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Name:	Index Number:	Class:
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YIO CHU KANG SECONDARY SCHOOL
O-LEVEL PRELIMINARY EXAMINATION 2025
SECONDARY FOUR EXPRESS
SECONDARY FIVE NORMAL (ACADEMIC)



MATHEMATICS
 Paper 1

4052/01
 2 hours 15 minutes

1 September 2025 (Monday)

READ THESE INSTRUCTIONS FIRST

Write your class, index number and name 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.
 DO **NOT** WRITE ON ANY BARCODES.

Answer **all** the questions.
 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 of the marks for this paper is 90.

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. Gives answers in degrees to one decimal place.
 For π , use either your calculator value or 3.142.

For Examiner's Use
90

Mathematical Formulae*Compound interest*

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

Mensuration

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

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

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

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

$$\text{Area of } \triangle ABC = \frac{1}{2}bc \sin A$$

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

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

Trigonometry

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

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

Statistics

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

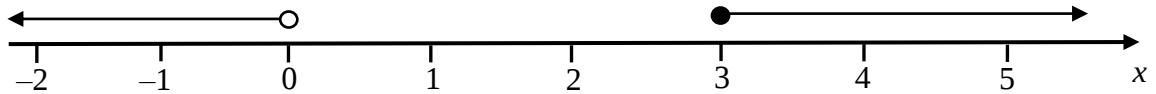
$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left[\frac{\sum fx}{\sum f}\right]^2}$$

Answer **all** the questions.

- 1 Simplify $5p - 4 - (3 + 2p) + p - 6$.

Answer [2]

2



- (a) Write down the inequalities that represent the numbers indicated on the number line.

Answer [1]

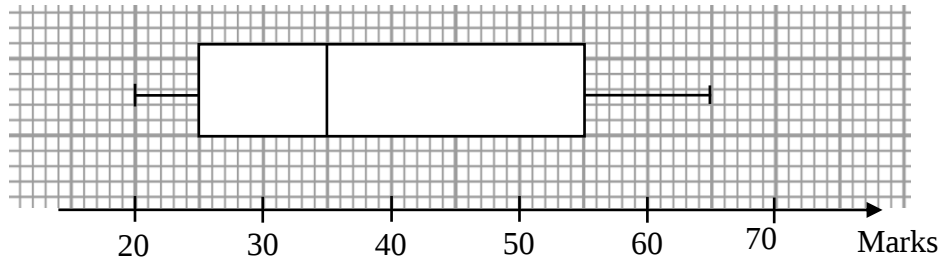
- (b) State the smallest prime number that satisfies the number line shown.

Answer [1]

- 3 Express as a single fraction in its simplest form $\frac{3x-2}{12} - \frac{5x-3}{8} - \frac{7(x+1)}{6}$.

Answer [3]

4



The box-and-whisker plot gives information about the marks of 40 students in a class who sat for a Mathematics examination.

- (a) Use the box-and-whisker plot to find the median mark.

Answer [1]

- (b) Layla says, “There are twice as many students who scored more than 35 marks as those who scored less than 35 marks”.

Is Layla correct?

Give a reason for your answer.

.....

 [1]

5 Factorise.

- (a) $24pq^2 + 15pq - 9p^2q$

Answer [1]

- (b) $5 + 2a^2bc - 5ac - 2ab$

Answer [2]

- 6** A map of Singapore has a scale of 1 : 125000.
- (a)** The length of the longest river in Singapore, Kallang River, is 10 km.
Calculate the length of Kallang River on the map.

Answer cm [2]

- (b)** The area of Pulau Ubin island on the map is 6.56 cm^2 .
Calculate the area, in square kilometres, of Pulau Ubin island.

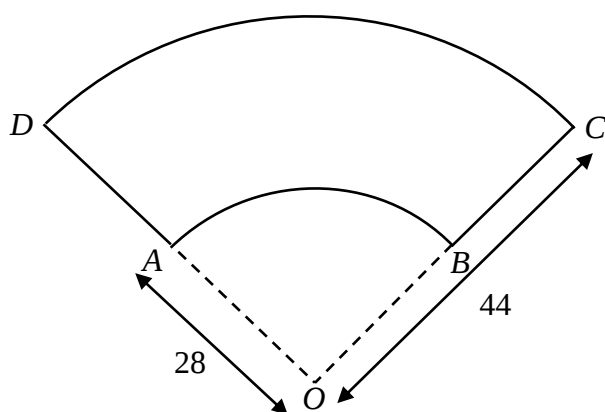
Answer km^2 [2]

- 7** In this sequence, the difference between any two consecutive terms is the same number.

$w \quad x \quad y \quad 23 \quad z \quad \dots$

The sum of the first five terms is 80. Find the values of w , x , y and z .

Answer $w = \dots \quad x = \dots \quad y = \dots \quad z = \dots$ [2]



The diagram shows the coverage of a car windscreen wiper $ABCD$. AB and DC are arcs of circles centre O with radii 28 cm and 44 cm respectively. The perimeter of $ABCD$ is $72\pi - 76$ cm.

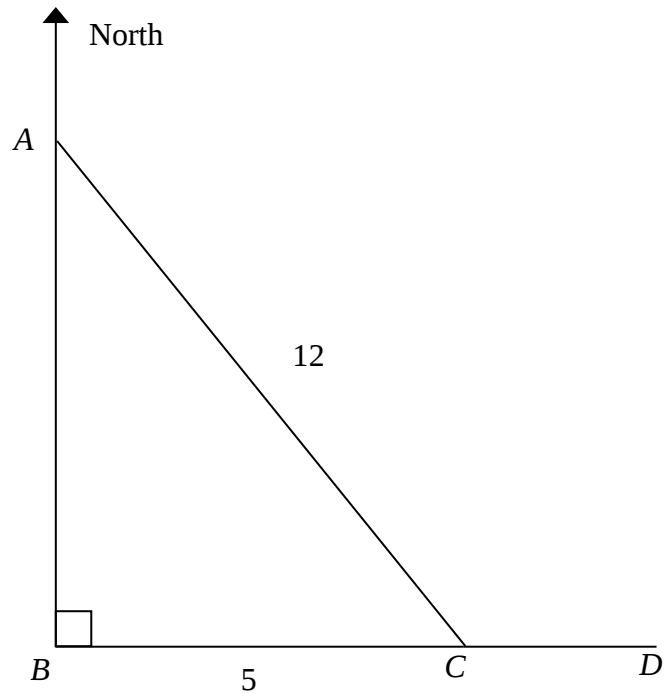
- (a) Calculate angle AOB in radians, leaving your answer in terms of π .

Answer [2]

- (b) Calculate the area of the windscreen that the car wiper wipes through.

Answer cm^2 [2]

9



A , B , C and D are four points on horizontal ground.
 $AC = 12$ km and $BC = 5$ km.

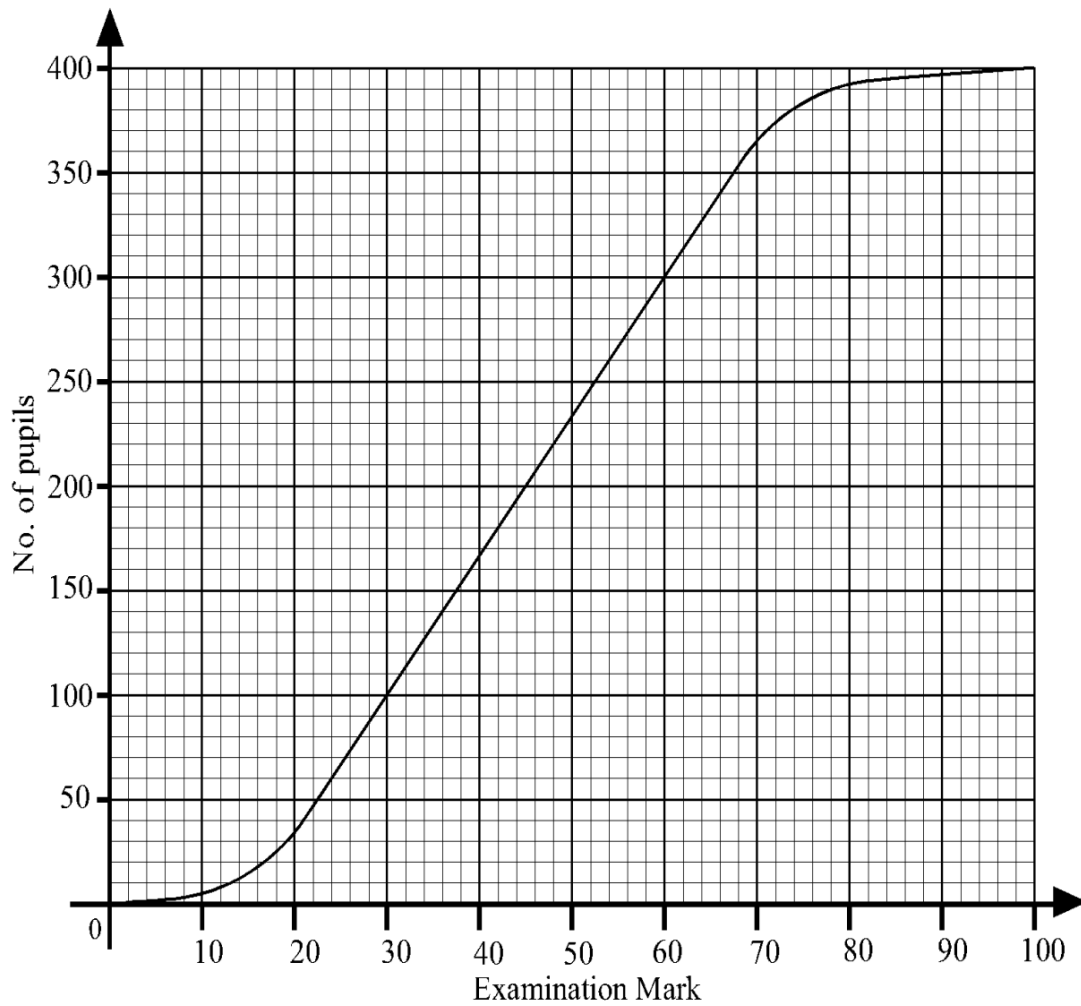
(a) Calculate angle ACD .

Answer angle $ACD = \dots\dots\dots^\circ$ [2]

(b) Find the bearing of A from C .

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

- 10** The cumulative frequency curve shows the marks of 400 pupils who sat for a Mathematics Paper 1 examination.



- (a) Use the diagram to find
- the interquartile range of the marks,
 - the 35th percentile.

Answer [2]

Answer [1]

- (b) One of the students is chosen at random.
Find the probability that this student's estimated mark is between 42 and 78.

Answer [2]

11 $P = 2w - \frac{x^2 y}{w}$

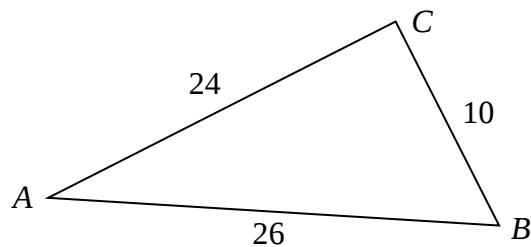
- (a) Find P when $w = 86.3$, $x = 21.41$ and $y = 0.872$.
Give your answer correct to 4 significant figures.

Answer $P = \dots\dots\dots$ [1]

- (b) Rearrange the formula to make x the subject.

Answer $x = \dots\dots\dots$ [3]

12



The diagram shows a triangle ABC such that $AB = 26$ cm, $BC = 10$ cm and $AC = 24$ cm.

When a circle is drawn, it passes through A , B and C .

Explain, with reasons, why AB is the diameter of the circle.

.....

.....

.....

.....

.....

.....

..... [3]

- 13 Solve the simultaneous equations.

$$8x - 3y = 25$$

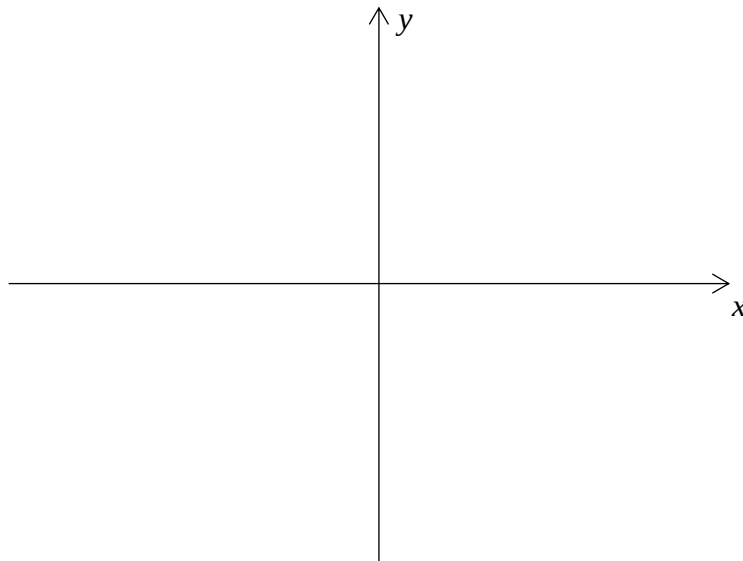
$$12x + 5y = 9$$

You must show your working.

Answer $x = \dots\dots\dots$ $y = \dots\dots\dots$ [3]

- 14 **Sketch** the graph of $y = -(x - 2)^2 + 16$ on the axes below.

Indicate clearly the coordinates of the points where the graph crosses the axes and the maximum point on the curve.

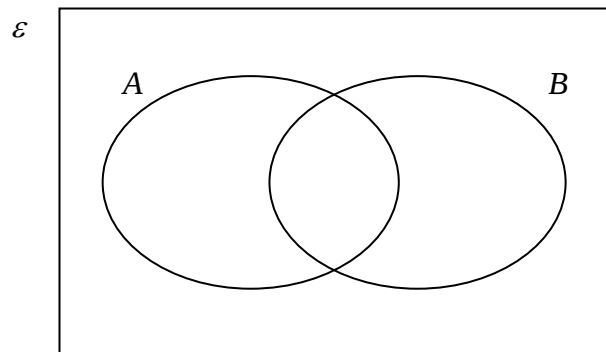


[3]

- 15 Aamon invested \$50000 into an account paying 3.6% per year compound interest, compounded monthly for 3 years.
Calculate the amount of interest Aamon earned at the end of 3 years.

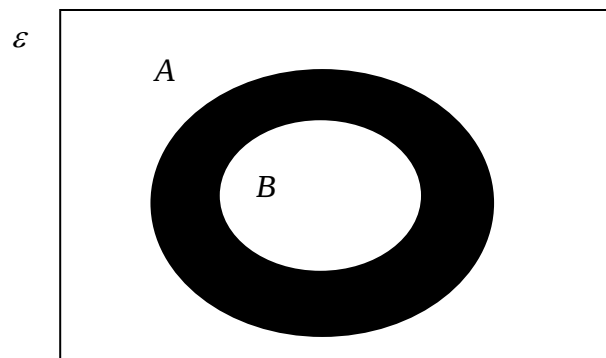
Answer \$ [3]

- 16 (a) On the Venn diagram, shade the region which represents $A' \cup B'$.



[1]

- (b) Write down the set represented by the shaded region.



Answer [1]

- 17 (a) Write 0.00728 in standard form.

Answer [1]

- (b) (i) Write 8.17×10^{501} in the form $A \times 10^{500}$.

Answer [1]

- (ii) Work out $(6.3 \times 10^{500}) + (8.17 \times 10^{501})$.
Give your answer in standard form.

Answer [2]

- 18 Written as a product of its prime factors, $84 = 2^2 \times 3 \times 7$.

- (i) Write 504 as a product of its prime factors.

Answer $504 = \dots\dots\dots$ [1]

- (ii) The highest common factor (HCF) of two numbers is 84.
The lowest common multiple (LCM) of the two numbers is 504.
Both numbers are greater than 100.
Find the two numbers.

Answer and [2]

19

$$\sin x^\circ = 0.427$$

Find two possible values of x in the range $0^\circ < x < 180^\circ$.

Answer $x = \dots\dots\dots$ or $\dots\dots\dots$ [2]

20

The cash price of a laptop is \$1800.

The hire-purchase price of the laptop is \$1944.

The hire-purchase price is a deposit plus 24 equal monthly payments of \$66.

(a) Calculate the amount of deposit to be paid.

Answer \$ $\dots\dots\dots$ [2]

(b) Calculate the interest rate per annum.

Answer $\dots\dots\dots$ % [2]

21 7 $6t$ 28 25 13 $8t^2$ 12

The list shows information about the total number of hours Kalea studied each week for 7 weeks.
The mean number of hours she studied per week is 16 hours.

(a) Show that $t = 1.5$.

Answer

[3]

(b) The standard deviation for Kalea's data is 7.41.

For the same 7 weeks, Kalea's brother also studied each week.

For his data, the mean is 13 hours and the standard deviation is 5.23.

By commenting on (1.) the means and (2.) the standard deviations, compare the distributions for the number of hours studied by Kalea and her brother.

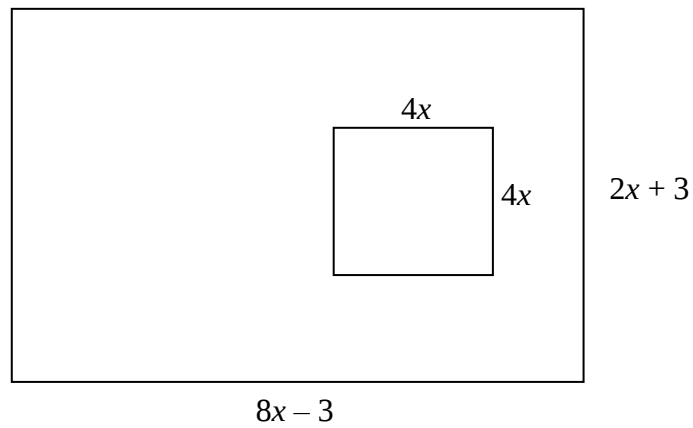
1.
.....
2.
.....

[2]

22 Expand $(2x^2 - 5x + 3)(5x - 4)$.

Answer [2]

23



A rectangular cardboard has length and breadth $(8x - 3)$ cm and $(2x + 3)$ cm respectively.

A square of length $4x$ cm is removed from the cardboard.

The area of the remaining cardboard is y cm².

(a) Show that y is an odd number.

Answer

[3]

(b) Find a possible value of y and the corresponding value of x .

Answer $x = \dots\dots\dots$ $y = \dots\dots\dots$ [1]

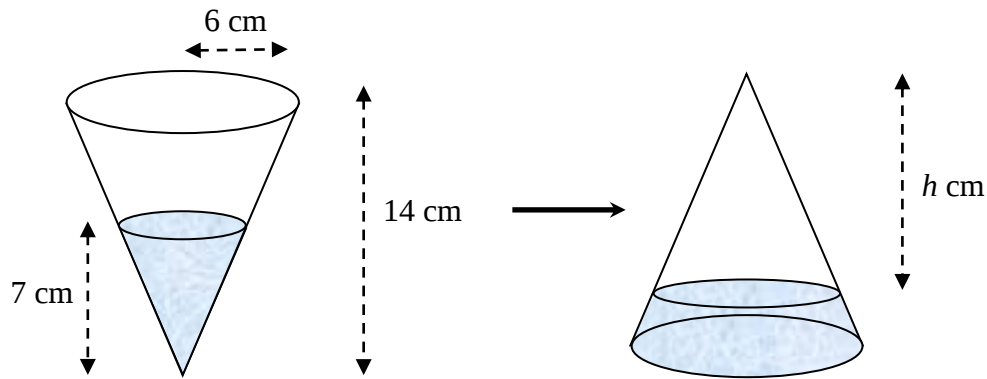
24 Simplify $\frac{5x^2 - 15x}{x^4 - 81}$.

Answer [3]

- 25 Solve the equation $x^2 + 16x + 18 = 0$ by **completing the square**.
Give your solutions correct to 2 decimal places.

Answer $x = \dots\dots\dots$ or $\dots\dots\dots$ [3]

- 26 An inverted cone with base radius 6 cm and height 14 cm is filled with water to a depth of 7 cm.



Find, in terms of π ,

- (i) the capacity of the cone,

Answer cm^3 [1]

- (ii) the volume of the water inside the cone.

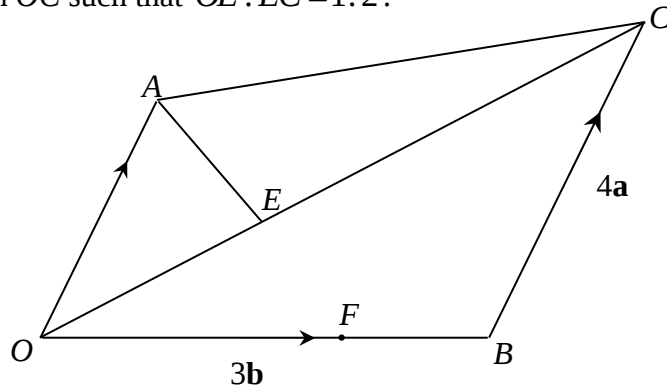
Answer cm^3 [2]

The cone is then turned upside down and the height of the empty space becomes h cm.

- (iii) Find the value of h .

Answer $h =$ [2]

- 27 In the diagram below, $\overrightarrow{BC} = 4\mathbf{a}$, $\overrightarrow{OB} = 3\mathbf{b}$, $\overrightarrow{OA} = \frac{3}{4}\overrightarrow{BC}$.
 E is a point on OC such that $OE : EC = 1 : 2$.



- (a) Show that $\overrightarrow{AE} = -\frac{5}{3}\mathbf{a} + \mathbf{b}$.

Answer

[2]

It is given that F is a point on OB such that $\overrightarrow{OF} = \frac{3}{5}\overrightarrow{OB}$.

- (b) Express vector $\overrightarrow{AF}$ in terms of $\mathbf{a}$ and/or $\mathbf{b}$, as simply as possible.

Answer $\overrightarrow{AF} = \dots\dots\dots$ [2]

- (c) Determine if points A , E and F lie on a straight line.
Justify your answer using vectors.

Answer

[2]

- (d) The area of triangle AEC is 30 cm^2 .
Find the area of triangle OAE .

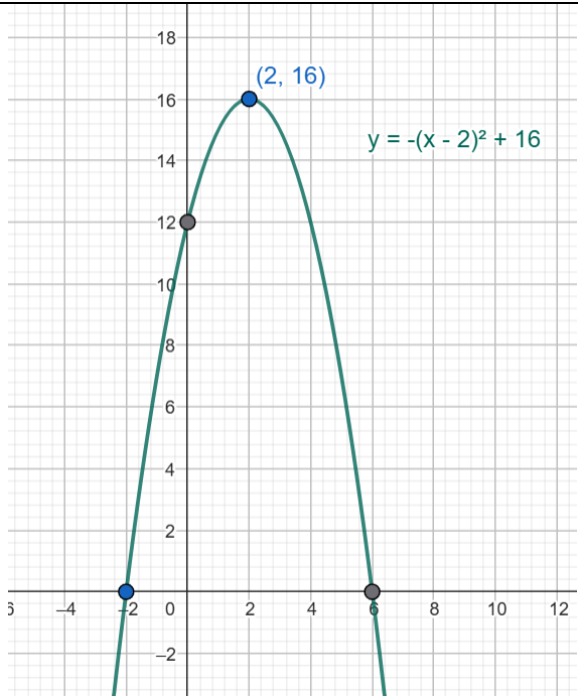
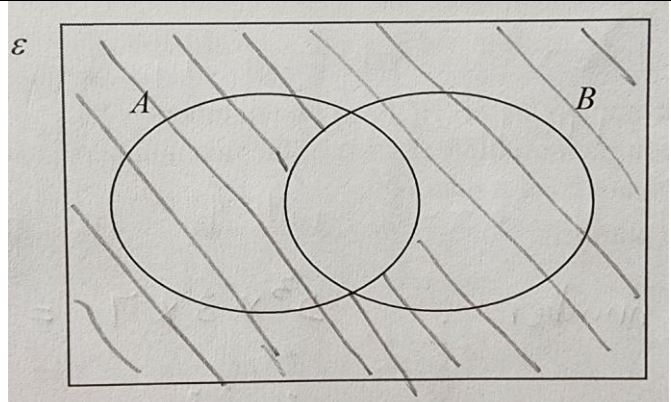
Answer cm^2 [1]

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Yio Chu Kang Secondary School
4E/5N Prelim Mathematics P1 2025
Marking Scheme

Qn	Solutions	Marks	Marker's Comments
1	$5p - 4 - (3 + 2p) + p - 6$ $= 5p - 4 - 3 - 2p + p - 6$ $= 4p - 13$	M1 A1	Well done
2a	$x < 0$ or $x \geq 3$	A1	Poorly done
2b	3	B1	
3	$\frac{3x-2}{12} - \frac{5x-3}{8} - \frac{7(x+1)}{6}$ $= \frac{2(3x-2) - 3(5x-3) - 4 \times 7(x+1)}{24}$ $= \frac{6x - 4 - 15x + 9 - 28x - 28}{24}$ $= \frac{-37x - 23}{24}$	M1 M1 A1	Many did not use LCM of denominators, hence some final answers were not in lowest term
4a	35	B1	
4b	Incorrect. Median mark means <u>50%</u> of students scored <u>both more than</u> or <u>less than</u> the mark.	B1	Poor
5a	$24pq^2 + 15pq - 9p^2q$ $= 3pq(8q + 5 - 3p)$	B1	
5b	$5 + 2a^2bc - 5ac - 2ab$ $= 5 - 5ac + 2a^2bc - 2ab$ $= 5(1 - ac) - 2ab(1 - ac)$ $= (1 - ac)(5 - 2ab) \quad \text{accept } (ac - 1)(2ab - 5)$	M1 A1	
6a	$1.25 \text{ km} : 1 \text{ cm}$ $1 \text{ km} : \frac{1}{1.25} \text{ cm}$ $10 \text{ km} : \frac{10}{1.25} = 8 \text{ cm}$	M1 A1	Poor conversion of units
6b	$1 \text{ cm}^2 : 1.25^2 \text{ km}^2 = 1.5625 \text{ km}^2$ $6.56 \text{ cm}^2 : 6.56 \times 1.25^2 \text{ km}^2 = 10.25 \text{ km}^2$	M1 A1	Some did not take square of the map scale
7	$(23 - 3d) + (23 - 2d) + (23 - d) + 23 + (23 + d) = 80$ $-5d + 115 = 80$ $d = 7$ $w = 2, x = 9, y = 16, z = 30$	B2 Deduct 1 mark for each error	Poorly done despite being a common past yr's O lvl qn

8a	$2(44 - 28) + 28\theta + 44\theta = 72\pi - 76$ $72\theta = 72\pi - 76 - 32$ $\theta = \frac{72\pi - 108}{72}$ $\text{angle } AOB = \pi - 1.5$	M1 A1	Poorly done as many used the formula for degree
8b	$\text{area} = \frac{1}{2} \times 44^2 (\pi - 1.5) - \frac{1}{2} \times 28^2 (\pi - 1.5)$ $= 946 \text{ cm}^2 (3\text{sf})$	M1 A1 (ecf)	Poorly done as many used the formula for degree
9a	$\cos \angle ACD = -\frac{5}{12} \quad \text{or} \quad \cos \angle ACB = \frac{5}{12}$ $\angle ACD = \cos^{-1}\left(-\frac{5}{12}\right) \quad \angle ACB = \cos^{-1}\frac{5}{12} = 65.375^\circ$ $= 114.624^\circ \quad \angle ACD = 180^\circ - 65.375^\circ$ $= 114.6^\circ$	M1 A1	Some did not leave answer in 1dp
9b	$360^\circ - (114.624^\circ - 90^\circ) = 335.4^\circ$	B1	Some did not leave answer in 1dp
10ai	$60 - 30 = 30$	M1A1	
10aii	36 marks	B1	
10b	$\frac{390 - 180}{400} = \frac{21}{40} \text{ (accept 0.525 \& 52.5\%)}$	M1A1	
11a	168.0 (4sf)	B1	Generally ok
11b	$P = 2w - \frac{x^2 y}{w}$ $\frac{x^2 y}{w} = 2w - P$ $x^2 y = 2w^2 - Pw$ $x^2 = \frac{2w^2 - Pw}{y}$ $x = \pm \sqrt{\frac{2w^2 - Pw}{y}}$	M1 M1 A1	Some wrote: $P = 2w - \frac{x^2 y}{w}$ $Pw = 2 - x^2 y$ Quite a number still weak in algebraic manipulation . Many did not include the $\pm$
12	$AB^2 = 26^2 = 676$ $AC^2 + BC^2 = 24^2 + 10^2 = 676 = AB^2$ By the converse of <u>Pythagoras' Theorem</u>, $\triangle ABC$ is a <u>right-angled triangle</u>. Hence, by the converse of <u>right-angle in semi-circle</u>, AB is the diameter of the circle.	M1 M1 A1	Poorly done as students are weak in explanation. Did not use the word "converse" when explaining using Pythagoras' Thm

13	$8x - 3y = 25 \text{ ----- (1)}$ $12x + 5y = 9 \text{ ----- (2)}$ $(1) \times 5, \quad 40x - 15y = 125 \text{ ----- (3)}$ $(2) \times 3, \quad 36x + 15y = 27 \text{ ----- (4)}$ $(3) + (4), \quad 76x = 152$ $x = 2$ $y = -3$	M1 A1 A1	Generally well done.
14		S1 – correct shape MP1 – correct max pt I1 – correct x-ints and y-int	Generally ok except for the location of the maximum point. Some indicate the point at (0,16)
15	$A = 50000 \left(1 + \frac{3.6/12}{100} \right)^{3 \times 12}$ $= 55693.38$ $Int = 55693.38 - 50000$ $= \$5693.38$	M1 M1 A1	Badly Done. Did not divide by 12 for 3.6 and change 3 years to 36 months although the question stated to compound monthly.
16a		B1	Generally ok

16b	$A \cap B'$	B1	Generally ok
17a	7.28×10^{-3}	B1	Generally well done
17bi	81.7×10^{500}	B1	Those who got it wrong did not understand what the question is asking.
17bii	$(6.3 \times 10^{500}) + (8.17 \times 10^{501})$ $= (6.3 + 81.7) \times 10^{500}$ $= 88 \times 10^{500}$ $= 8.8 \times 10^{501}$	M1 A1	Most of the students who did not get b(i) correctly will not be able to solve b(ii) as well.
18i	$504 = 2^3 \times 3^2 \times 7$	B1	Generally well done
18ii	1 st number : $(2^2 \times 3 \times 7) \times 2 = 168$ 2 nd number : $(2^2 \times 3 \times 7) \times 3 = 252$	B2	Generally ok. Those who did not answer correctly were mainly because they did not understand HCF and LCM fully.
19	$x = 25.277^\circ$ or $180^\circ - 25.277^\circ$ $x = 25.3^\circ$ or 154.7°	B2	Many did not correct to 1 dp for degrees
20a	$1944 = D + 66 \times 24$ $D = 1944 - 1584$ $= \$360$	M1 A1	Generally ok
20b	<i>Int :</i> $1944 - 1800 = \frac{(1800 - 360)(R)(2)}{100}$ $R = \frac{144 \times 100}{1440 \times 2} = 5$	M1 A1	Poorly done. Did not know that they need to use simple interest formula to calculate the interest rate per annum. For those who knew, they substitute either the wrong interest or principal value.
21a	$\frac{7+6t+28+25+13+8t^2+12}{7} = 16$ $8t^2 + 6t - 27 = 0$ $(2t - 3)(4t + 9) = 0$ $t = 1.5$ (shown) or -2.25 (rej)	M1 M1 A1	Generally ok.

21b	1. Kalea studied longer, on average, as her mean is higher. 2. Kalea's studying hour is more widespread as her SD is higher.	B1 B1	Generally ok. Some students are not explain when SD is higher, it means more widespread.
22	$(2x^2 - 5x + 3)(5x - 4)$ $= 10x^3 - 8x^2 - 25x^2 + 20x + 15x - 12$ $= 10x^3 - 33x^2 + 35x - 12$	M1 A1	Generally ok except for some students are not able to expand with careless mistakes such as -20x instead of +20x.

23a	$y = (8x - 3)(2x + 3) - (4x)^2$ $= 16x^2 + 18x - 9 - 16x^2$ $= 18x - 9$ Since $18x$ is an even number & 9 is an odd number, therefore $18x - 9$ will be an odd number.	M1 M1 A1	Poorly done. Some students assumed that $18x - 9$ is the final answer and did not explain why $18x - 9$ will be an odd number.
23b	$x = 1$ and $y = 9$	B1	Poorly done as they did not substitute an appropriate value for x to the equation $18x - 9$. They did not see the connection to part (a)
24	$\frac{5x^2 - 15x}{x^4 - 81}$ $= \frac{5x(x - 3)}{(x^2 - 9)(x^2 + 9)}$ $= \frac{5x(x - 3)}{(x - 3)(x + 3)(x^2 + 9)}$ $= \frac{5x}{(x + 3)(x^2 + 9)}$	M2 A1	Most is able to factorize the numerator by picking up common factor of $5x$. However, most did not factorize $x^4 - 81$. Those who manage to factorize $x^4 - 81 = (x^2 - 9)(x^2 + 9)$ but did not factorize $(x^2 - 9)$
25	$x^2 + 16x + 18 = 0$ $(x + 8)^2 - 8^2 = -18$ $(x + 8)^2 = -18 + 64$ $x + 8 = \pm\sqrt{46}$ $x = -1.22(2dp) \text{ or } -14.78(2dp)$	M1 A2	Generally ok for those who use the completing the square method. Some students use quadratic formula to solve. There are quite a number who roundoff to 3 S.F instead of 2 d.p.

26i	$V = \frac{1}{3}\pi(6)^2(14) = 168\pi$	B1	Generally ok. Some students did not leave answers in terms of π
26ii	Using Similar $\square$ s, $\frac{r}{6} = \frac{7}{14}$ $r = 3$ $V = \frac{1}{3}\pi(3)^2(7) = 21\pi$	M1 A1	Some students who did not use similar triangles to get radius is 3cm.
26iii	Using Similar figures, $\left(\frac{h}{14}\right)^3 = \frac{168\pi - 21\pi}{168\pi}$ $\frac{h}{14} = \sqrt[3]{\frac{147}{168}}$ $h = 13.4(3sf)$	M1 A1	Poorly done. Students did not see that they can use similar figures to get the volume. Some tried to get the values for radius or height but applied the wrong concept of using height of 7cm and 14cm as the ratio of similar heights.
27a	$\overrightarrow{OC} = \overrightarrow{OB} + \overrightarrow{BC} = 4\mathbf{a} + 3\mathbf{b}$ $\overrightarrow{AE} = \overrightarrow{AO} + \overrightarrow{OE}$ $= \overrightarrow{AO} + \frac{1}{3}\overrightarrow{OC}$ $= -3\mathbf{a} + \frac{1}{3}(4\mathbf{a} + 3\mathbf{b})$ $= -3\mathbf{a} + \frac{4}{3}\mathbf{a} + \mathbf{b}$ $= -\frac{5}{3}\mathbf{a} + \mathbf{b} \quad (shown)$	M1 A1	Generally ok.

27b	$\overrightarrow{AF} = \overrightarrow{AO} + \overrightarrow{OF}$ $= -3\mathbf{a} + \frac{3}{5}\overrightarrow{OB}$ $= -3\mathbf{a} + \frac{3}{5}(3\mathbf{b})$ $= -3\mathbf{a} + \frac{9}{5}\mathbf{b}$ $= \frac{9}{5}\left(-\frac{5}{3}\mathbf{a} + \mathbf{b}\right)$	M1 A1	Generally ok.
27c	Since $\overrightarrow{AF} = \frac{9}{5}\overrightarrow{AE}$ & <u>A is a common point</u>, <u>points A, E and F lie on a straight line.</u>	M1 A1	Poorly done. Students did not know how to get the scalar and state that A is a common point.
27d	$\frac{1}{2} \times 30 = 15\text{cm}^2$	B1	Generally ok.

Name:	Index Number:	Class:
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**YIO CHU KANG SECONDARY SCHOOL
O-LEVEL PRELIMINARY EXAMINATION 2025
SECONDARY FOUR EXPRESS
SECONDARY FIVE NORMAL (ACADEMIC)**



MATHEMATICS

Paper 2

4052/02

2 hours 15 minutes

Additional Materials: Nil

1 September 2025 (Monday)

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.

Candidates answer on Question Paper.

Write your name, class and index number on the cover sheet.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams or graphs.

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

Answer **all** questions.

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 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 π , use either the calculator value or 3.142, unless the question requires the answer in terms of π .

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

The total of the marks for this paper is 90.

For Examiner's Use

Setter: Mdm Annie Mathews

Mathematical Formulae

Compound interest

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

Mensuration

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

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

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

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

$$\text{Area of } \triangle ABC = \frac{1}{2} b c \sin A$$

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

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

Trigonometry

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

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

Statistics

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

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

- 1 (a) Find all the prime numbers that satisfy the inequality $-5 \leq 2x - 3 \leq 7$.

Answer [3]

(b) Simplify $\frac{18c^3d^3}{5f^3} \div \frac{3c^5d^2}{10f}$.

Answer [2]

(c) Simplify $\left(\frac{16y^8}{81x^{12}}\right)^{-\frac{3}{4}}$.

Answer [2]

(d) Write as a single fraction in its simplest form $\frac{3x}{(2x-1)^2} - \frac{2}{2x-1}$.

Answer [2]

- 2 (a) On average, fruit seller A is able to sell 20 mangoes, 32 apples and 15 oranges in a day.
On average, fruit seller B is able to sell 15 mangoes, 35 apples and 18 oranges in a day.

The information can be represented by the matrix $\mathbf{F} = \begin{pmatrix} 20 & 32 & 15 \\ 15 & 35 & 18 \end{pmatrix}$.

- (i) Evaluate the matrix $\mathbf{T} = 5\mathbf{F} \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$.

Answer $\mathbf{T} =$ [2]

- (ii) State what each of the elements of $\mathbf{T}$ represents.

.....
..... [1]

- (b) Seller A sells a mango for 80 cents, an apple for 50 cents and an orange for 60 cents.
Seller B sells a mango for 70 cents, an apple for 40 cents and an orange for 50 cents.

- (i) Represent this information in a 3×2 matrix $\mathbf{C}$.

Answer $\mathbf{C} =$ [1]

- (ii) Evaluate the matrix $\mathbf{P} = \mathbf{FC}$.

Answer $\mathbf{P} =$ [2]

- (iii) The cost price of all the fruits sold is \$10 for each seller.

Explain which seller made a higher profit.

.....

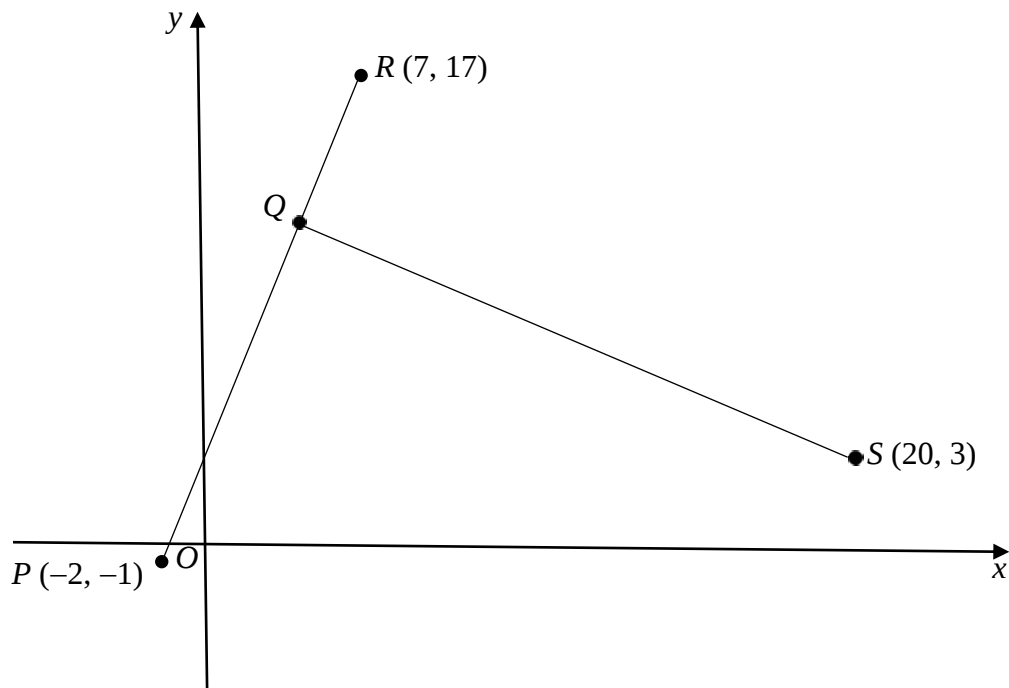
 [1]

- (c) In a promotion, both seller A and B decide to give a discount of 20% for each mango and 10% for each apple.

With the use of matrix multiplication, find a 3×2 matrix $\mathbf{N}$ where each element represents the new selling price of a mango, an apple and an orange by seller A and B respectively.

Answer $\mathbf{N} =$ [2]

3 (a)



The diagram shows the points $P(-2, -1)$, $R(7, 17)$ and $S(20, 3)$.
 Q is a point on PR such that SQ is perpendicular to PR .
 The product $(\text{gradient of } SQ) \times (\text{gradient of } PR) = -1$.

Use this information to find the equation of SQ .

Answer [4]

- (b) G is the point $(5, 3)$.
 H is the point $(-4, h)$, where $h > 0$.
The length of line GH is 15 units.

Find the value of h .

Answer $h = \dots\dots\dots$ [3]

- (c) The y -intercept of the line $2x + ky - 6 = 0$ is -2 .

Find the value of k .

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

- 4 (a) Complete the table of values for $y = \frac{x}{4}(8 - 6x + x^2)$.

Give your answer correct to 2 decimal places.

x	-1	0	0.5	1	1.5	2	2.5	3	4	5
y	-3.75	0		0.75	0.47	0	-0.47	-0.75	0	3.75

[1]

- (b) On the grid opposite, draw the graph of $y = \frac{x}{4}(8 - 6x + x^2)$ for $-1 \leq x \leq 5$. [3]

- (c) Use your graph to find the solution to the equation $x^3 - 6x^2 + 8x = 12$ for $-1 \leq x \leq 5$.

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

- (d) (i) Line L has gradient -0.5 and passes through the point $(3, 1)$.

Draw line L on the same axes for $-1 \leq x \leq 5$. [2]

- (ii) Write down the x -coordinate of the point where line L intersects the curve.

Answer $x = \dots\dots\dots$ [1]

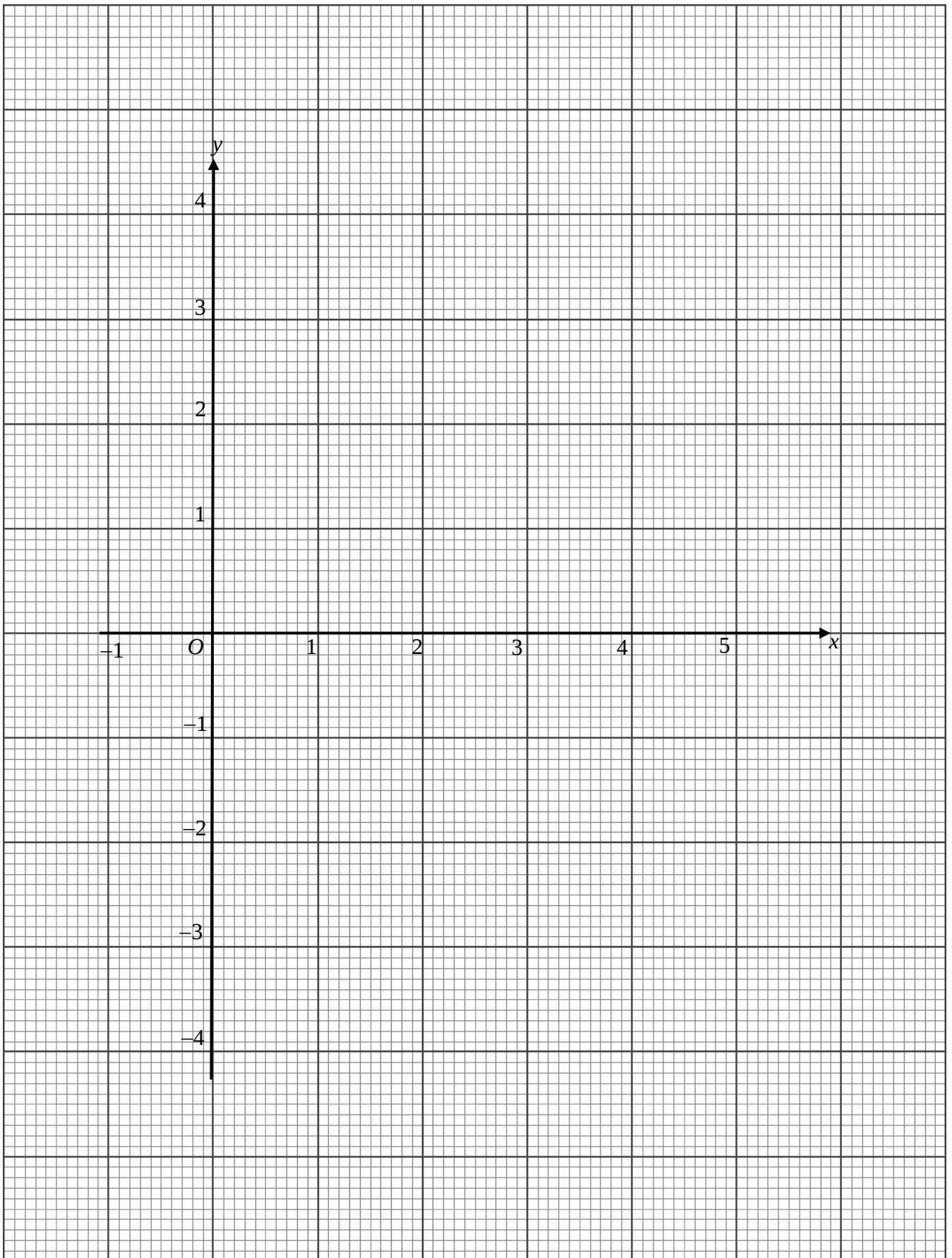
- (iii) This value of x is the solution of the equation $x^3 + Ax^2 + Bx + C = 0$.

Find the value of A , B and C .

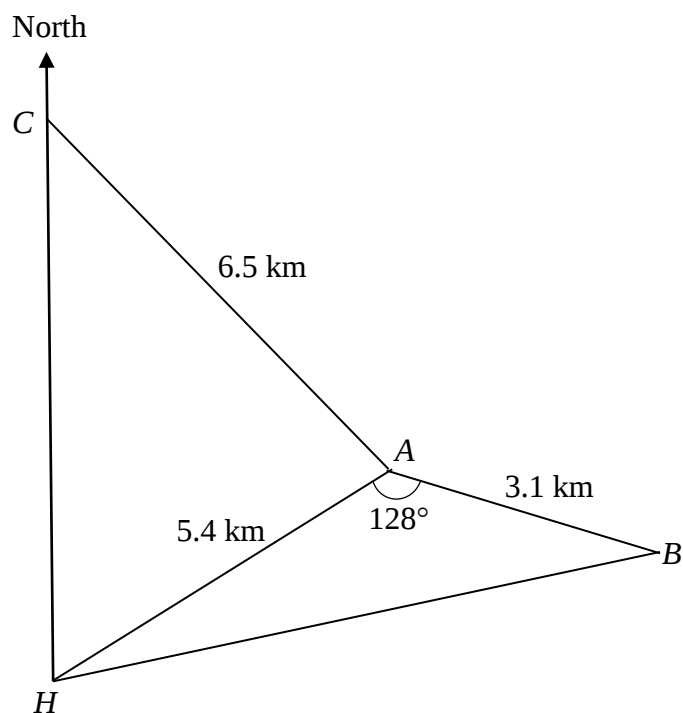
Answer $A = \dots\dots\dots$

$B = \dots\dots\dots$

$C = \dots\dots\dots$ [3]



5



The diagram shows the position of a harbour, H , and three islands, A , B and C .
 $HA = 5.4$ km, $AB = 3.1$ km and $AC = 6.5$ km.

The bearing of A from C is 133° and angle $HAB = 128^\circ$.

C is due north of H .

(a) Calculate HB .

Answer km [2]

- (b) Show that angle $CAH = 71.3^\circ$, correct to one decimal place.

Answer

[3]

- (c) Find the bearing of B from A .

Answer $^\circ$ [2]

- (d) A vertical tower is located on island A .
The angle of elevation of the top of the tower from B is 14° .
Calculate the angle of elevation of the top of the tower from C .

Answer $^\circ$ [3]

- 6** A motorboat can sail at a constant speed of x km/h in still water.
When the motorboat sails with the current in a river, its speed is increased by 3 km/h and when it sails against the current, its speed is decreased by 3 km/h.
The boat sails from Village A to Village B against the current and from Village B to Village C with the current.
Village A and Village B are 12 km apart. Village B and Village C are 9 km apart.
The total time taken for the whole journey is 1 hour and 15 minutes.

(a) Show that $5x^2 - 84x - 81 = 0$.

Answer

[5]

- (b) Solve the equation $5x^2 - 84x - 81 = 0$.
Give your answers correct to two decimal places.

Answer $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [3]

- (c) Explain why one of the answers in **part (b)** must be rejected.

.....
..... [1]

- (d) Calculate the difference between the times taken for the boat to travel from Village A to Village B and from Village B to Village C.
Give your answer in minutes and seconds, correct to the nearest second.

Answer minutes seconds [2]

- 7 (a) A group of 50 patients had their blood pressures taken.
The results are shown in the table.

Blood pressure (mmHg)	$100 < p \leq 120$	$120 < p \leq 140$	$140 < p \leq 160$	$160 < p \leq 180$
Frequency	27	12	6	5

- (i) Find the interval that contains the median blood pressure.

Answer $< p \leq$ [1]

- (ii) Calculate an estimate of the mean blood pressure.

Answer mmHg [1]

- (iii) Calculate an estimate of the standard deviation of the blood pressures.

Answer mmHg [1]

- (iv) The standard deviation of the blood pressures taken by a second group of patients was 22.1 mmHg.

Use this information to comment on one difference between the two distributions.

.....

.....

..... [1]

- (b) The heights of two groups of students are measured.
Their heights are shown in the stem-and-leaf diagram.

Group A					Group B				
			1	14	2				
9	8	8	2	15	3	x	7	8	
	4	3	3	16	0	2	4		
		3	0	17	8				
Key: 1 14 2					means a height of 141 cm in group A and a height of 142 cm in group B				

- (i) The interquartile range for Group B is 10 cm.

Show that the value of x is 3.

Answer

[3]

- (ii) One of the students from Group A is selected at random.

Find the probability that the student has a height between 152 cm and 164 cm.

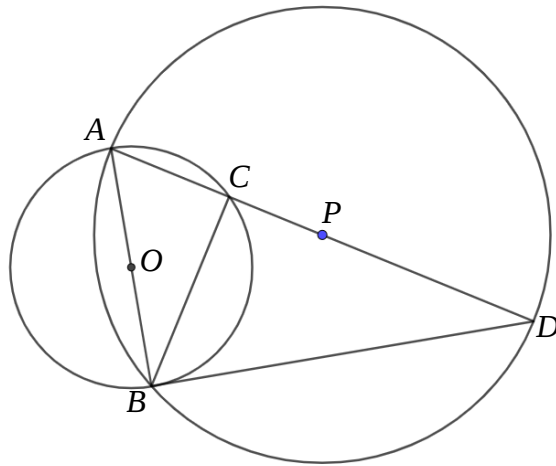
Answer [1]

- (iii) Two students are selected at random, one from Group A and the other from Group B.

Find the probability that one has a height above 160 cm and the other has a height below 155 cm.

Answer [2]

8 (a)



A , B and C are points on the circle with centre O .
 A , B and D are points on the circle with centre P .

- (i) Show that triangle ABC is similar to triangle ADB .
 Give a reason for each statement you make.

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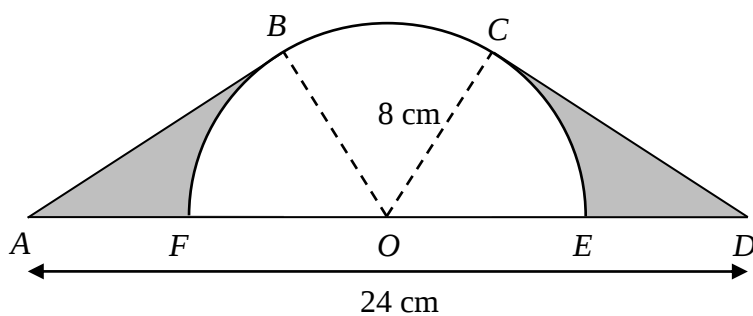
 [2]

- (ii) $AC = 6$ cm and $CD = 12$ cm.

Calculate the length of AB .

Answer cm [2]

(b)



The diagram shows a semicircle $FBCE$ with centre O and radius 8 cm .
 AB is a tangent to the semicircle at B and CD is a tangent to the semicircle at C .
 $AFOED$ is a straight line of length 24 cm .
 $AF = ED$.

Calculate the shaded area.

Answer cm^2 [5]

- 9 Chan is considering installing solar panels at his house and wants to determine if it would be worthwhile.

The tables below show information Chan needs to make his decision.

Electricity usage for 2025 (kWh)					
January	February	March	April	May	June
1007.8	1166.3	1133.6	1249	1248.5	1282.6

Charges for electricity usage
Electricity tariff: 28.12 cents per kWh (excluding GST) (charges are subjected to 9% Goods and Services Tax)

Installation of solar panels	
Dimensions of roof area of Chan's house	9 m by 4 m
Dimensions of 1 solar panel	1.65 m by 1 m
Cost of installing 10 solar panels (this cost is not subjected to 9% GST)	\$10 250
Average amount of electricity generated by 1 solar panel	45 kWh per month
Lifespan of solar panels	25 years

- (a) For the first six months of 2025, calculate the
- (i) average monthly amount of electricity, in kWh, used by Chan.

Answer kWh [2]

- (ii) average monthly cost that Chan paid for electricity usage.

Answer \$ [2]

- (b) Calculate the maximum number of solar panels that can be installed on the roof of Chan's house.

Answer [2]

- (c) Should Chan go ahead to install solar panels at his house?
Justify the decisions you make and show your calculations clearly.

Answer

.....
..... [5]

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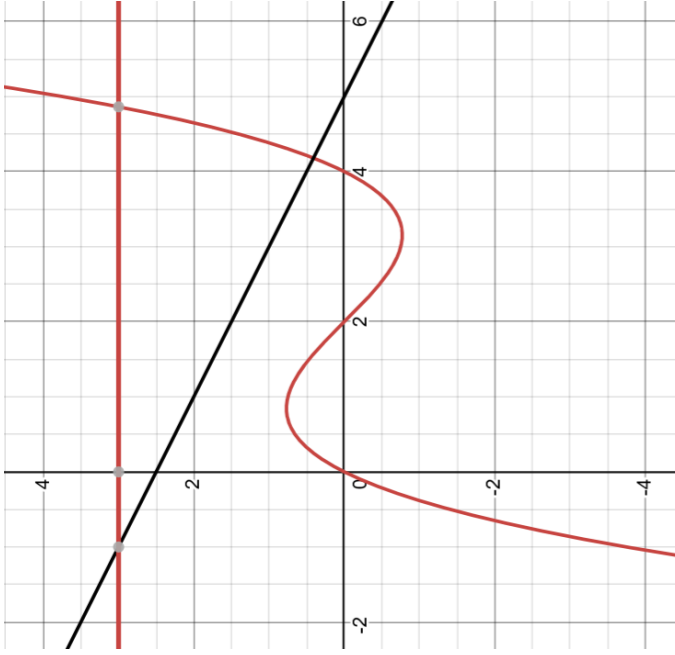
Yio Chu Kang Secondary School
4E/5N Prelim Mathematics P2 2025
Mark Scheme

Qn	Solutions	Marks	Marker's Comments
1(a)	$-5 < 2x - 3 \leq 7$ $-5 < 2x - 3$ $-1 < x$ $-1 < x \leq 5$ Prime numbers are 2, 3, 5.	M1 M1 A1	Many students did not combine final inequality to $-1 < x \leq 5$. Avoid doing by guess-and-check. Form simultaneous inequalities to solve. Those who simply wrote 2, 3, 5 get a maximum of 2 marks. Some still think that negative numbers and '1' are prime.
1(b)	$\frac{18c^3d^3}{5f^3} \div \frac{3c^5d^2}{10f}$ $= \frac{18c^3d^3}{5f^3} \times \frac{10f}{3c^5d^2}$ $= \frac{12d}{c^2f^2}$	B2 (deduct 1 m for 1 error)	No mark awarded for 'keep, change, flip'.
1(c)	$\left(\frac{16y^8}{81x^{12}} \right)^{-\frac{3}{4}}$ $= \left(\frac{3^4 x^{12}}{2^4 y^8} \right)^{\frac{3}{4}}$ $= \frac{27x^9}{8y^6}$	M1 A1	Cannot have a fraction within another fraction. That is not simplified.

1(d)	$\frac{3x}{(2x-1)^2} - \frac{2}{2x-1}$ $= \frac{3x-2(2x-1)}{(2x-1)^2}$ $= \frac{3x-4x+2}{(2x-1)^2}$ $= \frac{-x+2}{(2x-1)^2}$	M1 A1	$(2x-1)^2 \neq (2x-1)(2x+1)$ Many still get this Sec 2 identity mixed up.
2 (a)(i)	$\mathbf{T} = 5 \begin{pmatrix} 20 & 32 & 15 \\ 15 & 35 & 18 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$ $\mathbf{T} = 5 \begin{pmatrix} 67 \\ 68 \end{pmatrix}$ $\mathbf{T} = \begin{pmatrix} 335 \\ 340 \end{pmatrix}$	M1 A1	1 mark awarded for matrix multiplication without $\begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$ matrix.
(a)(ii)	The elements represent the <u>total number of mangoes, apples and oranges</u> sold by seller A and B respectively in <u>5 days</u> .	B1	“Weekdays” not allowed. It is ‘5 days’, “weekday” or “weekend” not mentioned. Total number, not average number.
(b)(i)	$\mathbf{C} = \begin{pmatrix} 80 & 70 \\ 50 & 40 \\ 60 & 50 \end{pmatrix} \quad \text{or} \quad \mathbf{C} = \begin{pmatrix} 0.80 & 0.70 \\ 0.50 & 0.40 \\ 0.60 & 0.50 \end{pmatrix}$	B1	
(b)(ii)	$\mathbf{P} = \begin{pmatrix} 20 & 32 & 15 \\ 15 & 35 & 18 \end{pmatrix} \begin{pmatrix} 80 & 70 \\ 50 & 40 \\ 60 & 50 \end{pmatrix}$ $\mathbf{P} = \begin{pmatrix} 4100 & 3430 \\ 4030 & 3350 \end{pmatrix} \quad \text{or} \quad \begin{pmatrix} 41.00 & 34.30 \\ 40.30 & 33.50 \end{pmatrix}$	A1 for 2 correct elements A2 for 4 correct elements	

(b)(iii))	Seller A receives a total of \$41 while seller B receives \$33.50. Seller A made a higher profit.	B1	“Total sales/total revenue ” not “total selling price”
(c)	$\mathbf{N} = \begin{pmatrix} 0.8 & 0 & 0 \\ 0 & 0.9 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 80 & 70 \\ 50 & 40 \\ 60 & 50 \end{pmatrix}$ $\mathbf{N} = \begin{pmatrix} 64 & 56 \\ 45 & 36 \\ 60 & 50 \end{pmatrix}$	M1 A1	Many still do not know that the orders of matrices are important for matrix multiplication.
3(a)	Gradient of $PR = \frac{17 - (-1)}{7 - (-2)} = 2$ Gradient of $SQ = -\frac{1}{2}$ Equation of $SQ : y = -\frac{1}{2}x + c$ Sub $S(20, 3)$ $3 = -\frac{1}{2}(20) + c$ $c = 13$ Equation of $SQ : y = -\frac{1}{2}x + 13$	M1 M1 M1 A1	Error carried forward (ecf) maximum of 2 marks.

(b)	$\sqrt{[5 - (-4)]^2 + (3 - h)^2} = 15$ $9^2 + (3 - h)^2 = 225$ $(3 - h)^2 = 144$ $3 - h = 12 \quad \text{or} \quad 3 - h = -12$ $h = -9 \quad \text{or} \quad h = 15$ Since $h > 0$, $h = 15$	M1 M1 A1	$\sqrt{81 + (h - 3)^2} \neq 9 + (h - 3)!!!$ For example, $\sqrt{81 + 25} = 10.3$ correct $\sqrt{81 + 25} = \sqrt{9 + 5} = \sqrt{14} = 3.74 \text{ incorrect!!}$
(c)	$2x + ky - 6 = 0$ $y = -\frac{2}{k}x + \frac{6}{k}$ $\frac{6}{k} = -2$ $k = -3$	M1 A1	Many wrote $2x + ky - 6 = -2$!! ‘-2’ is the y-intercept, so you should substitute $(0, -2)$ into the original equation $2x + ky - 6 = 0$.

4(a)	0.66	B1	Quite a few did not follow 2 d.p. required!!
(b)		P2 – pts plotted correctly C1 – smooth curve	Some curved were not even S-shaped! A cubic graph is S-shaped. Usually a result of one or two pointed incorrectly plotted. Do not extend your graph beyond the first and last points in the table. It is a curve. No part should be linear/straight-line. Many curves were not smooth; some parts had “double lines”. Some were using pencils not sharpened or not dark enough. Some lost marks as curve did not go through the middle of the plotted X.
(c)	$x^3 - 6x^2 + 8x = 12$ $x(x^2 - 6x + 8) = 12$ $\frac{x}{4}(8 - 6x + x^2) = 3$ Draw the line $y = 3$ From the graph, $x = 4.9 \pm 0.1$	M1 A1	Poorly done.

(d)(i)	Line $L: y = -\frac{1}{2}x + c$ Sub (3,1), $1 = -\frac{1}{2}(3) + c$ $c = 2\frac{1}{2}$ $y = -\frac{1}{2}x + \frac{5}{2}$	B1 for eq B1 for drawing line or B2 for drawing line	Poorly done.
(ii)	From the graph, $x = 4.2 \pm 0.1$	B1	Poorly done. Some wrote unreadable answers. You can only read to the accuracy of half the smallest box.
(iii)	$\frac{x}{4}(8 - 6x + x^2) = -\frac{1}{2}x + \frac{5}{2}$ $x(8 - 6x + x^2) = -2x + 10$ $x^3 - 6x^2 + 10x - 10 = 0$ $A = -6, B = 10, C = -10$	M1 A2 for 3 answers	Poorly done.
5(a)	$HB^2 = 5.4^2 + 3.1^2 - 2(5.4)(3.1)\cos 128^\circ$ $HB = \sqrt{59.382346}$ $HB = 7.705994$ $HB = 7.71 \text{ km (to 3 s. f.)}$	M1 A1	

(b)	$\frac{5.4}{\sin 47^\circ} = \frac{6.5}{\sin \angle CHA}$ $\sin \angle CHA = \frac{6.5 \sin 47^\circ}{5.4}$ $\angle CHA = 61.68256^\circ$ $\angle CAH = 133 - 61.68256^\circ$ $\angle CAH = 71.31744^\circ$ $\angle CAH = 71.3^\circ \text{ (to 1 d.p.)} \quad \text{(shown)}$	M1 M1 A1	When question asks for a number to “show”, you need to show the unrounded number before the rounded number that you are aiming to get.
(c)	Draw North line at A $\angle NAH = 180^\circ - 61.7^\circ = 118.3^\circ \text{ (int } \angle \text{ s)}$ $\text{Bearing of B from A} = 360^\circ - 128^\circ - 118.3^\circ = 113.7^\circ$	M1 A1	Poor presentation in finding bearings. Many still rounded to 3 s.f.
(d)	$\tan 14^\circ = \frac{h}{3.1}$ $h = 0.772917 \text{ km}$ $\tan \theta = \frac{0.772917}{6.5}$ $\theta = 6.8^\circ \text{ (to 1 d.p.)}$ angle of elevation = 6.8°	M1 M1 A1	A few students have ecf mark(s) here.

6(a)	Time taken to travel from A to B = $\frac{12}{x-3}$ h Time taken to travel from B to C = $\frac{9}{x+3}$ h $\frac{12}{x-3} + \frac{9}{x+3} = 1\frac{1}{4}$ $\frac{12(x+3) + 9(x-3)}{(x-3)(x+3)} = \frac{5}{4}$ $48x + 144 + 36x - 108 = 5(x^2 - 9)$ $84x + 36 = 5x^2 - 45$ $5x^2 - 84x - 81 = 0 \quad (\text{shown})$	M1 A1 M1 M1 A1	Many students were not able to connect speed, distance and time to form an equation.
(b)	$x = \frac{84 \pm \sqrt{(-84)^2 - 4(5)(-81)}}{2(5)}$ $x = \frac{84 \pm \sqrt{8676}}{10}$ $x = 17.7145 \text{ or } -0.91450$ $x = 17.71 \text{ or } -0.91$	M1 A1, A1	Some students failed to give the answers correct to 2 d.p.
(c)	The solution $x = -0.91$ must be rejected, as it results in the <u>speed</u> x km/h, to be a <u>negative value</u> .	B1	Some students took x to be time rather than speed.
(d)	Difference = $\left(\frac{12}{17.7145 - 3} - \frac{9}{17.7145 + 3} \right)$ h = 0.381044 h = 22.8626 min = 22 min 52 sec	M1 A1	Some used the 3 s.f. value of 17.7 to find the difference in time. This resulted in inaccurate answer. Some students do not know how to convert minutes to minutes and seconds.

7(a(i))	$100 < p \leq 120$	B1	Most were able to get the correct interval.
(ii)	125.6 mmHg	B1	Well done
(iii)	20.1 mmHg	B1	Well done
(iv)	The blood pressures of the second group of patients is <u>less consistent</u> than that of the first group of patients, since it has a <u>higher SD compared to the first group</u> .	B1	Good. Many correctly used the terms 'less consistent' or 'more consistent'.
(b)(i)	Group B: 142, 153, y, 157, 158, 160, 162, 164, 178 $Q_3 = \frac{162 + 164}{2} = 163$ $163 - Q_1 = 10$ $Q_1 = 153$ $Q_1 = \frac{153 + y}{2} = 153$ $y = 153$ $x = 3 \quad (\text{shown})$	M1 M1 A1	Poorly done. A number of students gave wrong presentations: 15x means 15 multiplied by x. $Q_1 = \frac{153 + 15x}{2} = 153$ $15x = 306 - 153$ $15x = 153$ $x = 3$ Wrong interpretation: x is not the height $Q_1 = \frac{153 + x}{2} = 153$ $x = 306 - 153$ $x = 153$ $x = 3$
(ii)	$\text{Prob} = \frac{5}{10} \times \frac{1}{2}$	B1	$\frac{7}{10}$ was a common answer, not realising that lengths 152 cm and 164 cm are not included.
(iii)	$\text{Prob} = \frac{5}{10} \times \frac{3}{9} + \frac{2}{10} \times \frac{3}{9}$ $= \frac{7}{30}$	M1 A1	Many had only one possible outcome, $\frac{5}{10} \times \frac{3}{9}$, not realising that there was another possible outcome.

8(a)(i)	$\angle BAC = \angle DAB$ (common) $\angle ACB = 90^\circ$ (angle in semicircle) $\angle ABD = 90^\circ$ (angle in semicircle) $\angle ACB = \angle ABD$ Triangle ABC is similar to triangle ADB (AA Similarity Test)	M1 A1 (only if both proofs are given)	Poorly done. Instead of proving 2 pairs of equal angles, answers such as AB is common were seen. Some proved 1 pair of equal angles only and concluded that the 2 triangles were similar.
(ii)	$\frac{AB}{AC} = \frac{AD}{AB}$ $\frac{AB}{6} = \frac{18}{AB}$ $AB^2 = 108$ $AB = 10.4$ cm (to 3 s. f.)	M1 A1	Poorly done. Didn't apply ratio of sides to find AB. Some correctly used Pythagoras Theorem. Diameter, $AD = 18$ cm Radius, $PB = 9$ cm, $CP = 3$ cm Found CB and AB
(b)	$OD = 12$ cm $\angle OCD = 90^\circ$ (tangent perpendicular to radius) $\cos \angle COD = \frac{8}{12}$ $\angle COD = 0.841069$ rad Area of sector $COE = \frac{1}{2}(8)^2(0.841069)$ $= 26.9142$ cm ² Area of $\triangle COD = \frac{1}{2}(8)(12)\sin 0.841069$ $= 35.7771$ cm ² Shaded area $= 2 \times (35.7771 - 26.9142)$ $= 17.7$ cm ² (to 3 s.f.)	M1 M1 M1 M1 A1	Some wrongly assumed $\angle AOB = \angle BOC = \angle COD = 60^\circ$. Some wrongly calculated Area of $\triangle COD = \frac{1}{2}(8)(12)$. Many left this question blank.

9(a(i))	Average monthly usage $= \frac{1007.8 + 1166.3 + 1133.6 + 1249 + 1248.5 + 1282.6}{6}$ = 1181.3 kWh	M1 A1	Most were able to get this right. Some approximated the correct answer to 3 s.f.									
(ii)	Average monthly cost = $1181.3 \times \$0.2812 \times 1.09$ = \$362.08 (2 d.p.)	M1 A1	Many were able to do this. Some left the answer in cents, even though answer line showed dollar sign.									
(b)	<table><tr><td></td><td></td><td>Total number of solar panels</td></tr><tr><td>$9 \text{ m} \div 1.65 \text{ m} = 5.4545 \approx 5$</td><td>$4 \text{ m} \div 1 \text{ m} = 4$</td><td>$5 \times 4 = 20$</td></tr><tr><td>$9 \text{ m} \div 1 \text{ m} = 9$</td><td>$4 \text{ m} \div 1.65 \text{ m} = 2.4242 \approx 2$</td><td>$9 \times 2 = 18$</td></tr></table> Maximum number of solar panels = 20			Total number of solar panels	$9 \text{ m} \div 1.65 \text{ m} = 5.4545 \approx 5$	$4 \text{ m} \div 1 \text{ m} = 4$	$5 \times 4 = 20$	$9 \text{ m} \div 1 \text{ m} = 9$	$4 \text{ m} \div 1.65 \text{ m} = 2.4242 \approx 2$	$9 \times 2 = 18$	M1 A1	Few got the correct number of solar panels. Many wrongly divided (9 m by 4 m) with (1.65 m by 1 m) and got an answer of 21.8 $\approx$ 21 or 22 panels.
		Total number of solar panels										
$9 \text{ m} \div 1.65 \text{ m} = 5.4545 \approx 5$	$4 \text{ m} \div 1 \text{ m} = 4$	$5 \times 4 = 20$										
$9 \text{ m} \div 1 \text{ m} = 9$	$4 \text{ m} \div 1.65 \text{ m} = 2.4242 \approx 2$	$9 \times 2 = 18$										
(c)	Amount of electricity produced by solar panels per month = 45 kWh $\times$ 20 solar panels = 900 kWh Average amount of electricity used per month after installation = 1181.3 kWh – 900 kWh = 281.3 kWh Average cost of electricity per month after installation = 281.3 kWh $\times$ \$0.2812 $\times$ 1.09 = \$86.22 Average cost of solar panels per month = $\frac{10250 \times 2}{25 \text{ years} \times 12 \text{ months}} = \68.33 Total average cost of electricity per month after installation = \$86.22 + \$68.33 = \$154.55 < \$362.08 (from ii) Since the average cost of electricity per month paid by Chan after installing the solar panels will be less than what he is currently paying, he should go ahead and install the solar panels.	EU1 EC1 SP1 CE1 A1	Ecf from parts (a) and (b) There were some students who got full 5 marks from Ecf. Some left this question blank.									

<u>Solution</u> (values calculated per year) Amount of electricity produced by solar panels per year = 10800 kWh Average amount of electricity used per year after installation = 3375.6 kWh Average cost of electricity per year after installation = \$1034.64 Average cost of solar panels per year = $\frac{10250 \times 2}{25 \text{ years}} = \\820 Total average cost of electricity per year after installation = \$1034.64 + \$820 = \$1854.64 < \$362.08 × 12 (from ii) Since the average cost of electricity per year paid by Chan after installing the solar panels will be less than what he is currently paying, he should go ahead and install the solar panels. <u>Solution</u> (values calculated for 25 years) Amount of electricity produced by solar panels for 25 years = 270000 kWh Average amount of electricity used for 25 years after installation = 84390 kWh Average cost of electricity for 25 years after installation = \$25866 Average cost of solar panels for 25 years = \$20500 Total average cost of electricity for 25 years after installation = \$25866 + \$20500 = \$46366 < 108624 Since the average cost of electricity for 25 years paid by Chan after installing the solar panels will be less than what he is currently paying, he should go ahead and install the solar panels.		
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