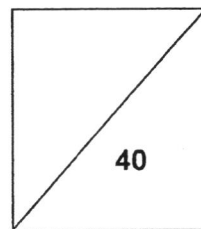




NORTH VISTA SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2018



NAME: _____ () CLASS: _____

SUBJECT: MATHEMATICS (PAPER 1)

DATE: 4 OCTOBER 2018

LEVEL/STREAM: SECONDARY 1 EXPRESS

TIME: 1 HOUR

READ THESE INSTRUCTIONS FIRST

Write your register number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a 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 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.
The total of the marks for this paper is 40.

<i>For Examiner's Use</i>	
Category	Question No.
Accuracy	
Brackets	
Fractions	
Units	
Others	
Marks Deducted	

Answer all the questions.

- 1 (i) Express 864 as a product of its prime factors.

Answer [1]

- (ii) Find the smallest positive integer k such that $\frac{864}{k}$ is a square number.

Answer $k =$ [1]

- 2 The table shows the highest and lowest temperatures one day in Bangkok, Rome and Toronto.

	Bangkok	Rome	Toronto
Highest	32 °C	14 °C	4 °C
Lowest	26 °C	7 °C	-5 °C

- (a) Which city has the greatest temperature variation in a day?

Answer [1]

- (b) Find the mean of the lowest temperatures in the three cities.

Answer °C [1]

- 3 (i) Calculate $\frac{\sqrt{5\frac{5}{8}-2.25}}{\frac{1}{200}}$, write down the first five digits shown on your calculator display.

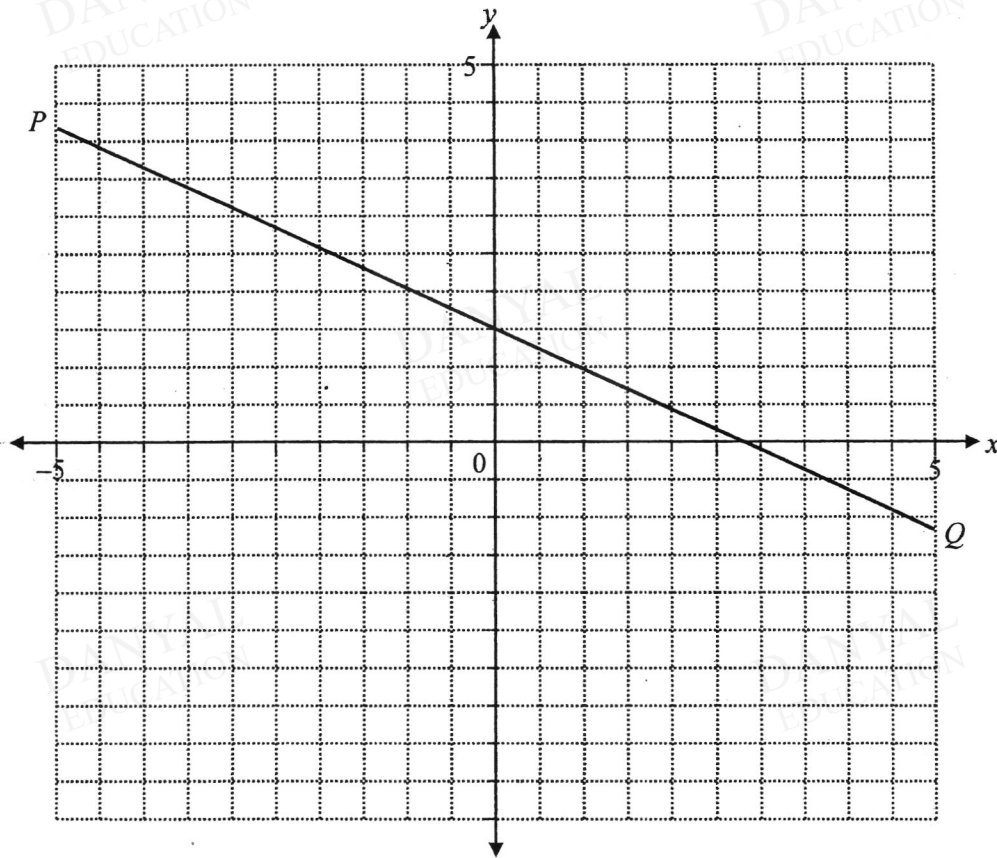
Answer [1]

- (ii) Give your answer correct to 2 significant figures.

Answer [1]

- 4 The Cartesian plane shows a line PQ .

Answer



- (a) Write down the coordinates of the point where the graph intersects with y -axis.

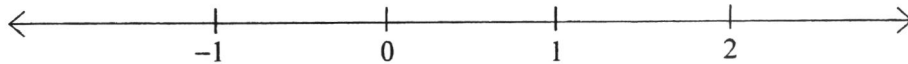
Answer (..... ,) [1]

- (b) On the same Cartesian plane, draw and label the graph of $x = 3$. [1]

- 5 (i) Solve the inequality $5x \geq 9$.

Answer [1]

- (ii) Hence, show your solution on the number line below.



[1]

- 6 A pineapple is p cm long. A factory worker removes q cm of it from each end. The remaining piece is cut into r small pieces of equal thickness along the length of the pineapple.

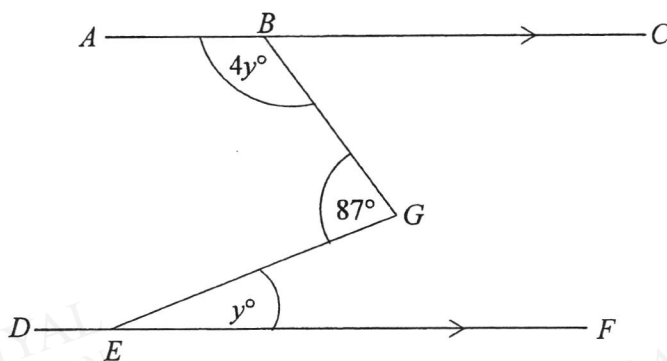
- (i) Express the thickness of each small piece in terms of p , q and r .

Answer cm [1]

- (ii) When $p = 18$, $q = 2$ and $r = 10$, find the thickness of each small piece of pineapple.

Answer cm [2]

- 7 In the diagram, ABC is parallel to DEF . Angle $ABG = 4y^\circ$, angle $FEG = y^\circ$ and angle $BGE = 87^\circ$.



Stating your reasons clearly, calculate the value of y .

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

8 The first four terms of a sequence are 5, 12, 19, 26.

(a) Write down the 7th term of the sequence.

Answer [1]

(b) Find an expression, in terms of n , for the n th term of the sequence.

Answer [1]

(c) One term in the sequence is 222.
Find the value of n for this term.

Answer $n =$ [1]

9 Simplify

(a) $3(-4+3y)+2y(2-3x)$,

Answer [2]

(b) $\frac{-3+5x}{4} - \frac{x-1}{2}$.

Answer [2]

10 Solve the following equations

(a) $12(3x-9) = 60$,

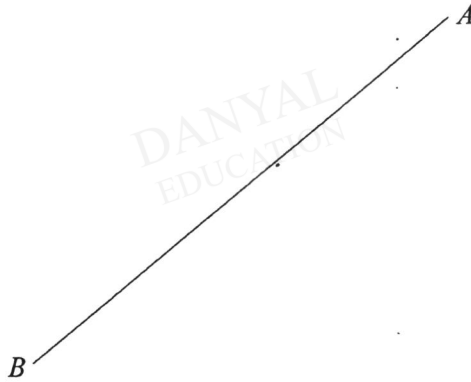
Answer $x =$ [2]

(b) $\frac{2y+7}{3} = \frac{y-3}{5}$.

Answer $y =$ [2]

- 11 (a) Construct triangle ABC where $BC = 9$ cm and $AC = 10$ cm.
 AB has already been drawn.

Answer



- (b) Construct
- (i) the perpendicular bisector of AB , [1]
 - (ii) the bisector of angle ABC . [1]
- (c) Mark clearly a point which is inside the triangle, equidistant from points A and B , and is also equidistant from lines BC and BA . Label this point P . [1]
-

12 The marked price of a mobile phone was \$780, including 5% Goods and Services Tax (GST). The GST is now increased to 7%.

Find

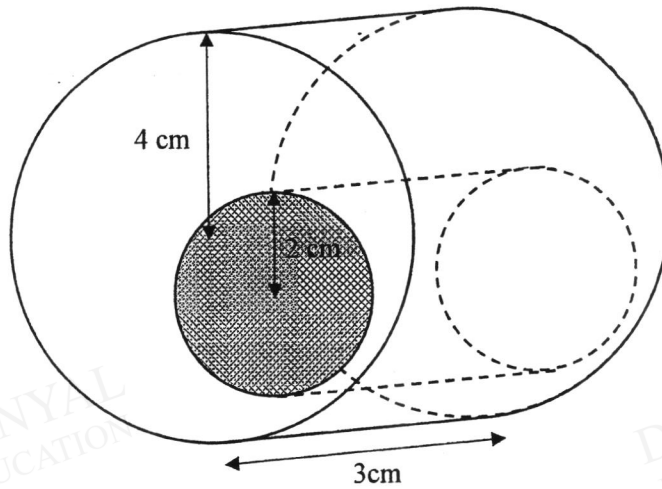
(a) the percentage increase in the GST,

Answer % [2]

(b) the new marked price.

Answer \$..... [2]

- 13 The figure shows a hole of radius 2 cm drilled through a solid cylindrical disc of radius 4 cm and thickness 3 cm.



Find, in terms of π ,

- (a) the cross-sectional area of the disc with the hole,

Answer cm^2 [2]

- (b) the volume of the disc with the hole,

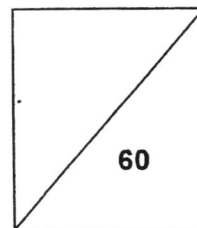
Answer cm^3 [1]

- (c) total surface area of the disc with the hole.

Answer cm^2 [2]



NORTH VISTA SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2018



NAME: _____ () CLASS: _____

SUBJECT: MATHEMATICS (PAPER 2)

DATE: 8 OCT 2018

LEVEL/STREAM: SECONDARY 1 EXPRESS

TIME: 1 HOUR 30 MINUTES

READ THESE INSTRUCTIONS FIRST

Write your register number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a 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 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.

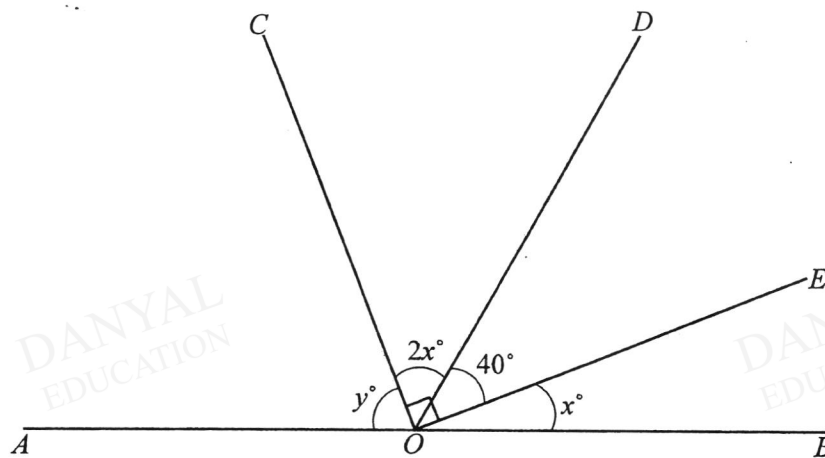
The total of the marks for this paper is 60.

<i>For Examiner's Use</i>	
Category	Question No.
Accuracy	
Brackets	
Fractions	
Units	
Others	
Marks Deducted	

Answer **all** the questions.

- 1 In the figure below, AOB is a straight line. Find the values of x and y .

[3]



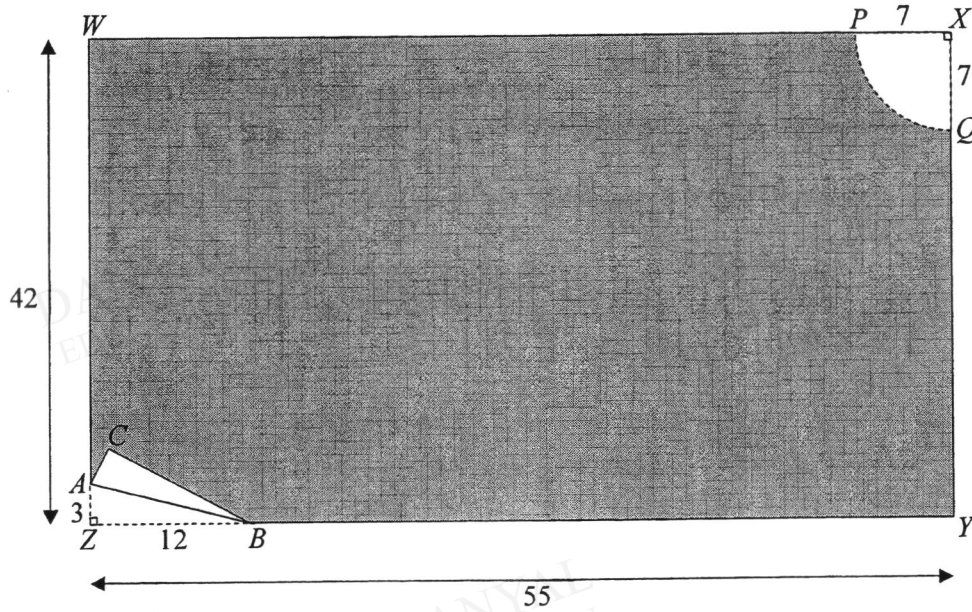
-
- 2 In a supermarket, a can of fruit juice costs \$5.48.
A bar of chocolate costs 88 cents.
A tub of ice cream costs \$7.98.
Without calculating the exact amount to be paid, explain if it is possible to buy 3 cans of fruit juice, 10 bars of chocolate and 2 tubs of ice cream with \$40.

[3]

- 3 The figure shows a wrapping paper that is folded at the corner Z . A quadrant of radius 7 cm is cut from the corner X .

Calculate the perimeter of the shaded region.

[3]



- 4 Albert visits a library every 8 days.
Bernard visits the library every 12 days.
Chris visits the library every 14 days.
- (a) If all the three boys visit the library on a particular day, after how many days will they visit the library on the same day again? [2]

Both Albert and Bernard visited the library on 1 June 2018 .

- (b) If Danny wishes to meet up with only Albert and Bernard the next time they both visit the library, what is the next available date? [2]

-
- 5 Factorise completely
- (a) $(r-s)(t+2)+s(t+2)$, [2]
- (b) $y(3a-9b)+5x(a-3b)$. [2]

- 6 90% of all students in ABC Secondary School voted for one of three candidates to be the new head prefect during the Head Prefect Election 2018. The votes received by the candidates were in the ratio 2:3:11. If 1440 students voted, calculate
- (a) the number of votes received by the new head prefect, [2]
(b) the number of students who did not vote. [2]

-
- 7 A n -sided polygon has four exterior angles each of size 28° and the remaining exterior angles are each of size 31° . Find
- (a) the value of n , [2]
(b) the sum of interior angles of the polygon. [2]

- 8 If $-11 < a < 3$ and $-6 < b < 4$ and a and b are integers, find
- (a) the smallest value of $a + b$, [1]
- (b) the greatest value of ab . [1]

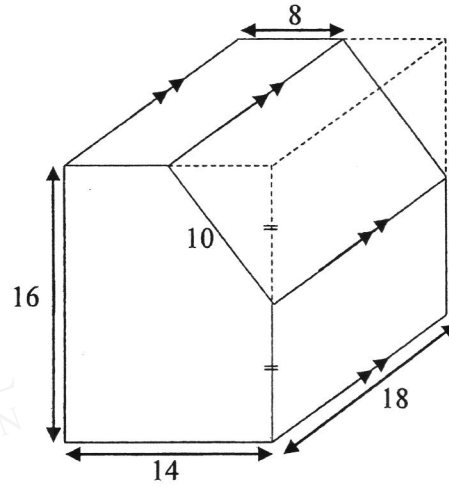
-
- 9 A boy runs 5 km in 25 minutes. He then walks a further 10 km at an average speed of 6 km/h. Calculate
- (a) his running speed, giving your answers in km/h, [2]
- (b) the time in hours when he is walking, [1]
- (c) his average speed, in km/h, for the whole journey. [2]
-

- 10 The following table shows the time taken, in seconds, by 60 upper secondary students to complete a 100-metre sprint.

Time (x s)	Frequency
$12.2 < x \leq 12.6$	9
$12.6 < x \leq 13.0$	18
$13.0 < x \leq 13.4$	17
$13.4 < x \leq 13.8$	w
$13.8 < x \leq 14.2$	10

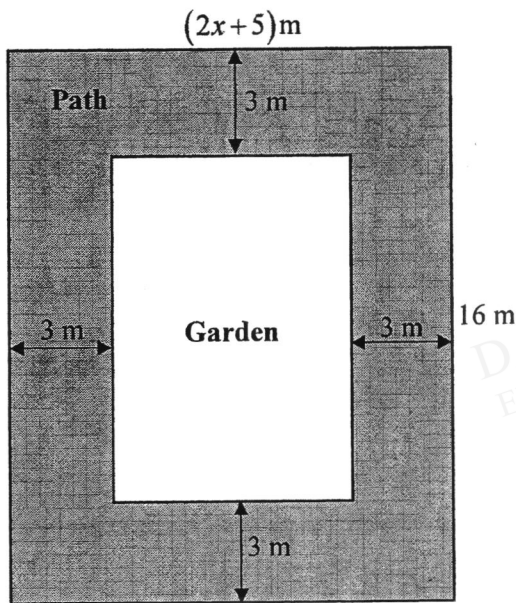
- (a) Find the value of w . [1]
- (b) Find the number of students who took at most 13.4 seconds to complete the 100-metre sprint. [1]
- (c) A pie chart is used to represent the data in the table.
Find the angle of the sector that represents the number of students who took more than 12.2 seconds but at most 12.6 seconds to complete the 100-metre sprint. [2]

11



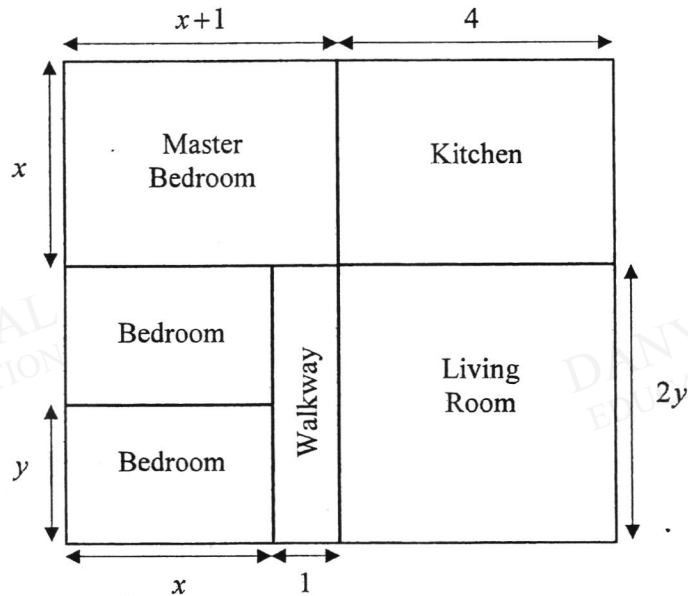
- A portion of a solid cuboid is cut and removed as shown.
 Given that all dimensions in the diagram are in centimetres, find
- the volume, [3]
 - the total surface area of the solid that remains. [2]

- 12 The diagram below shows a rectangular plot of land $(2x+5)$ m by 16 m.
A path 3 m wide runs round the edge, and it surrounds the garden in the middle.



- (a) Write, in terms of x , the area of the rectangular plot of land in its simplest form. [1]
 (b) Write, in terms of x , the area of the garden in its simplest form. [1]
 (c) (i) If the area of the path is 138 m^2 , find the value of x . [2]
 (ii) Hence, find the area of the garden. [1]

- 13 Mr Koh just bought a 4-room flat in Toa Payoh and the dimensions are as shown in the figure below (not drawn to scale). The flat consists of a master bedroom, two same-sized bedrooms, a living room, a kitchen and a common walkway. All dimensions are stated in metres.



It is known that $x = 3$ and $y = 2$.

- (a) Find the floor area of the entire house. [2]
- (b) Mr Koh needs to do tiling for his entire house and is considering offers from two contractors, Timber Works and Tile Kings, with prices as seen in the figure below. Which company will offer a cheaper deal for Mr Koh? [4]
Justify your answer with calculations.

TIMBER WORKS

\$3.50 per sqm
30% DISCOUNT!

CALL 9283 7458

timberworks.com.sg

Tile Kings LOWEST PRICE GUARANTEED

FLAT RATE!!!

\$2.50 per sqm
CALL 8352 0091 NOW

www.tilekings.com.sg

14 Answer the whole of this question on a piece of graph paper.

A van slows down to a stop at a traffic light.

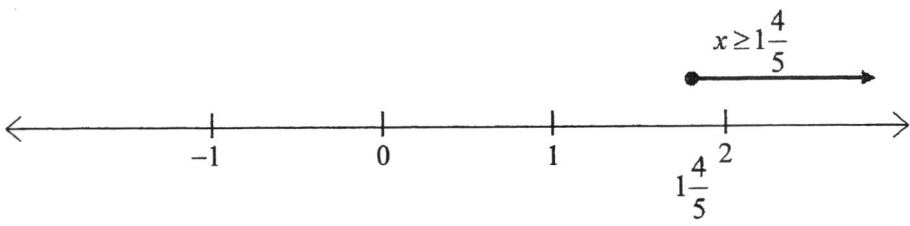
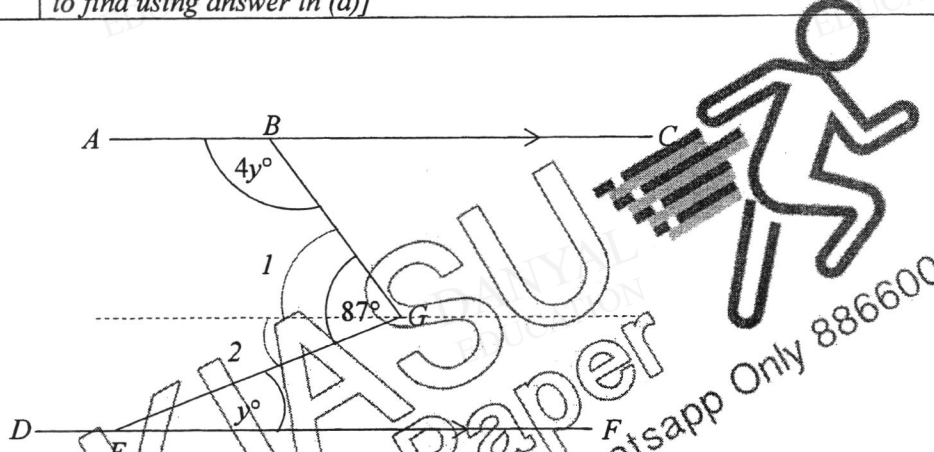
The speed y m/s of a van at time x seconds is given by $y = -2x + 16$ for $0 \leq x \leq 8$.

x	0	2	4	6	8
y	16	a	8	b	0

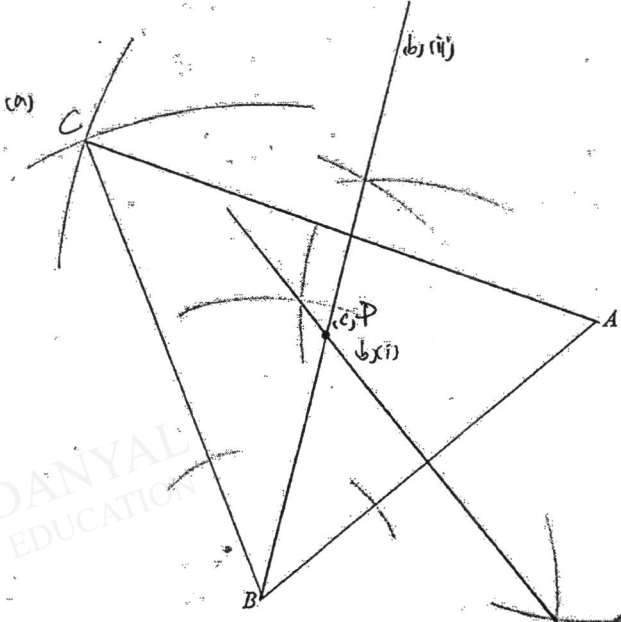
- (a) Calculate the values of a and b . [1]
- (b) Draw the graph of $y = -2x + 16$ for $0 \leq x \leq 8$, using 2 cm to represent 1 unit on the horizontal axis and 2 cm to represent 2 units on the vertical axis. [3]
- (c) Using your graph, find
- (i) the gradient of the graph, [1]
- (ii) the speed of the van when $x = 2.5$, [1]
- (iii) the time when $y = 7.4$. [1]
- (d) A car approaches the same traffic light at 16 m/s and it starts to apply its brakes. The car slows down at a constant rate of 4 m/s per second, until it comes to a complete stop. Justify, with working, whether the car will be able to slow down faster than the van. [1]

2018 1E Math EOY Marking Scheme

1	(i)	$864 = 2^5 \times 3^3$	B1
	(ii)	6	B1
2	(a)	Toronto	B1
	(b)	$\frac{26 + 7 + (-5)}{3}$ $= 9\frac{1}{3}^{\circ}\text{C}$ <p><i>[students are advised not to round off rational values to 3sf]</i></p>	B1
3	(i)	367.42	B1
	(ii)	370	B1 √
4	(a)	$(0, 1\frac{1}{2})$ or $(0, 1.5)$	B1
	(b)		B1
5	(i)	$5x \geq 9$ $x \geq 1\frac{4}{5}$ or $x \geq 1.8$	A1

	(ii)	 <p style="text-align: center;">$x \geq 1\frac{4}{5}$</p>	B1 √
		<i>[no mark is awarded if the minimum value of x is not labelled]</i>	
6	(a)	$\frac{p-2q}{r}$	B1
		<i>[no mark is awarded if the expression is not in the simplest form]</i>	
	(b)	$\frac{18-2(2)}{10}$ $= 1.4$	M1 A1
		<i>[no ecf as solution does not depend on answer in (a) and question did not instruct to find using answer in (a)]</i>	
7		 <p> $\angle 1 = 180 - 4y$ (int. \angles, // lines) $\angle 2 = y$ (alt. \angles, // lines) $180 - 4y + y = 87$ $180 - 3y = 87$ $-3y = -93$ $y = 31$ </p>	M1 M1 A1
		<i>[instead of receiving 0 mark for not showing derivation of angle 1 and 2, students who managed to find the correct value of y (with appropriate working) receive 1 mark for their answer]</i> <i>[deduct 1 mark for not writing / incorrect reason(s)]</i>	
8	(a)	47	B1
	(b)	$5 + (n-1)(7)$ $= 5 + 7n - 7$ $= 7n - 2$	B1
		<i>[no mark is awarded if the expression is not in the simplest form]</i>	

	(c)	$7n - 2 = 222$ $7n = 224$ $n = 32$				B1
9	(a)	$3(-4 + 3y) + 2y(2 - 3x)$ $= -12 + 9y + 4y - 6xy$ $= -6xy + 13y - 12$				M1 A1
	(b)	$\frac{-3 + 5x}{4} - \frac{x - 1}{2}$ $= \frac{-3 + 5x - 2(x - 1)}{4}$ $= \frac{-3 + 5x - 2x + 2}{4}$ $= \frac{3x - 1}{4}$				M1 A1
10	(a)	$12(3x - 9) = 60$ $3x - 9 = 5$ $3x = 14$ $x = 4\frac{2}{3}$	M1 A1	or	$12(3x - 9) = 60$ $36x - 108 = 60$ $36x = 168$ $x = 4\frac{2}{3}$	M1 A1
	(b)	$\frac{2y + 7}{3} = \frac{y - 3}{5}$ $10y + 35 = 3y - 9$ $7y = -44$ $y = -\frac{44}{7}$ $y = -6\frac{2}{7}$				M1 A1


11	 <p>(a) correct position and labelling of point C (with arcs). [B1] (b) correct bisectors with arcs. [B1] [B1] (c) correct position and labelling of point P. [B1]</p>	B1 B1 B1 B1
12	(a) $\frac{7-5}{5} \times 100\%$ $= 40\%$	M1 A1
	(b) $\frac{780}{105} \times 107$ ≈ 794.86 <i>[recorded on cover page for not rounding off currency value to the nearest cent]</i>	M1 A1
13	(a) $\pi(4)^2 - \pi(2)^2$ $= 12\pi$	M1 A1
	(b) $12\pi \times 3$ $= 36\pi$	B1 ecf
	(b) $2\pi(4)(3) + 2\pi(2)(3) + 2 \times 12\pi$ $= 24\pi + 12\pi + 24\pi$ $= 60\pi$ <i>[deduct 1 mark overall for question 13 for not expressing answers in terms of π]</i>	M1 ecf A1

1E EOY 2018 Paper 2 Marking Scheme

Qn	Answer	Marks
1	$2x + 40 = 90$ $2x = 90 - 40$ $2x = 50$ $x = \frac{50}{2}$ $x = 25$ $y = 180 - 90 - 25$ $= 65$	<p>M1</p> <p>A1</p> <p>B1</p>
2	<p>\$5.48 ≈ \$6 \$0.88 ≈ \$1 \$7.98 ≈ \$8</p> <p>estimated total cost = $3 \times \\$6 + 10 \times \\$1 + 2 \times \\$8$ = \$44</p> <p>It is not possible to buy 3 cans of fruit juice, 10 bars of chocolate and 2 tubs of ice cream.</p> <p>Alternative solution: \$5.48 ≈ \$5 \$0.88 ≈ \$1 \$7.98 ≈ \$8</p> <p>estimated total cost = $3 \times \\$5 + 10 \times \\$1 + 2 \times \\$8$ = \$44</p> <p>It is not possible to buy 3 cans of fruit juice, 10 bars of chocolate and 2 tubs of ice cream.</p>	<p>M1 – (round up to nearest dollar)</p> <p>M1 – (total estimated cost)</p> <p>A1 (conclusion)</p> <p>M1 – (round up to nearest dollar)</p> <p>M1 – (total estimated cost)</p> <p>A1 – (conclusion)</p>

Qn	Answer	Marks
3	$WA = 42 - 3$ $= 39 \text{ cm}$ $WP = 55 - 7$ $= 48 \text{ cm}$ $QY = 42 - 7$ $= 35 \text{ cm}$ $BY = 55 - 12$ $= 43 \text{ cm}$ $\text{length of arc } PQ = \frac{1}{4} \times 2 \times \pi \times 7$ $= 10.99557429... \text{ cm}$ $\text{perimeter of shaded region} = 39 + 3 + 12 + 43 + 35 + 10.99557429... + 48$ $= 190.9955743... \text{ cm}$ $\approx 191 \text{ cm (3 s.f.)}$	M1 – finding $QY, WA,$ WP, BY M1 – finding length of arc PQ A1
4a	$\begin{array}{r l} 2 & 8 \quad 12 \quad 14 \\ \hline 2 & 4 \quad 6 \quad 7 \\ 2 & 2 \quad 3 \quad 7 \\ 3 & 1 \quad 3 \quad 7 \\ 7 & 1 \quad 1 \quad 7 \\ \hline & 1 \quad 1 \quad 1 \end{array}$ $\text{LCM} = 2^3 \times 3 \times 7$ $= 168$ <p>They will visit the library the same day again 168 days later.</p>	M1 A1
4b	$\begin{array}{r l} 2 & 8 \quad 12 \\ \hline 2 & 4 \quad 6 \\ 2 & 2 \quad 3 \\ 3 & 1 \quad 3 \\ \hline & 1 \quad 1 \end{array}$ $\text{LCM} = 2^3 \times 3$ $= 24$ $1^{\text{st}} \text{ June} + 24 \text{ days} = 25^{\text{th}} \text{ June}$ <p>The next available date is 25th June 2018.</p>	M1 – LCM A1 – Correct Date
5a	$(r - s)(t + 2) + s(t + 2) = (t + 2)(r - s + s)$ $= r(t + 2)$	M1 A1
5b	$y(3a - 9b) + 5x(a - 3b) = 3y(a - 3b) + 5x(a - 3b)$ $= (a - 3b)(3y + 5x)$	M1 A1

Qn	Answer	Marks
6a	no. of votes received by the head prefect = $\frac{1440}{2+3+11} \times 11$ = 990	M1 A1
6b	no. of students who did not vote = $\frac{1440}{90} \times 10$ = 160	M1 A1
7a	$4 \times 28 + (n-4) \times 31 = 360$ $112 + 31(n-4) = 360$ $112 + 31n - 124 = 360$ $31n - 12 = 360$ $31n = 360 + 12$ $31n = 372$ $n = \frac{372}{31}$ $n = 12$	M1 A1
7b	sum of interior $\angle s = (12-2) \times 180^\circ$ = 1800°	M1(ECF) A1
8a	smallest value of $a+b = -10 + (-5)$ = -15	B1
8b	greatest value of $ab = -10 \times (-5)$ = 50	B1


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Qn	Answer	Marks
9a	$25 \text{ min} = \frac{25}{60} \text{ h}$ $= \frac{5}{12} \text{ h}$ $\text{running speed} = 5 \text{ km} \div \frac{5}{12} \text{ h}$ $= 12 \text{ km/h}$	M1 – convert min to h A1
9b	$\text{time taken} = \frac{10 \text{ km}}{6 \text{ km/h}}$ $= 1\frac{2}{3} \text{ h}$	A1
9c	$\text{total distance} = 5 + 10$ $= 15 \text{ km}$ $\text{total time} = \frac{5}{12} + 1\frac{2}{3}$ $= \frac{25}{12} \text{ h}$ $\text{average speed} = \frac{\text{total distance}}{\text{total time}}$ $= 15 \div \frac{25}{12}$ $= 15 \times \frac{12}{25}$ $= 7.2 \text{ km/h}$	M1 – Find total distance and total time A1
10a	$9 + 18 + 17 + w + 10 = 60$ $w + 54 = 60$ $w = 60 - 54$ $w = 6$	B1
10b	$\text{no. of students who took at most } 13.4\text{s} = 9 + 18 + 17$ $= 44$	B1
10c	$\text{angle of sector} = \frac{9}{60} \times 360^\circ$ $= 54^\circ$	M1 A1

Qn	Answer	Marks
11a	<p>volume = cross-sectional area \times length</p> $= \left(8 \times 14 + \frac{1}{2} \times 8 \times (8 + 14) \right) \times 18$ $= (112 + 88) \times 18$ $= 200 \times 18$ $= 3600 \text{ cm}^3$ <p>Alternative solution:</p> <p>volume of cuboid = $16 \times 14 \times 18$</p> $= 4032 \text{ cm}^3$ <p>volume of triangular prism = $\frac{1}{2} \times 6 \times 8 \times 18$</p> $= 432 \text{ cm}^3$ <p>volume of solid = $4032 - 432$</p> $= 3600 \text{ cm}^3$	<p>M2</p> <p>A1</p> <p>M1</p> <p>M1</p> <p>A1</p>
11b	<p>total surface area</p> <p>= perimeter of cross section \times length + $2 \times$ cross-sectional area</p> $= \left(16 + 14 + \frac{16}{2} + 10 + 8 \right) \times 18 + 2 \times \left(14 \times 8 + \frac{1}{2} \times 8 \times (14 + 8) \right)$ $= 56 \times 18 + 2 \times 200$ $= 1008 + 400$ $= 1408 \text{ cm}^2$	<p>M1</p> <p>A1</p>

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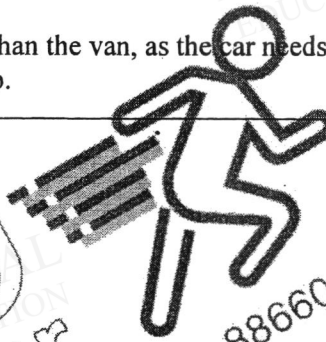
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Qn	Answer	Marks
12a	EITHER area of rectangular plot of land = $16(2x + 5) \text{ m}^2$ OR area of rectangular plot of land = $(32x + 80) \text{ m}^2$	B1 B1
12b	EITHER area of garden = $(16 - 3 - 3)(2x + 5 - 3 - 3)$ = $(10)(2x - 1) \text{ m}^2$ OR area of garden = $(20x - 10) \text{ m}^2$	B1 B1
12ci	$(32x + 80) - (20x - 10) = 138$ $32x + 80 - 20x + 10 = 138$ $12x + 90 = 138$ $12x = 138 - 90$ $12x = 48$ $x = \frac{48}{12}$ $x = 4$	M1(ECF) A1
12cii	area of garden = $20(4) - 10$ = $80 - 10$ = 70 m^2	B1
13a	Floor area = $(3 + 1 + 4) \times (3 + 2 \times 2)$ = 8×7 = 56 m^2	M1 A1
13b	For Timber Works, cost before discount = 3.50×56 = \$196 cost after discount = 196×0.7 = \$137.20 For Tile Kings, cost = 2.50×56 = \$140 The Timber Works will offer a cheaper deal for Mr Koh.	M1 M1 M1 A1

Qn	Answer	Marks
14a	$a = 12, b = 4$	B1
14b	Graph drawn	P2 L1
14ci	$\text{gradient} = \frac{\text{rise}}{\text{run}}$ $= \frac{-16}{8}$ $= -2$	B1
14cii	speed of van = 11 m/s	B1
14ciii	time = 4.3 s	B1
14d	$\text{time taken for car to stop} = \frac{16}{4}$ $= 4 \text{ s}$ <p>The car will be able to slow down faster than the van, as the car needs 5 s to stop, while the van needs 8 s to stop.</p>	B1 – Working with correct conclusion.

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14)

(a) $y = -2x + 16$
 when $x = 2, y = a,$
 $a = -2(2) + 16$
 $= 12 //$

when $x = 6, y = b,$
 $b = -2(6) + 16$
 $= 4 //$

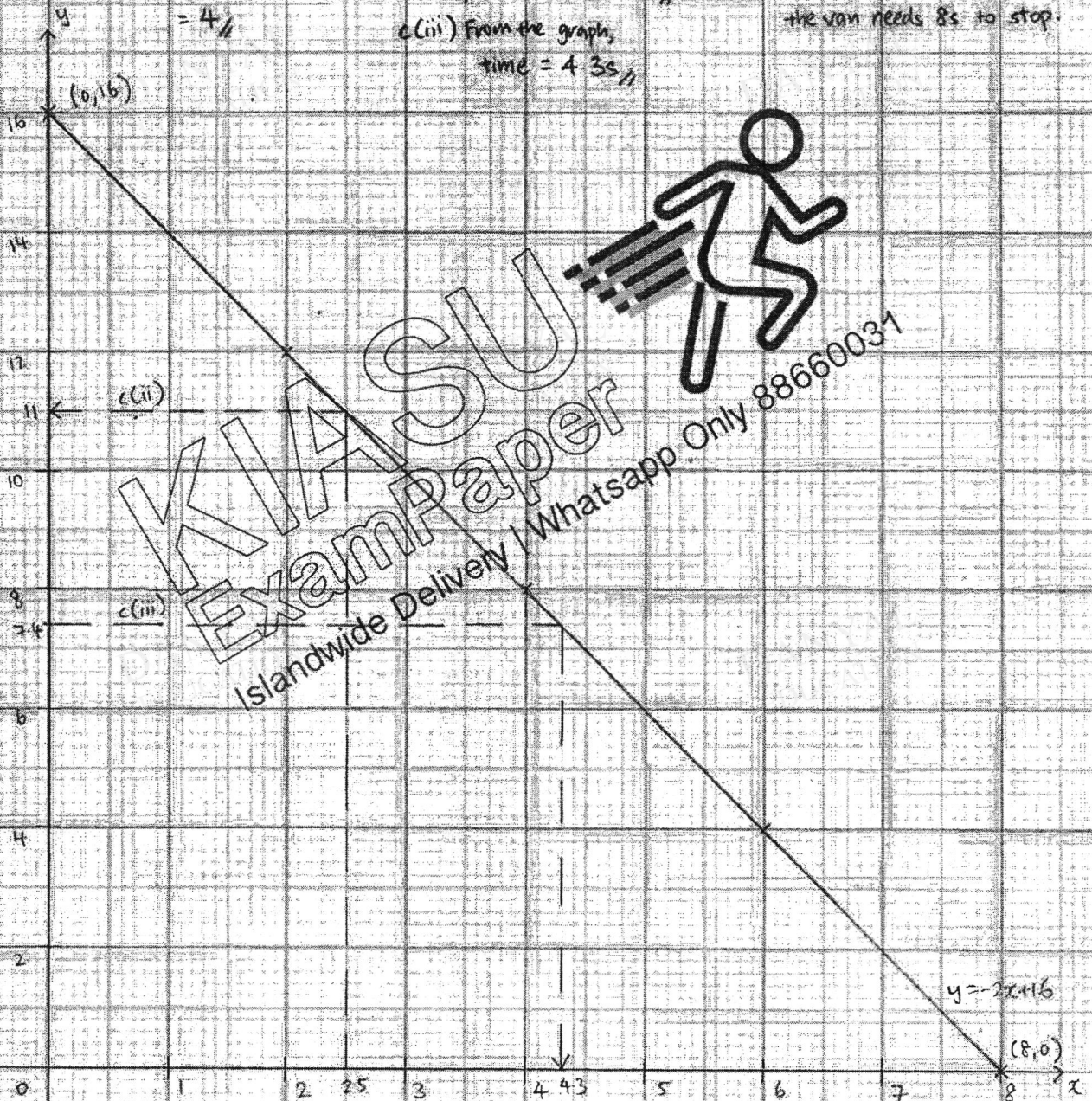
c(i) Gradient = $\frac{\text{rise}}{\text{run}}$
 $= \frac{-16}{8}$
 $= -2 //$

c(ii) From the graph,
 speed of van = 11 m/s //

c(iii) From the graph,
 time = 4 s //

(d) Time taken for
 car to stop = $\frac{16}{4}$
 completely = 4s

The car will be able to slow down
 faster than the van, as the car
 needs 4s to stop, while
 the van needs 8s to stop.



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