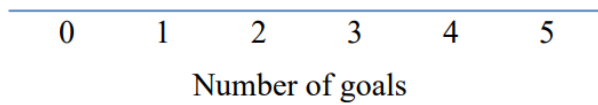
Give your answer in standard form.

*Answer* ..... [2]

- 2 The table shows the number of goals scored in 20 soccer matches.

2	1	1	3	4
1	4	0	1	5
4	3	1	0	2
5	2	1	3	3

- (a) Represent the information by completing the dot diagram below.



[2]

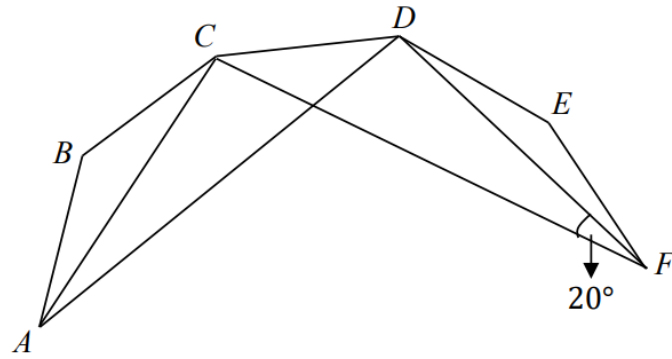
- (b) State the median number of goals.

*Answer* ..... [1]

- (c) What is the probability of the soccer match ending with a single goal?

*Answer* ..... [1]

3



$ABCDEF\dots$  represents part of a regular 15-sided polygon.

- (a) Calculate angle  $ABC$ .

Answer ..... $^{\circ}$  [2]

- (b) Given that triangle  $ACD$  is congruent to triangle  $FDC$  and angle  $CFD = 20^{\circ}$ , calculate angle  $ADC$ .

Answer ..... $^{\circ}$  [3]

- 
- 4 (a) Find 240 as a product of its prime factors.

*Answer* ..... [1]

- (b) Find the smallest positive integer value of  $a$  such that  $240a$  is a perfect square.

*Answer* ..... [1]

- (c) Green pens are sold in packets of 240.

Black pens are sold in packets of 210.

Amy wants to buy the same number of green and black pens.

What is the smallest number of packets of each type of pens she could buy?

*Answer* Green : .....

Black : ..... [3]

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**5** A car costs \$22 500.

Andy bought a car at a 10% discount.

**(a)** He intends to sell it for a cash price of \$28 888.

Calculate his percentage profit.

*Answer* .....% [2]

**(b)** Andy has two interested buyers, Mary and Jane.

Mary offers to pay a deposit of 20% of the cash price and 58 monthly instalments of \$510 each. Jane offers to pay a deposit of 15% and 60 monthly instalments of \$520.

Which buyer should Andy sell it to? Explain your answer. [3]

*Answer*

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**6** The coordinates of points  $A$  and  $B$  are  $(2, 5)$  and  $(5, 9)$  respectively.

**(a)** Calculate the length of the line segment  $AB$ .

*Answer* ..... [2]

**(b)** Find the equation of the line  $AB$ .

*Answer* ..... [2]

**(c)** The point  $C$  lies on  $AB$  produced.

Given that  $AB = BC$ , find the coordinates of point  $C$ .

*Answer* (....., ..... ) [2]

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7 (a) Factorise

(i)  $3uv + 2v - 12u - 8$ ,

*Answer* ..... [2]

(ii)  $2x^2 - 11x + 5$ .

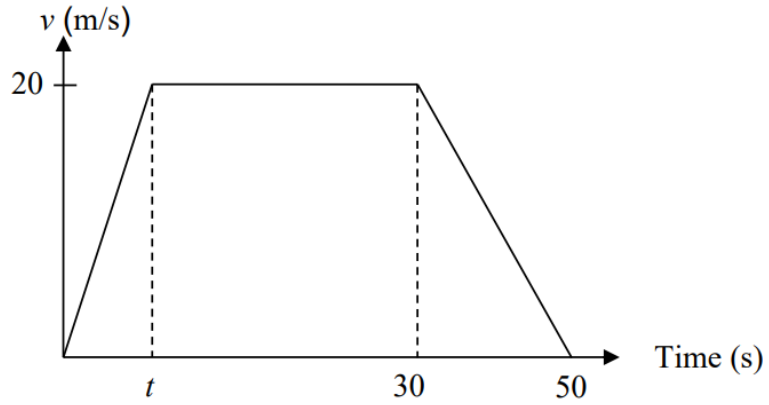
*Answer* ..... [2]

(b) Simplify  $\frac{9x^3}{4} \div \frac{3x^2}{8}$ .

*Answer* ..... [2]

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8



The diagram shows the speed-time graph of a car.

The car travelled with an acceleration of  $2.5 \text{ m/s}^2$  to reach a speed of  $20 \text{ m/s}$  in the first  $t$  seconds.

Find

(a) the value of  $t$ ,

Answer ..... [1]

(b) the speed of the car at 36 seconds,

Answer ..... m/s [2]

(c) the total distance travelled.

Answer ..... m [2]

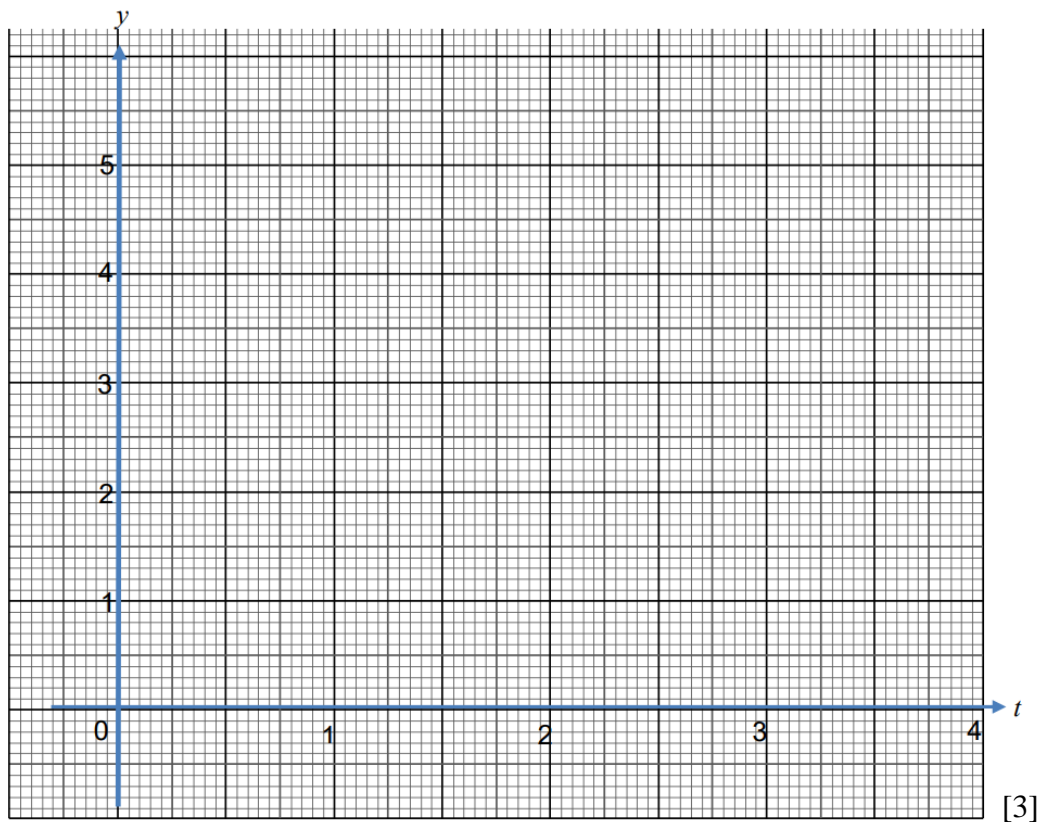
- 9 The size of a cell,  $y \text{ mm}^3$ , is given by  $y = t + \frac{1}{2t} - 1$ , where  $t$  is the time in seconds.

$t$	0.1	0.3	0.5	0.8	1	2	3	4
$y$	4.1	1.0	0.5	0.4	0.5	1.3	$p$	3.1

- (a) Calculate the value of  $p$ .

Answer ..... [1]

- (b) Draw the graph of  $y = t + \frac{1}{2t} - 1$  for  $0.1 \leq t \leq 4$ .



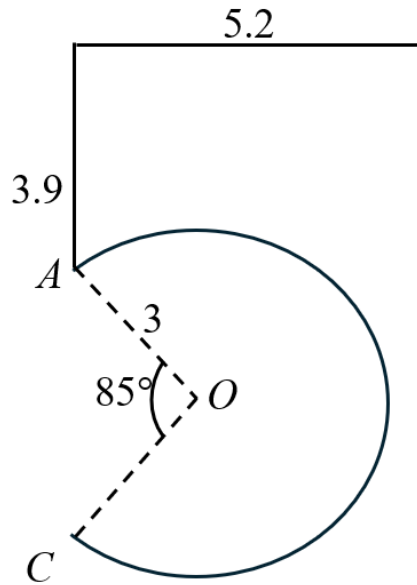
- (c) Use your graph to find the values of  $t$  when  $y = 2$ .

Answer  $t = \dots\dots\dots$  [2]

- (d) By drawing a tangent, find the gradient of the curve at  $t = 0.3$ .

Answer ..... [2]

10



A thin piece of wire is bent into a figure '5' shape as shown.

The shape has two straight sections of length 5.2 cm and 3.9 cm.

The curved part is the major arc of a circle, centre  $O$  and radius 3 cm.

The minor arc of the same circle subtends an angle of  $85^\circ$  at the centre.

Find

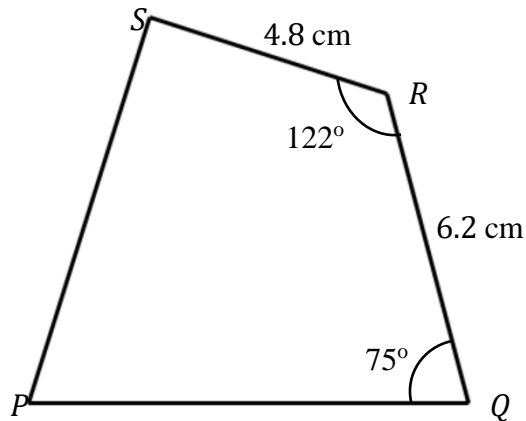
- (a) the reflex angle  $AOC$ ,

Answer ..... $^\circ$  [1]

- (b) the total length of the wire needed to make the figure '5'.

Answer ..... cm [2]

- 11 The diagram shows the sketch of a quadrilateral  $PQRS$ .



- (a) Construct the quadrilateral accurately.  
The side  $PQ$  has been drawn for you.

$P$  \_\_\_\_\_  $Q$  [2]

- (b) Construct the perpendicular bisector of  $PS$ . [1]

- (c)  $X$  is a point where the perpendicular bisector of  $PS$  crosses  $QR$ .  
Measure  $QX$ .

Answer ..... cm [1]

- 12** This year, 10 blocks in Woodlands Drive were declared as a moderate-risk dengue cluster. A total of 50 people had been infected with dengue fever.

Table 10.1 shows the distribution of dengue cases among the 10 blocks.

Block	520	521	522	523	524	525	526	527	528	529
No of cases	4	3	3	23	9	1	1	3	1	2

**Table 10.1**

- (a) Calculate the mean number of dengue cases per block.

*Answer* ..... [1]

- (b) Explain why the mean calculated in (a) is not a good representation of the central tendency of the dengue cases in the Woodlands Drive cluster.

Suggest another method to better represent the central tendency of dengue cases per block in the Woodlands Drive cluster.

*Answer* .....  
 .....  
 .....  
 ..... [2]

- (c) Table 10.2 shows the number of homes with mosquito breeding habitats in each block.

Block	520	521	522	523	524	525	526	527	528	529
No of cases	2	1	1	8	5	0	0	2	0	1

**Table 10.2**

To contain the dengue outbreak in the Woodlands Drive cluster, the National Environment Agency (NEA) has decided to engage the services of Pestbusters, an external pest control company.

Table 10.3 shows the works that need to be carried out.

- Fogging of all blocks with 5 or more breeding habitats
- Larvicide treatment of all homes with breeding habitats
- Installation of external mosquito traps at the stairwells of blocks with 5 or more breeding habitats.

**Table 10.3**

Table 10.4 shows the quantities of the items required to carry out the works.

ITEM	QUANTITY REQUIRED	COSTS
Fogging Chemical	10 units per block	\$38 per unit or \$220 per carton of 6 units
Larvicide Chemical	1 unit for every 5 homes	\$18 per unit or \$50 per pack of 3 units
External mosquito trap	5 units per block	\$75 per unit
Labour	3 man-hours per block for fogging and 0.5 hours per home for larvicide treatment	\$40 per man-hour

**Table 10.4**

The Sales Manager of Pestbusters gave NEA a quotation of \$2 500 for the services.

Do you think it is a reasonable quotation?

Justify your answer with working.

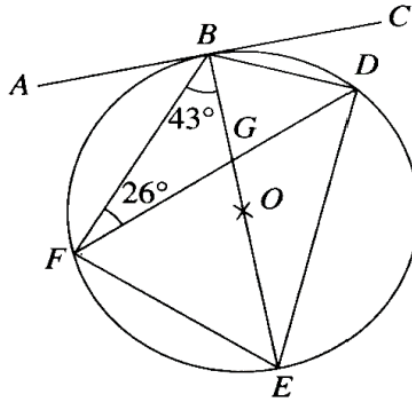
[4]

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**Section B** (8 marks)

Answer **one** question from this section. Each question carries 8 marks.

13



In the figure,  $O$  is the centre of the circle.

Angle  $BFD = 26^\circ$ , angle  $FBE = 43^\circ$  and  $ABC$  is a tangent to the circle at  $B$ .

(a) Find, giving reasons for each answer,

(i) angle  $GDE$ ,

Answer ..... $^\circ$  [1]

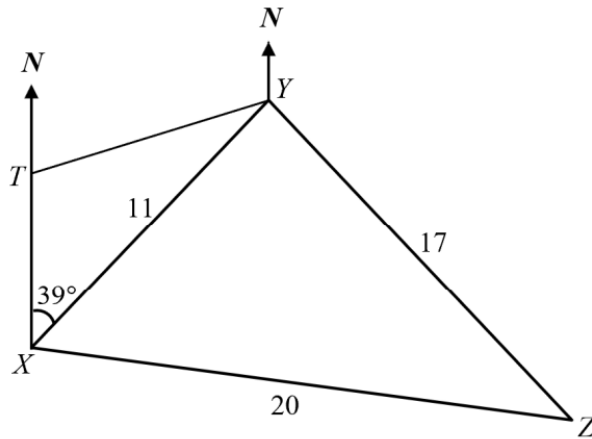
(ii) angle  $BDG$ ,

Answer ..... $^\circ$  [2]

(iii) angle  $ABF$ .

Answer ..... $^\circ$  [1]

(b)



A ship sails from  $X$  to  $Y$  to  $Z$  and then back to  $X$  again.

$XY = 11$  km,  $YZ = 17$  km and  $XZ = 20$  km.

The bearing of  $Y$  from  $X$  is  $039^\circ$ .

(i) Calculate angle  $YXZ$ ,

Answer ..... $^\circ$  [2]

(ii) The ship then sails North to the point  $T$  from  $X$ , where the bearing of  $T$  from  $Y$  is  $253^\circ$ .

Find the distance of  $TY$ .

Answer ..... km [2]

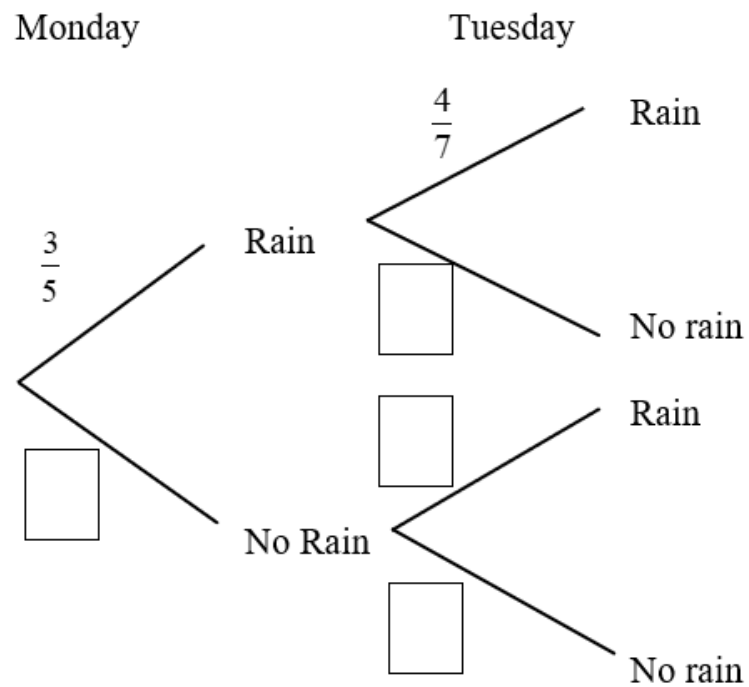
- 14 (a) Sue makes reports for weather forecast for Mondays and Tuesdays.

The probability that it will rain on Monday is  $\frac{3}{5}$ .

If it rains on Monday, the probability that it rains on Tuesday is  $\frac{4}{7}$ .

If it does not rain on Monday, the probability that it rains on Tuesday is  $\frac{5}{7}$ .

- (i) Complete the tree diagram.

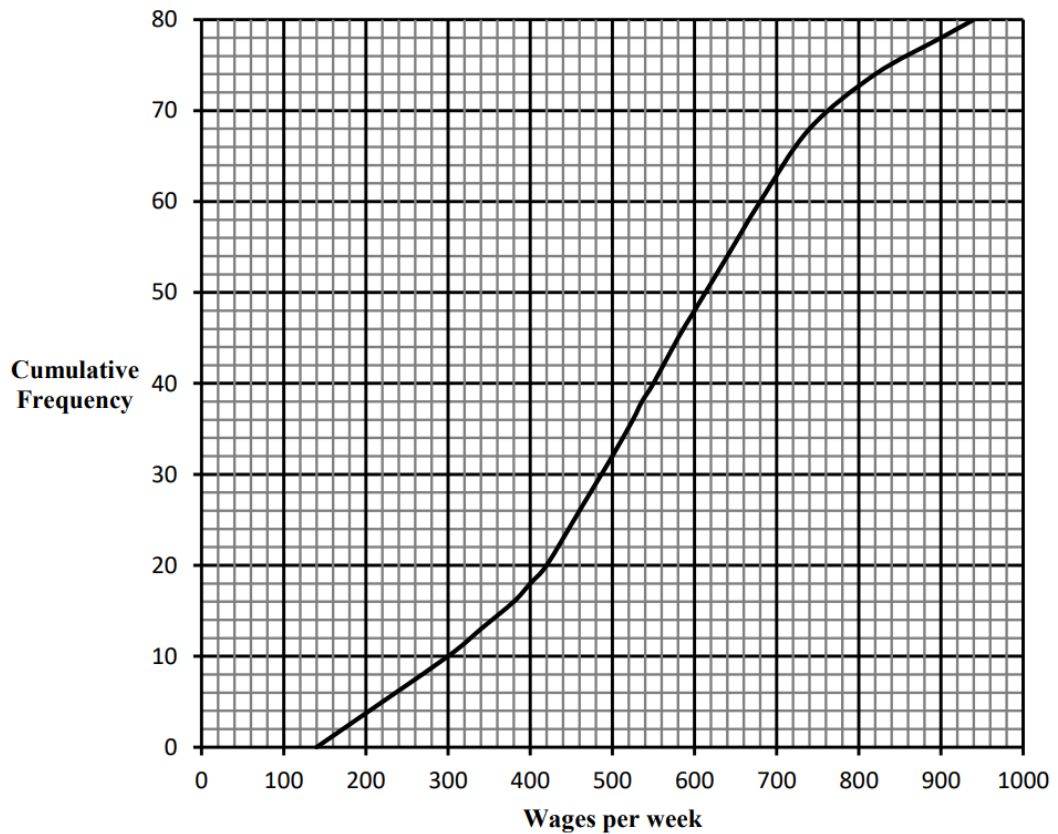


- (ii) Find the probability that it will rain on only one of the days.

[2]

Answer ..... [2]

- (b) Alex recorded the wages per week of 80 workers in a factory.



Use the graph to find

- (i) the median wage,

Answer \$ ..... [1]

- (ii) the interquartile range,

Answer \$ ..... [2]

- (iii) the number of workers who earn more than \$460 a week.

Answer ..... workers [1]

**End of Paper**

Setter: Mdm Noor Azizah