SOLUTIONS

S4

MATHEMATICS   **4048/02**
Paper 2   **31 August 2022**
                                                                2 hours 30 minutes

Candidates answer on the Question Paper and Graph Paper

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 HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** the 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.
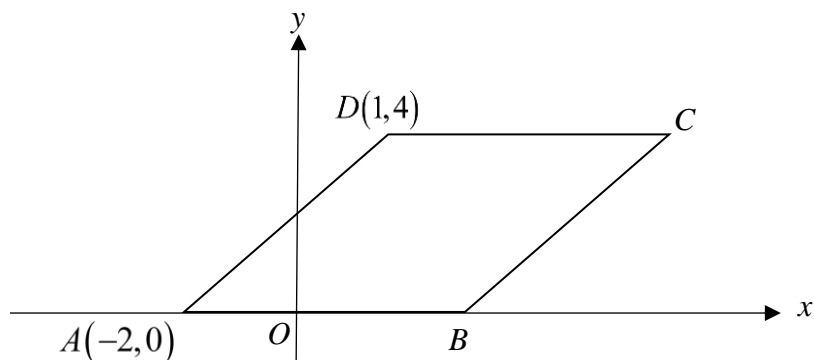The total number of marks for this paper is 100.

For Examiners' Use

Questions	1	2	3	4	5	6	7
Marks							
Questions	8	9	10	11	12	13	14
Marks							

Table of Penalties	Units			**100**		
	Clarity/Logic					
	Accuracy/Precision					

Parent's Name and Signature:	
Date:	

This document consists of 23 printed pages and 1 blank page.

1   **(a)**   Below are the first five terms of a sequence.

$$\frac{1}{17} \quad \frac{4}{25} \quad \frac{9}{33} \quad \frac{16}{41} \quad \frac{25}{49}$$

          (i)   Find the sixth term of the sequence.

(ai)	$\dfrac{36}{57} = \dfrac{12}{19}$	B1 award mark even if student give $\dfrac{36}{57}$

          (ii) T_n is the nth term of the sequence.

                Find an expression, in terms of n, for T_n.

(aii)	$T_n = \dfrac{n^2}{8n+9}$	B2: 1 mark for each series.

          (iii)   The kth term is 1. Find the value of k.

(aiii)	$k^2 = 8k + 9$ $k^2 - 8k - 9 = 0$ $(k-9)(k+1) = 0$ $k = 9$ or $k = -1$ (N.A.)	M1 A1

        (b)   Ali invested \$7500 in a saving account for 3 years. The rate of compound interest was fixed at r% per annum. At the end of 3 years, there was \$8436.48 in his account. Find the value of r.

b	$\$8436.48 = \$7500\left(1+\dfrac{r}{100}\right)^3$ $\left(1+\dfrac{r}{100}\right)^3 = \dfrac{\$8436.48}{\$7500}$ $\left(1+\dfrac{r}{100}\right) = \sqrt[3]{\dfrac{\$8436.48}{\$7500}}$ $\left(1+\dfrac{r}{100}\right) = 1.04$ $r = (1.04-1) \times 100$ $r = 4$	 M1 M1 A1

2

The diagram shows a rhombus *ABCD*, with sides 5 units, and coordinates $A(-2,0)$ and $D(1,4)$.

(a) Show that the equation of line *BC* is $3y = 4x - 12$.

(a)	$B(-2+5,0) = B(3,0)$	M1: coordinates of *B* or *C*
	Gradient $= \dfrac{4-0}{1-(-2)}$	
	$= \dfrac{4}{3}$	
	$y = \dfrac{4}{3}x + c$	
	$0 = \dfrac{4}{3}(3) + c$	M1
	$c = -4$	
	Equation of $BC : y = \dfrac{4}{3}x - 4$	
	$3y = 4x - 12$	M1

E is a point on *BC*, such that *DE* is perpendicular to *AD*. The gradient of the line *DE* is $-\dfrac{3}{4}$.

(b) Find the coordinates of *E*.

(b)	$y = -\dfrac{3}{4}x + c$	
	$4 = -\dfrac{3}{4}(1) + c$	
	$c = \dfrac{19}{4}$	
	Equation of DE: $y = -\dfrac{3}{4}x + \dfrac{19}{4}$	M1
	$-\dfrac{3}{4}x + \dfrac{19}{4} = \dfrac{4}{3}x - 4$	M1
	$x = \dfrac{21}{5}$	
	$y = \dfrac{8}{5}$	
	Coordinates of E: $\left(\dfrac{21}{5}, \dfrac{8}{5}\right)$ or $\left(4\dfrac{1}{5}, 1\dfrac{3}{5}\right)$	A1

(c) Given that the length of $BE = 2$ units, hence, find the area of *ABED*.

(c)	$DE = \sqrt{\left(\dfrac{21}{5}-1\right)^2 + \left(\dfrac{8}{5}-4\right)^2}$	
	$= \sqrt{16}$	
	$= 4$ units	M1, accept shoelace method
	Area of $ABED = \dfrac{1}{2}(2+5)(4)$	
	$= 14$ units^2	A1

3 **(a)** A group of 24 tourists visited the National Museum.

One of the 24 tourists is selected at random. The probability that it is a Korean male tourist is $\dfrac{1}{3}$. By showing clear workings, complete the table of information about the 24 tourists.

	Male	Female
Korean		5
Japanese		2

(a)	Number of Korean male tourists	
	$= \dfrac{1}{3} \times 24$	M1
	$= 8$	

			Male	**Female**	A1
		Korean	8	5	
		Japanese	7	2	

(b) Two of the 24 tourists are selected at random. Find the probability that they are both male tourists.

(b)	P(both tourists are males)	
	$= \left(\dfrac{8+7}{24}\right)\left(\dfrac{8+7-1}{24-1}\right)$	M1
	$= \dfrac{35}{92}$	A1

4 Terry pays $15 a month for a season parking of his motorcycle in his workplace.
James, also a motorist, uses a different scheme in which he pays a deposit of $50 and then a monthly payment of $8.

Let the number of months that both Terry and James have been paying for their motorcycle be *x*.
By forming an inequality, find the minimum number of months James will have to pay to ensure that his scheme is cheaper than Terry.

4	$50 + 8x < 15x$	M1
	$50 < 7x$	M1
	$x > 7\dfrac{1}{7}$	A1
	∴ James will have to pay for a minimum of **8 months** for his scheme to be cheaper than Terry.	B1

5

In the diagram, *A, B, C* and *D* are four points on a circle with centre *O*.
Angle $OAB = 2x°$, angle $OCB = 3x°$, and angle $ADC = 2.5x°$.
(a) Express angle *ABC* in terms of *x*.

(a)	Angle $ABO = 2x°$ (isoceles triangle, $OA = OB$ same radii)	M1
	Angle $OBC = 3x°$ (isoceles triangle, $OB = OC$ same radii)	
	Angle $ABC = 2x° + 3x°$	
	$\qquad\qquad = 5x°$	A1
	OR	
	$\angle ABC + \angle ADC = 180°$ (angles in opposite segments are supplementary)	M1
	$\angle ABC + 2.5x° = 180°$	
	$\angle ABC = (180 - 2.5x)°$	A1

(b) Find the value of x.

(b)	$\angle ABC + \angle ADC = 180°$ (angles in opposite segments are supplementary)	M1
	$5x + 2.5x = 180°$	
	$7.5x \qquad = 180°$	
	$x \qquad = 24$	A1

6 **(a)** Given that $\dfrac{5x-3a}{8} - \dfrac{3x-4a}{6} = 1$, express x in terms of a.
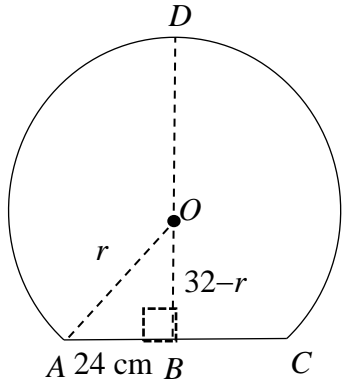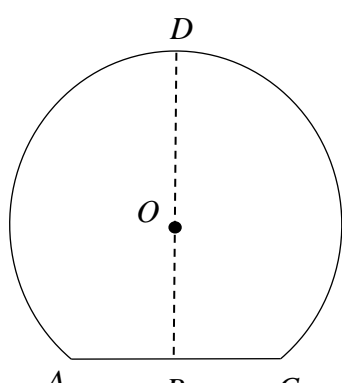
(a)	$\dfrac{5x-3a}{8} - \dfrac{3x-4a}{6} = 1$	
	$\dfrac{3(5x-3a) - 4(3x-4a)}{24} = 1$	M1 for combining into a single algebraic fraction
	$15x - 9a - 12x + 16a = 24$	
	$3x = 24 - 7a$	
	$x = \dfrac{24-7a}{3}$	A1 for expressing x in terms of a

(b) Find the largest positive integer value of a if $x \geq -29$.

(a)	Given that $x \geq -29$,	M1 for forming this inequality
	$\dfrac{24-7a}{3} \geq -29$	
	$24 - 7a \geq -87$	
	$-7a \geq -87 - 24$	M1 for solving this inequality
	$a \leq \dfrac{-111}{-7}$	
	$a \leq 15\dfrac{6}{7}$	
	$\therefore$ The largest integer value of $a = 15$	A1

7 **(a)** *ABCD* is a major segment of a circle, centre O. *BD* is 32 cm, *AC* is 48 cm and

angle *DBA* is $\dfrac{\pi}{2}$.

    (i) Show that the radius of the circle is 25 cm.

(ai)	Let the radius of the circle be r cm.	
		M1 for forming an equation to solve for radius.
	$r^2 = \left(\dfrac{48}{2}\right)^2 + (32-r)^2$	
	$r^2 - (32-r)^2 = 24^2$	
	$(r-32+r)(r+32-r) = 576$	
	$(2r-32)32 = 576$	M1 for solving the equation to find the radius
	$2r - 32 = \dfrac{576}{32}$	
	$2r - 32 = 18$	
	$2r = 50$	
	$r = 25$	A1
	The radius of the circle is 25 cm. (shown)	

    (ii) Calculate the area of the major segment *ABCD*.

(aii)	$\sin \angle AOB = \dfrac{24}{25}$	M1 for finding angle *AOC*.
	$\angle AOB = 1.2870$	
	$\angle AOC = 1.2870 \times 2$	
	≈ 2.574	

	Area of major segment *AODC*	
	= Area of major sector *OADC* + Area of triangle *OABC*	
	$= \frac{1}{2}r^2\left(\text{reflex }\angle AOC\right)+\frac{1}{2}r^2\sin\left(\text{acute }\angle AOC\right)$	
	$= \frac{1}{2}(25)^2\left(2\pi-2.574\right)+\frac{1}{2}(25)^2\sin(2.574)$	M2 (one mark for each part)
	≈ 1327.12	
	$\approx 1330 \text{ cm}^2$	A1

(b) The sector *OADC* was cut from the above to form a cone where the *OA* is glued to *OC*.

   (i) Calculate the circumference of the base circle of the cone.

(bi)	Circumference of the base of the cone	
	= arc length of the major sector *OADC*	
	$=r\left(\text{reflex }\angle AOC\right)$	
	$=25(2\pi-2.574)$	M1
	≈ 92.730	A1
	$\approx 92.7 \text{ cm}$	

   (ii) Hence, calculate the vertical height of the cone.

(bii)	Radius of base circle	
	$=\dfrac{92.730}{2\pi}$	
	$\approx 14.758 \text{ cm}$	M1
	Let the vertical height be *h* cm.	
	$25^2=h^2+\left(14.758\right)^2$	M1
	$h^2=25^2-\left(14.758\right)^2$	
	$h=\sqrt{25^2-\left(14.758\right)^2}$	
	$h\approx 20.179$	
	$h\approx 20.2$	A1
	The vertical height is about 20.2 cm	

8 **(a)** The heights of a group of 30 students were measured and the results are shown in the stem-and-leave diagram.

14	4 5 5 7 7 7 8 8 8 9 9 9 9
15	1 1 2 3 3 3 3 5 5 6 9 9 9
16	0 3 8
17	
18	9

Key: 14	4 means 144 cm

(i) Find the median height.

(ai)	Position of median height $= \dfrac{30+1}{2}$ $= 15.5$ $=$ between 15th and 16th position Median height $= \dfrac{151+152}{2}$ $= 151.5$ cm	B1

(ii) Explain why mean may not be an appropriate average to use to summarise the heights of this group of students?

(aii)	Mean is not an appropriate measure as there is an outlier of 189 cm	B1

(b) The table shows the height of another group of 30 students.

Height (h cm)	$140 \le h < 150$	$150 \le h < 160$	$160 \le h < 170$	$170 \le h < 180$
Frequency	p	9	11	q

(i) The estimated mean height is $161\dfrac{1}{3}$ cm. Find the value of p and of q.

(bi)	Total number of students $= 30$ $p+9+11+q = 30$ $p+q = 10$ $p = 10-q$ ----------- (1) Estimated mean $= 161\dfrac{1}{3}$ $\dfrac{145p+155\times9+165\times11+175q}{30} = 161\dfrac{1}{3}$ $145p+3210+175q = 161\dfrac{1}{3}\times30$ $145p+3210+175q = 4840$ ----------- (2) Sub (1) into (2): $145(10-q)+3210+175q = 4840$ $1450-145q+3210+175q-4840 = 0$ $30q-180 = 0$ $30q = 180$ $q = 6$	M1 for forming two equations M1 for solving

		A1 for both answers
	$p = 10 - 6$ $p = 4$	

       (ii)   Calculate an estimate of the standard deviation.

(bii)	Estimated standard deviation ≈ 9.2912 cm ≈ 9.29 cm	B1

       (iii)   Given that the estimated standard deviation of the first group of students is 8.83 cm, make one comparison between the heights of the two groups of students.

(biii)	Since the first group of students have a lower standard deviation of 8.83 cm as compared to the second group which is 9.29 cm, the heights of the first group of students are generally more consistent.	B1

9
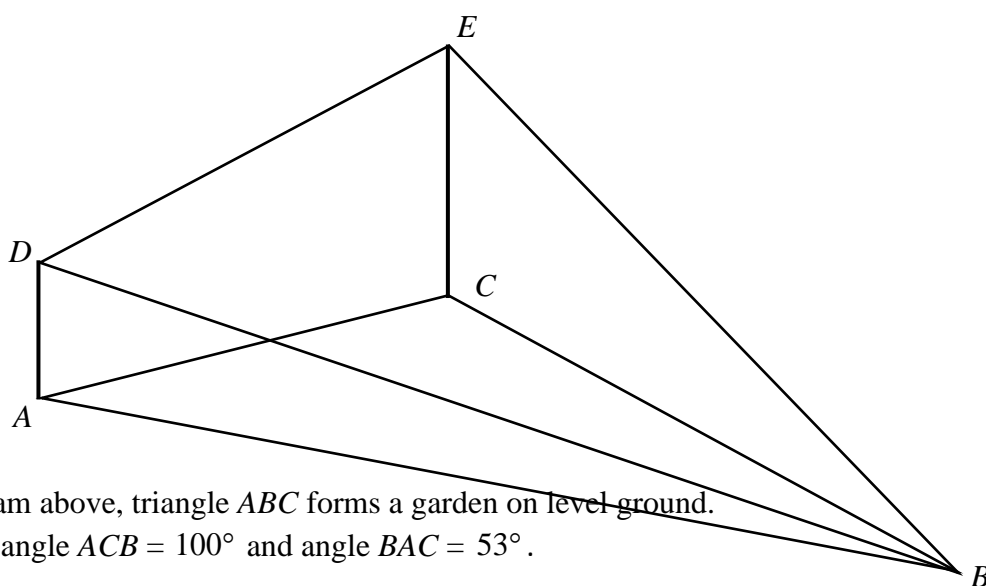
In the diagram above, triangle *ABC* forms a garden on level ground.
$BC = 32$ m, angle $ACB = 100°$ and angle $BAC = 53°$.

    (a)   Show that $AC = 18.19$ m, correct to 4 significant figures.

(a)	$\angle ABC = 180° - 100° - 53°$ $\quad\quad\quad = 27° \; (\text{adj. } \angle\text{s on a str. line})$ $\dfrac{AC}{\sin 27°} = \dfrac{BC}{\sin 53°}$ $AC = \dfrac{32\sin 27°}{\sin 53°}$ $\quad\quad = 18.19065$ $\quad\quad = 18.19$ m	M1 M1: for correct use of sine rule.

    (b)   Triangle *BDE* is a roof designed for the garden. Two vertical poles, $AD = 2$ m and $CE = 5$ m, were built to hold up the roof. Find

       (i)   the length of *DE*,

(bi)	$DE = \sqrt{18.19^2 + (5-2)^2}$ $= 18.4357$ $= 18.4 \text{ m}$	M1 A1, can accept if students use value which is more exact than 18.19.

(ii) angle *DBE*.

(bii)	$\dfrac{AB}{\sin 100°} = \dfrac{BC}{\sin 53°}$ $AB = \dfrac{32\sin 100°}{\sin 53°}$ $= 39.4596 \text{ m}$ $BD = \sqrt{3^2 + 39.4596^2}$ $= 39.5735 \text{ m}$ $BE = \sqrt{5^2 + 32^2}$ $= 32.3883 \text{ m}$ $DE^2 = BD^2 + BE^2 - 2(BD)(BE)\cos \angle DBE$ $18.4357^2 = 39.5735^2 + 32.3883^2 - 2(39.5735)(32.3883)\cos \angle DBE$ $\cos \angle DBE = 0.887554$ $\angle DBE = \cos^{-1} 0.887554$ $= 27.4325°$ $= 27.4°$	M1 M1 M1 M1 A1

10 Billy is engaged as a coding instructor to conduct Level 1 and Level 2 course on weekdays and weekends. The matrix **C** shows the number of sessions he teaches each week.

$$\begin{array}{cc} \text{Level 1} & \text{Level 2} \end{array}$$
$$\mathbf{C} = \begin{pmatrix} 3 & 0 \\ 2 & 1 \end{pmatrix} \begin{array}{l} \text{Weekday} \\ \text{Weekend} \end{array}$$

He is paid \$80 per session for conducting Level 1 course and \$120 per session for conducting Level 2 course.

(a) Represent the payment per session with a 2×1 matrix, **N**.

(a)	$\begin{pmatrix} 80 \\ 120 \end{pmatrix}$	B1

(b) Evaluate **Q = CN**.

(b)	$Q = \begin{pmatrix} 3 & 0 \\ 2 & 1 \end{pmatrix}\begin{pmatrix} 80 \\ 120 \end{pmatrix}$ $= \begin{pmatrix} 3\times 80 + 0\times 120 \\ 2\times 80 + 1\times 120 \end{pmatrix}$ $= \begin{pmatrix} 240 \\ 280 \end{pmatrix}$	B1

(c) Describe the elements in **Q**.

(c)	Q represent the total amount of course fee collect on weekday and weekend respectively.	B1

(d) Using matrix multiplication, calculate his total weekly income.

(d)	Total weekly collection $= \begin{pmatrix} 1 & 1 \end{pmatrix}\begin{pmatrix} 240 \\ 280 \end{pmatrix}$ $= (1\times 240 + 1\times 280)$ $= (520)$ His weekly income is \$520.	B1

(e) Due to the popularity of the courses, Billy is paid 5% more for each session of Level 1 and Level 2 course he conducts. The matrix **D** shows the number of sessions he teaches each week.

$$\text{Level 1} \quad \text{Level 2}$$
$$D = \begin{pmatrix} 4 & x \\ 3 & y \end{pmatrix}\begin{matrix} \text{Weekday} \\ \text{Weekend} \end{matrix}$$

Given that his total income on weekdays and weekends are \$462 and \$504 respectively, find the value of x and of y.

(e)	New fee $= 1.05\begin{pmatrix} 80 \\ 120 \end{pmatrix} = \begin{pmatrix} 84 \\ 126 \end{pmatrix}$ $\begin{pmatrix} 4 & x \\ 3 & y \end{pmatrix}\begin{pmatrix} 84 \\ 126 \end{pmatrix} = \begin{pmatrix} 462 \\ 504 \end{pmatrix}$ $\begin{pmatrix} 4\times 84 + 126x \\ 3\times 84 + 126y \end{pmatrix} = \begin{pmatrix} 462 \\ 504 \end{pmatrix}$ $\therefore \; 336 + 126x = 462 \quad$ and $\quad 252 + 126y = 504$ $\qquad\qquad x = 1 \qquad$ and $\qquad\qquad y = 2$	B2 – 1 mark each for answer

11
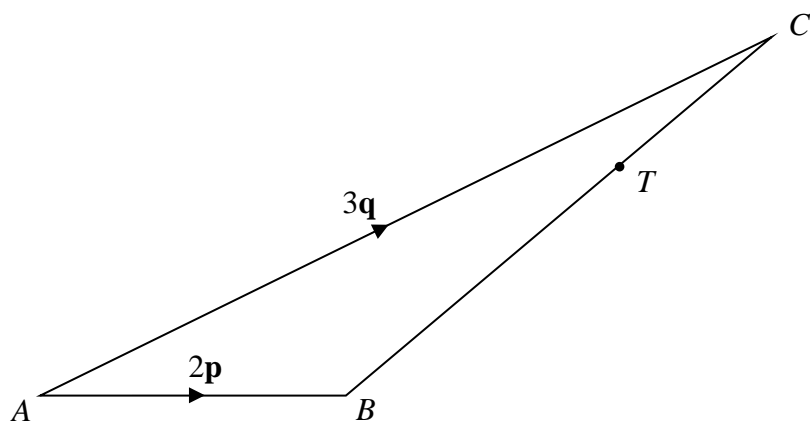
ABC is a triangle. $\overrightarrow{AB} = 2\mathbf{p}$ and $\overrightarrow{AC} = 3\mathbf{q}$.
T is a point on BC such that $CT : TB = 2 : 3$.

Note: Minus 1 mark from the whole question if students didn't put curly lines below.

(a) Express, as simply as possible, in terms of $\mathbf{p}$ and/or $\mathbf{q}$,

(i) $\overrightarrow{BC}$,

(ai)	$\overrightarrow{BC} = \overrightarrow{BA} + \overrightarrow{AC}$	
	$= -2\mathbf{p} + 3\mathbf{q}$	B1

(ii) $\overrightarrow{TC}$.

(aii)	$\overrightarrow{TC} = \dfrac{2}{5}\overrightarrow{BC}$ $= \dfrac{2}{5}(-2\mathbf{p} + 3\mathbf{q})$	B1 accepted if expanded

(b) R is a point on AC such that triangle ABC is similar to triangle RTC.

Express $\overrightarrow{RC}$, as simply as possible, in terms of $\mathbf{p}$ and/or $\mathbf{q}$.

(b)	$\overrightarrow{RC} = \dfrac{2}{5}\overrightarrow{AC}$ $= \dfrac{2}{5}(3\mathbf{q})$ $= \dfrac{6}{5}\mathbf{q}$	B1

(c) Find the ratio of

(i) $\dfrac{\text{area of triangle } RTC}{\text{area of triangle } ABC}$,

(ci)	$\dfrac{\text{area of triangle } RTC}{\text{area of triangle } ABC} = \left(\dfrac{2}{5}\right)^2$ $= \dfrac{4}{25}$	B1

(ii) $\dfrac{\text{area of triangle } RBC}{\text{area of triangle } ABC}$.

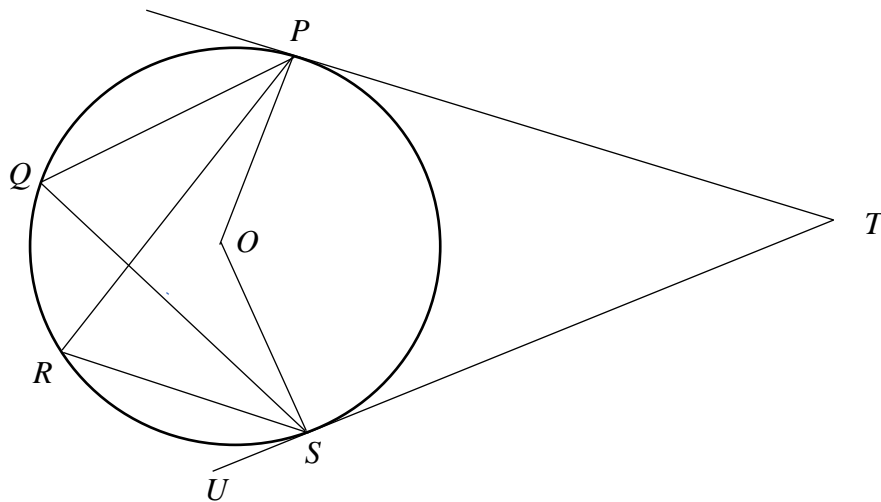| (cii)	$\dfrac{\text{area of triangle } RBC}{\text{area of triangle } ABC} = \dfrac{RC}{AC}$ $= \dfrac{2}{5}$	B1

(d) S is a point on AC.

Triangle ASB has the same area as triangle SBC.

Express $\overrightarrow{SB}$, as simply as possible, in terms of **p** and/or **q**.

(d)	S is a midpoint of AC. $\overrightarrow{SB} = \overrightarrow{SA} + \overrightarrow{AB}$ $= \dfrac{1}{2}\left(-\overrightarrow{AC}\right) + 2\mathbf{p}$ $= 2\mathbf{p} - \dfrac{3}{2}\mathbf{q}$	M1: for recognising midpoint A1

12

In the diagram, *P, Q, R* and *S* are four points on a circle with centre *O*. *PT* and *ST* are tangents to the circle at *P* and *S* respectively. Angle *PRS* = 68° and angle *QSU* = 70°. Find, giving reasons for each answer,

(a) angle *PQS*,

(a)	Angle $PQS = 68°$ (angle in the same segment)	B1

(b) angle *OSU*,

(b)	Angle $OSU = 90°$ (radius perpendicular to tangent)	B1

(c) angle *PTS*.

(c)	Angle $POS = 2 \times 68°$ (angle at centre is 2 times angle at circumference) $\quad = 136°$ Angle $PTS = 360° - 90° - 90° - 136°$ (sum of angle in quadrilateral) $\quad = 44°$	M1 A1

13 **(a)** Complete the table of values for $y = \dfrac{x^3}{5} - x + 4$ below.

x	-3.5	-3	-2	-1	0	1	2	3
y	-1.1	1.6	**4.4** (B1)	4.8	4	3.2	3.6	6.4

(b) Using a scale of 2 cm to represent 1 unit on both axes, plot the points given in the table and join them with a smooth curve for $-3.5 \leq x \leq 3$.

(b)		B1 for points plotted correctly B1 for smoothness B1 for labelling of axes and curve

(c) By drawing a tangent, find the gradient of the curve at $x = 2$.

(c)	Gradient $= 1.38 \pm 0.1$	M1 for showing the working A1

(d) Use your graph to find the solutions of the equation $\dfrac{x^3}{5} - \dfrac{1}{2}x = 0$ for $-4 \leq x \leq 3$.

(d)	$\dfrac{x^3}{5} - \dfrac{1}{2}x = 0$	
	$\dfrac{x^3}{5} = \dfrac{1}{2}x$	
	$\dfrac{x^3}{5} - x + 4 = \dfrac{1}{2}x - x + 4$	
	$y = -\dfrac{1}{2}x + 4$	M1 for drawing this line to intersect curve
		A1
	$x = -1.45,\ 0,\ 1.45$	

(e) The solutions in part (d) are also the solutions for the equation $2x^3 + Ax^2 + Bx = 0$. Find the value of A and the value of B.

(e)	$\dfrac{x^3}{5} - x + 4 = -\dfrac{1}{2}x + 4$	
	Multiply by 10,	
	$2x^3 - 10x + 40 = -5x + 40$	M1
	$2x^3 - 5x = 0$	
	$\therefore\ A = 0,\ B = -5$	A1 for both values

15 Mrs Lee intends to buy a 7−seater car so that she can bring her family out for outings. Typically a 7−seater car has an engine capacity that is more than 1600 cc. After doing some research, she realizes that the total cost of purchasing a car includes the following components which are summarised in Table 1.

Table 1: Costs Incurred in Car Purchase

Category	A	B
Engine Capacity (in cc)	≤ 1600	> 1600
Certificate of Entitlement, COE Prices	\$74 989	\$106 001
Open Market Value, OMV	\$15,602 – \$41,124	\$26,211 – \$74,924
Road Tax, RT	\$371.45 per 6 months	\$606.05 per 6 months
Insurance	\$1,684 per annum	
Additional Registration Fee, (ARF)	Refer to Table 2 for the guide to calculating ARF	
Goods and Services Tax, GST	7% of the OMV	

Table 2: Guide to Calculating ARF

Additional Registration Fee, (ARF)	Chargeable ARF	Rate	ARF Payable
	First \$20,000:	100% of OMV	\$20,000
	Next \$30,000:	140% of OMV	\$42,000
	Next \$30,000:	180% of OMV	\$54,000

	In excess of $80,000:	220% of OMV	$176,000

(a) How much is the maximum amount of the total Additional Registration Fee that Mrs Lee will have to pay for a 7−seater car.

(a)	For an OMV of $74 924,	
	ARF of the last $24\,924 = \dfrac{180}{100} \times \$24\,924$	M1
	$= \$44863.20$	
	Total max amount of ARF to be paid	M1
	$= \$20\,000 + \$42\,000 + \$44863.20$	
	$= \$10\,6863.20$	A1
	If they choose Category B but value is not the max, we give method marks and not A1.	
	If they choose Category A, zero marks.	

(b) What is the total cost of the car, excluding the road tax and the insurance.

(b)	GST to be paid $= \dfrac{7}{100} \times \$74\,924$	
	$= \$5244.68$	
	Total cost of a car excluding insurance and road tax	M1
	$= \text{COE} + \text{OMV} + \text{ARF} + \text{GST}$	
	$= \$106\,001 + \$74\,924 + \$106\,863.20 + \$5\,244.68$	A1
	$= \$293\,032.88$	

(c) The car company allows Mrs Lee to pay 30% of the total cost as down-payment and the subsequent amount at a simple interest rate of 1.5% per annum over 7 years. To ensure that her monthly salary is enough to pay for the monthly instalment of the car and the petrol, she will need to calculate how much money she needs to set aside every month for the car.

Mrs Lee also found the following information about the petrol prices over the last one year and the national average distance travelled is 1000 km per month with one litre of petrol being able to cover an average of 12 km in city area or 15 km on highway.
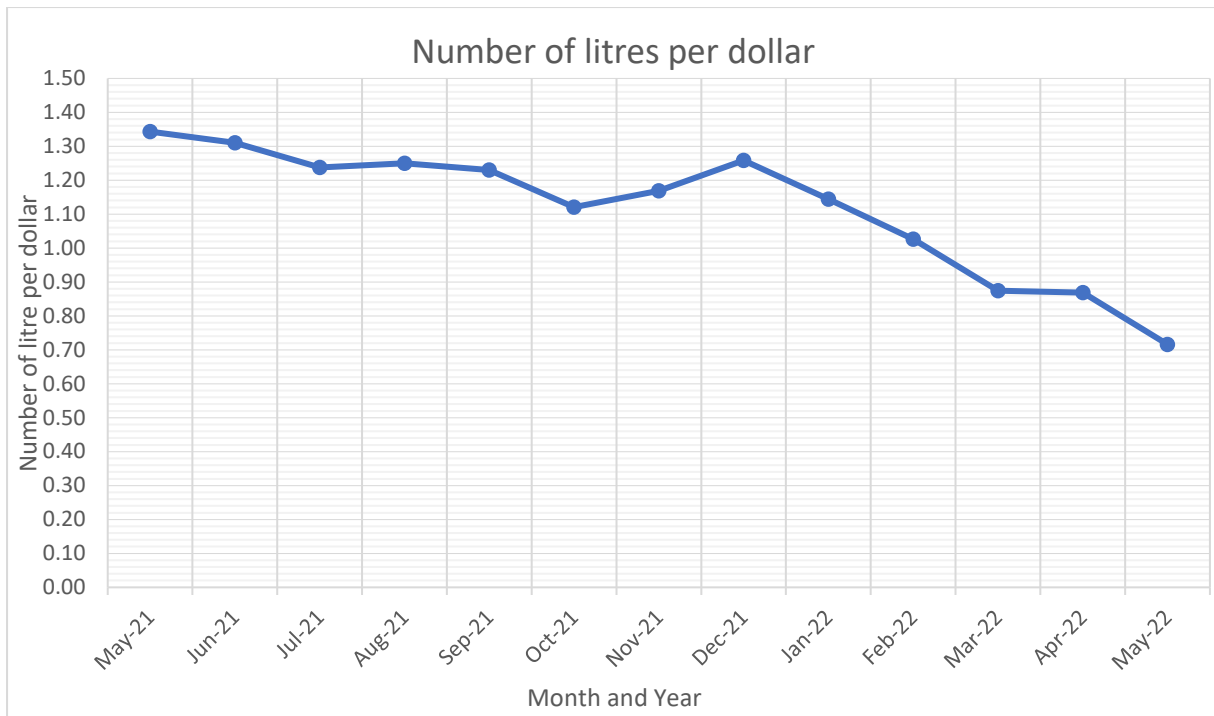
Suggest a suitable amount of money that Mrs Lee need to set aside every month in her bank to pay for **all** expenses of the car during the first seven years.

Justify any decisions you made and show your calculations clearly.

(c)	Amount owed before interest	
	$= \dfrac{70}{100} \times \$293\,032.88$	
	$= \$205\,123.016$	
	Total amount owed including interest	
	$= \dfrac{1.5}{100} \times \$205\,123.016 \times 7 + \$205\,123.016$	T1
	$= \$226\,660.9327$	
	Monthly cost of a car excluding petrol cost, insurance and road tax	
	$= \dfrac{\$226\,660.9327}{7 \times 12}$	
	$= \$2\,698.3444$	I1
	Cost of petrol for a month $= \dfrac{1000}{12} \div 0.72$	P1
	$= \$115.7407$	
	12km is chosen to calculate for the worst case scenario where Mrs Lee has to purchase the maximum amount of petrol.	J_1-1 mark
	0.72 litres per dollar is chosen to calculate for the worst case scenario where petrol price is the highest.	J_2 – 1 mark

Total monthly cost of a car $= \$2\ 698.3444 + \$115.7407 + \dfrac{\$606.05}{6} + \dfrac{\$1684}{12}$ $= \$3\ 055.4268$ $\approx \$3\ 055.43$ Therefore, Mrs Lee should have at least about \$3100 in the bank per month to pay for the costs of the car.	RT + I = 1mark C1 (award this mark as long as student suggests at least \$10 more. in multiples od \$10, \$100 or \$1000)