

Name	Index Number	Class
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WOODGROVE SECONDARY SCHOOL

A COMMUNITY OF FUTURE-READY LEARNERS AND THOUGHTFUL LEADERS

END-OF-YEAR EXAMINATIONS 2025

LEVEL & STREAM : SECONDARY 2 G3

SUBJECT (CODE) : MATHEMATICS (4052)

DATE (DAY) : 29 SEPTEMBER 2025 (MONDAY)

DURATION : 2 HOURS 15 MINUTES
(FOR SECTION A AND B)

**Section
A**

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs, tables or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **ALL** questions.

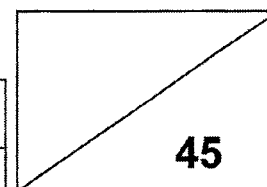
If working is needed for any question, it must be shown with the answer.
Omission of essential working will result in loss of marks.
The use of an approved scientific calculator is expected, where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π , use either your 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.
There are 2 sections in this paper and the total number of marks is 90.

SECTION A (45 MARKS)

DO NOT TURN OVER THE QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.

Student's Signature		Parent's Signature	
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Answer **all** the questions.

- 1** Solve the inequality $5 - 2x \geq -19$.

Answer [2]

- 2** Solve these simultaneous equations.

$$8x + y = 34$$

$$3x - 2y = 8$$

Answer $x =$

$y =$ [3]

- 3 (a) Simplify $(3x+4)(x-2)$.

Answer [2]

- (b) Factorise completely $6y^2+10y-4$.

Answer [2]

- 4 (a) Write $\frac{5t^2}{v^3} \div \frac{25t}{v^2}$ as a single fraction in its simplest form.

Answer [2]

- (b) Express $\frac{6}{2x-3} - \frac{1}{x+2}$ as a fraction in its simplest form.

Answer [2]

- 5 (a) Solve $x^2 = x$.

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

- (b) Hence, solve $(3y-2)^2 = (3y+2)$

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

- 6 (a) (i) If 12 workers take 100 days to build a house, how long will it take 16 workers to build the same house.

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

- (ii) Name one assumption made in part (i) for you to work out the answer.

Answer $\dots\dots\dots$

$\dots\dots\dots$ [1]

- (b) y is inversely proportional to x^2 .
Find the percentage change in y when x is reduced by 50%.

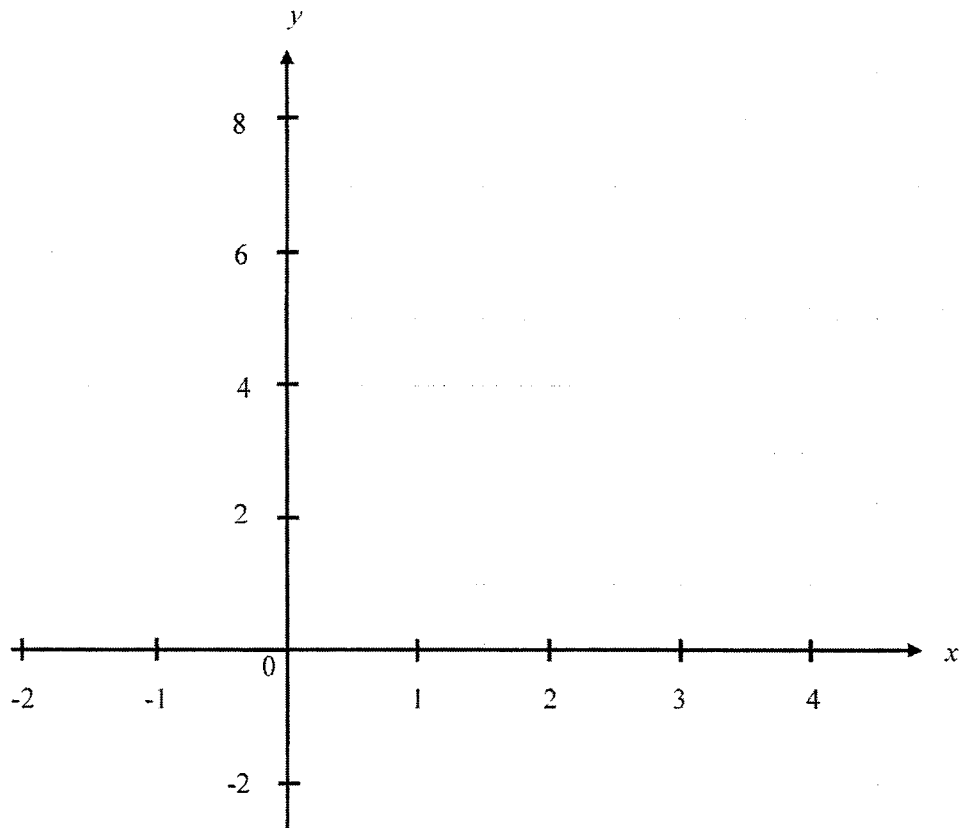
Answer [2]

- 7 (a) Complete the table of values for the linear function $y = 2x + 1$.

x	-0.5	0	1	2.5
y		1	3	6

[1]

- (b) Plot the graph of $y = 2x + 1$ on the grid below and label the line. [2]



- 8 A survey was conducted to find out how much money adults spend on their lunch on average per day. The results are shown in the table below.

Amount of money spend (\$x)	Frequency
$3 \leq x < 4$	30
$4 \leq x < 5$	48
$5 \leq x < 6$	54
$6 \leq x < 7$	31
$7 \leq x < 8$	20
$8 \leq x < 9$	7

- (a) Calculate an estimated mean amount of money spent per day.
Give your answer to the nearest cent.

Answer \$..... [2]

- (b) What is the median amount of money spent per day on lunch?

Answer \$..... $\leq x <$ [1]

- (c) An adult was chosen at random.
Find the probability that this person spends \$6 or more for lunch per day.

Answer [2]

- 9 Among a group of 45 students, 30 are girls.
 $\frac{3}{5}$ of the girls and $\frac{4}{5}$ of the boys passed a recent science test.
A student is selected randomly.
Find, as a fraction in its lowest terms, the probability that the student

(a) fail the test,

Answer [2]

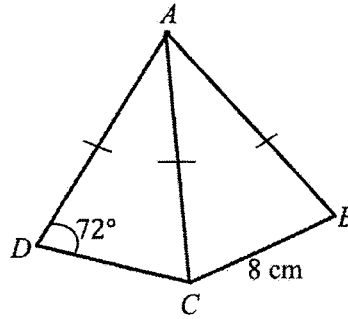
(b) is a boy who passed the test,

Answer [1]

(c) is a girl who failed the test.

Answer [1]

10 Triangle ABC and triangle ADC are congruent triangles.



Find

(a) length CD ,

Answer cm [1]

(b) angle BAD .

Answer° [2]

11 Find the value of θ and x .

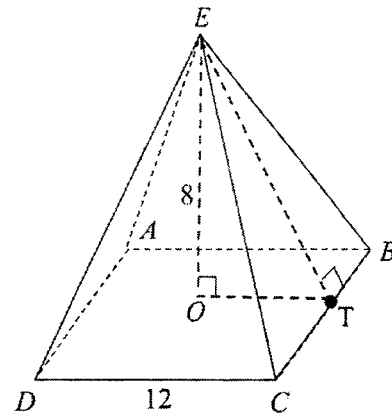
(a) $2\sin \theta = \frac{16}{21}$

Answer $\theta =$ ° [2]

(b) $\tan 72^\circ = \frac{x}{18.5}$

Answer $x =$ [1]

- 12 The diagram shows a solid glass paperweight made in the shape of a square pyramid. $ABCD$ is the square base of a pyramid with side 12 cm. The height of the pyramid is 8 cm. T is the midpoint of BC .



- (a) Calculate the volume of the paperweight.

Answer cm^3 [2]

- (b) Show that the slant height ET is 10 cm.

[1]

(c) Find the total surface area of the paperweight.

Answer cm^2 [2]

END OF SECTION A

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**Section
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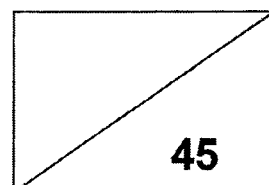
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SECTION B (45 MARKS)

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Answer **all** the questions.

13 (a) Factorise completely $3xy - 6ay - 4x + 8a$

Answer [2]

(b) If $m + 3n = 6$ and $m - 3n = -5$, find the value of $m^2 - 9n^2$.

Answer [2]

14 Simplify $\frac{3x-12}{3x^2-10x-8}$

Answer [3]

15 A map is drawn with the scale of 1 : 60 000.

- (a) The actual distance between town A and town B is 7.68 km.
Find the distance between the two towns represented on the map.

Answer cm [2]

- (b) On the map, the distance between a gas station and a school is 7.5 cm.
What is the actual distance in km?

Answer km [1]

- (c) A forested area on the map has an area of 15 cm^2 .
Find the actual area, in km^2 .

Answer km^2 [2]

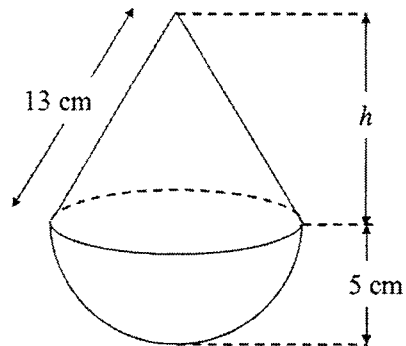
16 Rearrange the formula $a = \frac{b(c+2)}{5+c}$ to make c the subject.

Answer $c = \dots\dots\dots$ [4]

17 The lengths of the sides of a triangle are 6 cm, x cm and y cm.
The longest side of the triangle is x cm.
Given that $(x+y)(x-y) = 36$, explain whether the triangle is a right-angled triangle.
Show your workings clearly below.

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

- 18 The diagram shows a solid made from a cone and a hemisphere.
The slant height of the cone is 13 cm and the radius of the hemisphere is 5 cm.



- (a) Show that the height, h , of the cone is 12 cm. [1]

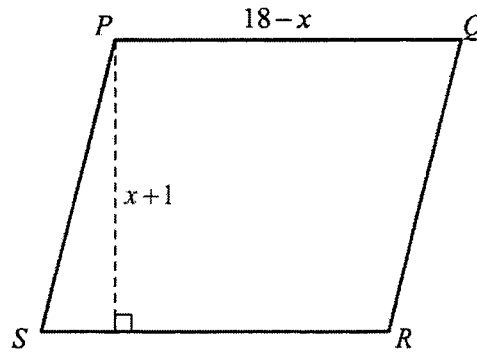
- (b) Calculate the volume of the solid.

Answer cm^3 [3]

- (c) Find the total surface area of the solid.

Answer cm^2 [3]

- 19 $PQRS$ is a parallelogram. The dimensions are measured in centimetre.

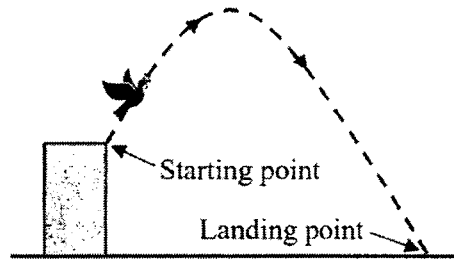


- (a) Given that the area of $PQRS$ is 78 cm^2 , find an expression in terms of x and show that it reduces to $x^2 - 17x + 60 = 0$. [3]

- (b) Hence solve $x^2 - 17x + 60 = 0$, given that x is less than 10.

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

- 20 In a computer game, the flight path of a bird is modelled by the equation $y = -x^2 + 6x + 1$, where y is the height of the bird above the ground at a horizontal distance, x units, from the starting point. The landing point of the bird is at $y = 0$.



Some corresponding values of x and y are given in the table below.

x	0	1	2	3	4	5	6	6.5
y	1	6	9	10	9	6	p	q

- (a) Find the value of p and q .

Answer $p = \dots\dots\dots$

$q = \dots\dots\dots$ [2]

- (b) On the grid opposite, draw the graph of $y = -x^2 + 6x + 1$ for $0 \leq x \leq 6.5$. [3]

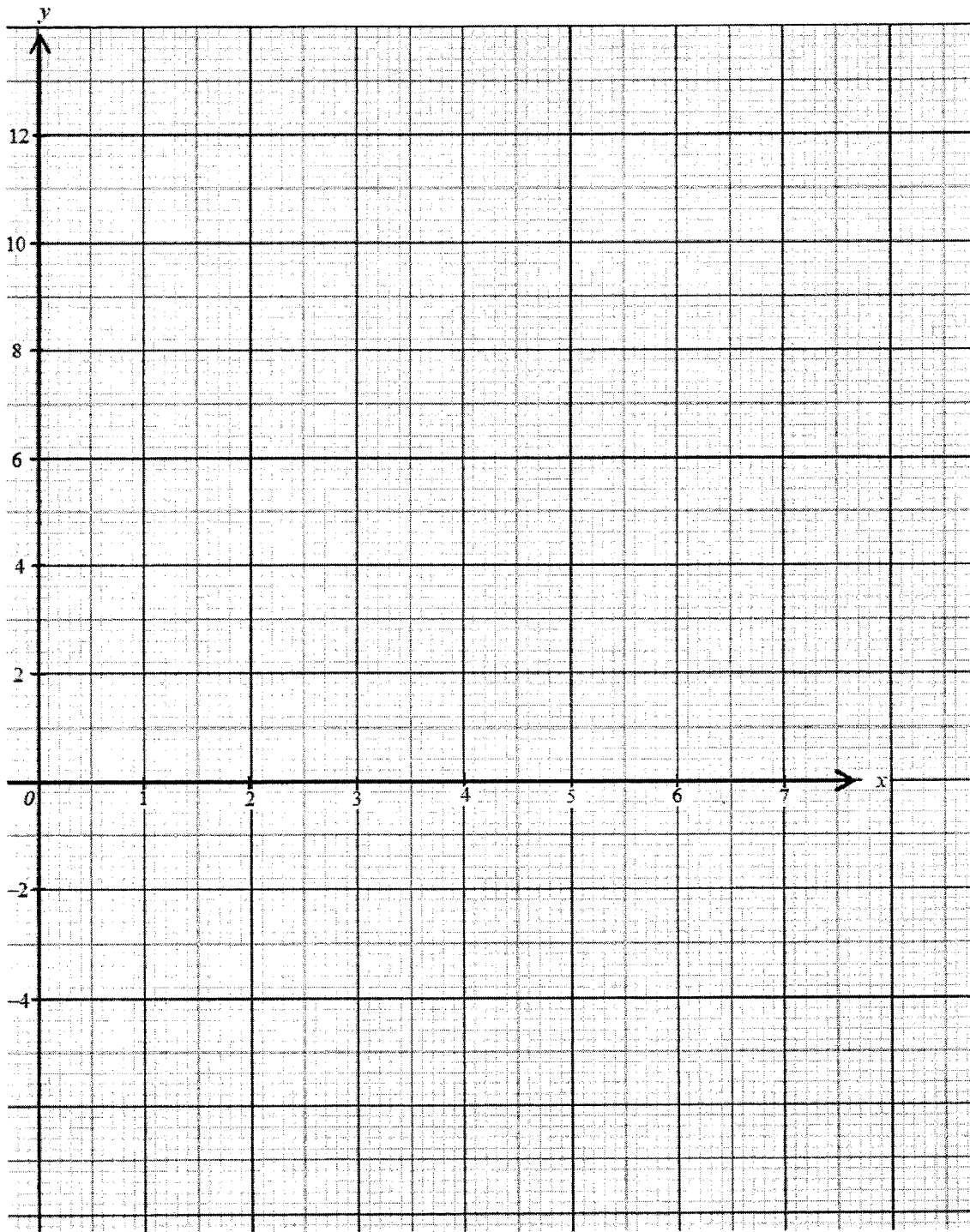
- (c) Use your graph to find

- (i) the coordinates of the landing point,

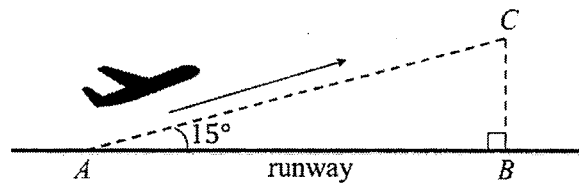
Answer $\dots\dots\dots$ [1]

- (ii) the maximum height of the bird above the ground.

Answer $\dots\dots\dots$ units [1]



- 21 The authorities are designing the layout of a new airport and its neighbouring building and structures. In a simplified plan, an aeroplane takes off at an angle of 15° from a runway at point A . The average takeoff speed of the aeroplane is 78 m/s and C is a point vertically above point B on the horizontal ground. The aeroplane takes half a minute to climb from point A to point C in a straight path.



- (a) Find the distance AC in km.

Answer km [2]

- (b) Find the height BC in metres.

Answer m [2]

- (c) Jane is planning a holiday trip for her family to Manila, which is approximately 2400 km from Singapore. Her family consist of 2 adults and 3 children. She searches online and came across the following air ticket prices from 3 different airline A, B and C.

Airline	Adult Ticket	Child Ticket	Additional Charges	Special Promotion
A	\$500	\$350	NIL	5% off all tickets
B	\$380	\$380	Additional 2% fuel surcharge on total cost of tickets for destination more than 2000 km.	NIL
C	\$700	\$600	NIL	Buy 1 Adult ticket and get 1 Child ticket for free

Which airline should Jane choose to purchase the cheapest tickets?
 Show your workings clearly below to justify Jane's choice of airline.

Answer

..... [4]

END OF SECTION B



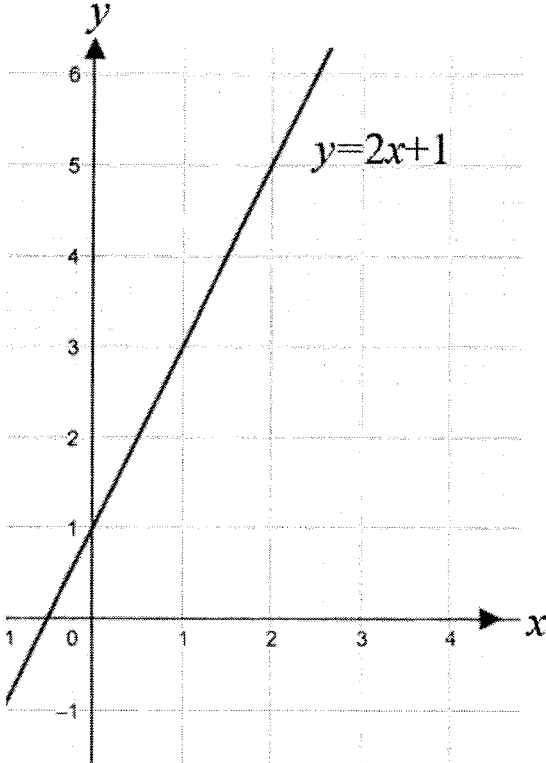
END-OF-YEAR EXAMINATIONS 2025

WGS 2025 2EXP EOY Exam
Section A Marking Scheme

1	(a)	$5 - 2x \geq -19$ $-2x \geq -19 - 5$ $-2x \geq -24$ $x \leq 12$	M1 A1
2		$8x + y = 34$ --- (1) $3x - 2y = 8$ --- (2) <u>By Substitution:</u> From (1): $y = 34 - 8x$ --- (3) Sub (3) into (2): $3x - 2(34 - 8x) = 8$ $3x - 68 + 16x = 8$ $19x = 8 + 68$ $19x = 76$ $x = 4$ Sub $x = 4$ into (3) $y = 34 - 8(4)$ $y = 2$ <u>By Elimination:</u> (1) $\times 2$: $16x + 2y = 68$ --- (3) (3) + (2) : $16x + 2y + 3x - 2y = 68 + 8$ $19x = 72$ $x = 4$ Sub $x = 4$ into (1) $8(4) + y = 34$ $y = 34 - 32$ $y = 2$	M1(Accept Elimination Method) A1 A1
3	(a)	$(3x + 4)(x - 2)$ $= 3x^2 - 6x + 4x - 8$ $= 3x^2 - 2x - 8$	M1 A1
	(b)	$6y^2 + 10y - 4$ $= 2(3y^2 + 5y - 2)$ $= 2(3y - 1)(y + 2)$	M1 A1

4	(a)	$\frac{5t^2}{v^3} \div \frac{25t}{v^2}$ $= \frac{5t^2}{v^3} \times \frac{v^2}{25t}$ $= \frac{5t^2v^2}{25tv^3}$ $= \frac{t}{5v}$	M1 A1
	(b)	$\frac{6}{2x-3} - \frac{1}{x+2}$ $= \frac{6(x+2) - (2x-3)}{(2x-3)(x+2)}$ $= \frac{6x+12-2x+3}{(2x-3)(x+2)}$ $= \frac{4x+15}{(2x-3)(x+2)}$	M1 (combining into single fraction) A1
5	(a)	$x^2 = x$ $x^2 - x = 0$ $x(x-1) = 0$ $x = 0 \text{ or } x-1 = 0$ $x = 0 \text{ or } x = 1$	M1 A1 for both correct answers
	(b)	$(3y-2)^2 = (3y-2)$ $\text{Let } x = (3y-2)$ $3y-2 = 0$ $3y = 2$ $y = \frac{2}{3}$ $3y-2 = 1$ $3y = 3$ $y = 1$	B1 B1
6	(ai)	Let w be workers and D be days $wD = k$ $12 \times 100 = k$	M1

[illegible]

		$y = 1 + 2x$ $y = 1 + 2(-0.5)$ $y = 0$	B1
7	(b)		G1 for all correct plotting of points G1 for drawing of straight line with which passes through all points.
8	(a)	$\bar{x} = \frac{(3.5 \times 30) + (4.5 \times 48) + (5.5 \times 54) + (6.5 \times 31) + (7.5 \times 20) + (8.5 \times 7)}{30 + 48 + 54 + 31 + 20 + 7}$ $\bar{x} = \frac{105 + 216 + 297 + 201.5 + 150 + 59.5}{190}$ $\bar{x} = \frac{1029}{190}$ $\bar{x} = \$5.42$	M1 A1
	(b)	$\$5 \leq x < 6$	B1
	(c)	Total adults who spend \$6 or more $= 31 + 20 + 7$ $= 58$ $P(\text{spend } \$6 \text{ or more}) = \frac{58}{190}$ $= \frac{29}{95}$	M1 A1
9	(a)	Total number of students who fail the test $(\frac{2}{5} \times 30) + (\frac{1}{5} \times 15) = 15$	M1 for finding total number of students who failed the test.

		$P(\text{student who fail the test}) = \frac{12+3}{45}$ $= \frac{1}{3}$	A1
	(b)	$\frac{4}{5} \times 15 = 12 \text{ (no. of boys who pass)}$ $P(\text{boy who pass the test}) = \frac{12}{45}$ $= \frac{4}{15}$	B1
	(c)	$P(\text{girl who fail the test}) = \frac{12}{45}$ $= \frac{4}{15}$	B1
10	(a)	$CD = CB$ (corr angles of congruent triangles) $CD = 8\text{ cm}$	B1
	(b)	$\angle BAC = \angle DAC$ $= 180^\circ - 72^\circ - 72^\circ$ (isos triangle) $= 36^\circ$ $\angle BAD = 36^\circ + 36^\circ$ $= 72^\circ$	M1 A1
11	(a)	$\sin \theta = \frac{16}{21} \div 2$ $\sin \theta = \frac{16}{42}$ $\theta = \sin^{-1}\left(\frac{16}{42}\right)$ $\theta = 22.4^\circ$ (1d.p.)	M1 A1
	(b)	$18.5 \tan 72^\circ = x$ $x = 56.9$ (3s.f.)	B1
12	(a)	$\text{Vol of pyramid} = \frac{1}{3} \times (12 \times 12) \times 8$ $= 384\text{ cm}^3$	M1 A1
	(b)	$ET = \sqrt{8^2 + 6^2}$ $= 10\text{ cm}$	B1
	(c)	Total Surface Area	M1

		$= (12 \times 12) + 4\left(\frac{1}{2} \times 12 \times 10\right)$ $= 384 \text{ cm}^2$	A1
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END-OF-YEAR EXAMINATIONS 2025

WGS 2025 2EXP EOY Exam

Section B Marking Scheme

Setter: Ms Goh Sujuan

13	(a)	$3xy - 6ay - 4x + 8a$ $= 3y(x - 2a) - 4(x - 2a)$ $= (x - 2a)(3y - 4)$ <u>Alternative Method:</u> $3xy - 6ay - 4x + 8a$ $= 3xy - 4x + 8a - 6ay$ $= x(3y - 4) + 2a(4 - 3y)$ $= x(3y - 4) - 2a(3y - 4)$ $= (x - 2a)(3y - 4)$	M1-Accept $3y(x - 2a) + 4(-x + 2a)$ A1 M1 for step 2 or 3 A1
	(b)	$m^2 - 9n^2$ $= m^2 - (3n)^2$ $= (m + 3n)(m - 3n)$ $= (6)(-5)$ $= -30$ <u>Alternative Method</u> $m + 3n = 6 \text{ ---} 1$ $m - 3n = -5 \text{ ---} 2$ Using Elimination Method: $6n = 11$ $n = \frac{11}{6}$ $m = 6 - 3(\frac{11}{6})$ $m = 0.5$ $m^2 - 9n^2$ $= (0.5)^2 - 9(\frac{11}{6})^2$ $= -30$	M1 A1 Accept Elimination or Substitution method. M1 for finding both m and n . A1

14		$\frac{3x-12}{3x^2-10x-8}$ $= \frac{3(x-4)}{(3x+2)(x-4)}$ $= \frac{3}{3x+2}$	M1 - for factorising $3x-12$ M1 - for factorising $3x^2-10x-8$ A1
15	(a)	1 cm : 60 000 cm 1 cm : 0.6 km $7.68 \div 0.6$ $= 12.8 \text{ cm}$	M1 A1
	(b)	1 cm : 0.6 km $7.5 \text{ cm} : 0.6 \times 7.5$ $= 4.5 \text{ km}$	B1
	(c)	1 cm : 0.6 km $1 \text{ cm}^2 : 0.6 \times 0.6 \text{ km}^2$ $1 \text{ cm}^2 : 0.36 \text{ km}^2$ $15 \text{ cm}^2 : 0.36 \times 15 \text{ km}^2$ $= 5.4 \text{ km}^2$	M1 – finding area scale Accept ($1 \text{ cm}^2 : 3.6 \times 10^9 \text{ cm}^2$) ECF if using part (a) to do conversion A1
16		$a = \frac{b(c+2)}{5+c}$ $a(5+c) = b(c+2)$ $5a + ac = bc + 2b$ $ac - bc = 2b - 5a$ $c(a-b) = 2b - 5a$ $c = \frac{2b-5a}{a-b}$	M1 – cross multiply M1- expansion M1 – factorising common term c A1 – accept $c = \frac{5a-2b}{b-a}$
17		$(x+y)(x-y) = 36$ $x^2 - y^2 = 6^2$ $x^2 = 6^2 + y^2$ Since $x^2 = 6^2 + y^2$, by converse of Pythagoras' Theorem, the triangle is a right angled triangle.	M1 (Accept $x^2 - y^2 = 6^2$) A1 – must include $x^2 = 6^2 + y^2$ and Converse of Pythagoras' Theorem. Do not accept $x^2 - y^2 = 6^2$ in the statement.
18	(a)	$h = \sqrt{13^2 - 5^2}$	B1

		$h = 12\text{cm}$ (shown)	
	(b)	Vol of cone + vol of hemisphere $= \frac{1}{3} \pi r^2 h + \frac{2}{3} \pi r^3$ $= \left(\frac{1}{3} \times \pi \times 5^2 \times 12\right) + \left(\frac{2}{3} \times \pi \times 5^3\right)$ $= 575.96$ $= 576\text{cm}^3 \text{ (3 s.f.)}$	M1 for vol of cone M1 for vol of hemisphere A1
	(c)	Total Surface Area $= \pi r l + 2\pi r^2$ $= (\pi \times 5 \times 13) + (2 \times \pi \times 5^2)$ $= 361.28$ $= 361\text{cm}^2$	M1 for curved S.A. of cone M1 for S.A. of hemisphere A1
19	(a)	$(18 - x)(x + 1) = 78$ $18x + 18 - x^2 - x - 78 = 0$ $-x^2 + 17x - 60 = 0$ $x^2 - 17x + 60 = 0 \text{ (shown)}$	M1 M1 for correct expansion A1
	(b)	$x^2 - 17x + 60 = 0$ $(x - 12)(x - 5) = 0$ $x - 12 = 0$ $x = 12 \text{ (rejected as } x \text{ is less than } 10)$ $x - 5 = 0$ $x = 5$	M1 for factorising quadratic equation A1
20	(a)	$p = -(6)^2 + 6(6) + 1$ $p = 1$ $q = -(6.5)^2 + 6(6.5) + 1$ $q = -2.25$	B1 B1
	(b)	See attached graph Students tend to plot the last point as (6.5, -2.5).	B1-6 points plotted correctly B1-all 8 points plotted correctly Accept the last point if student plotted (6.5, -2.3).) B1-smooth curve
	(ci)	(6.15, 0)	B1 – Accept (6.15 ± 0.1, 0)

	(cii)	10 units	B1
21	(a)	$1s \text{ --- } 78 \text{ m}$ $30s \text{ --- } 78 \times 30$ $\quad = 2340m$ $\quad = 2.34km$	M1 A1
	(b)	$\sin 15^\circ = \frac{BC}{2.34}$ $BC = 2.34 \sin 15^\circ$ $BC = 0.60564km$ $BC = 605.64m$ $BC = 606m \text{ (3 s.f.)}$	M1-Accept ECF A1
	(c)	<u>Airline A:</u> Cost of 2A + 3C (without discount) $= 2(\\$500) + 3(\\$350)$ $= \\$2050$ Final cost (with 5% discount on all tickets) $= \frac{95}{100} \times \\2050 $= \\$1947.50$ <u>Airline B:</u> Cost of 2A + 3C (without fuel surcharge) $= 5(\\$380)$ $= \\$1900$ Final cost (with 2% fuel surcharge) $= \frac{102}{100} \times \\1900 $= \\$1938$ <u>Airline C:</u> Final cost (with Buy 1 Adult, free 1 Child) $= \\$700 + \\$700 + \\$600$ $= \\$2000$ Jane should buy the tickets from <u>Airline B</u> as the total cost for 2 adults and 3 children is the cheapest among the 3 airlines.	M1 M1 M1 A1

