SERVE·LEAD·EXCEL

GREENDALE SECONDARY SCHOOL
End of Year Examination 2018

MATHEMATICS **4048/01**

Paper 1 08 Oct 2018

Sec 1 Express / SBB (Express) **1 hour**

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your index number and name on all the work you hand in.
Write in dark or blue 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 may result in loss of marks.
You are expected to use a scientific calculator to evaluate explicit numerical expressions.
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 required the answer in terms of π.

At the end of the examination, fasten all your work securely together.
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 **40**.

Target Before:

Target After:

Post-Exam Use

Question	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
Marks											
								Total Marks:			

This document consists of **9** printed pages, including this cover page.

Mathematical Formulae

Compound interest

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

Mensuration

Curve surface area of a cone $= \pi r l$

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

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

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

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

Arc length $= r\theta$, where θ is in radians

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

Trigonometry

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

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

Statistics

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

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

For Examiner's Use Only

Answer **all** questions.

1   **(a)**   Express 12.8495 correct to 3 significant figures.

Ans (a) : .... [1]

     (b)   By rounding each number to 1 significant figure, estimate the value of

$$\frac{290 \times 5.59}{\sqrt{107}}.$$

Ans (b) : .... [1]

2   Completely factorise the following expressions.

     (a) $2x^3 + 6xy^2$

Ans (a) : .... [2]

     (b) $a(x - 2y) + b(2y - x)$

Ans (b) : .... [2]

For Examiner's Use Only

3   **(a)**   Express $\dfrac{2x}{3} - \dfrac{(x-3)}{4}$ as a single fraction in its simplest form.

Ans (a) : .... [2]

(b)   It is given that $L = \dfrac{1}{2}m(v^2 - u^2)$.

Find L when $m = 3$, $u = 4$ and $v = 10$.

Ans (b) : $L =$ .... [2]

4   Solve the following equations.

   (a) $\dfrac{2x+4}{3} = 2$

Ans (a) : $x =$ .... [2]

   (b) $\dfrac{50}{x} = \dfrac{1}{8}$

Ans (b) : $x =$ .... [2]

5 Simplify the following expressions.

(a) $6(4x + y) + 2(x - y)$

Ans (a) : .... [2]

(b) $5p - 3(p - 2)$

Ans (b) : .... [1]

6 Ahmad, Brad and Candy shared a sum of money between them in the ratio $2 : 11 : 5$.

Brad had $72 more than Ahmad.

How much money did Candy have?
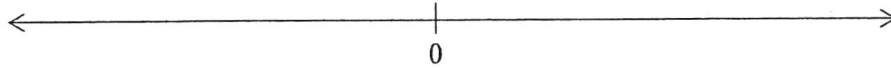
Ans : $............................ [2]

7 **(a)** Represent $x \geq -3$ on the number line below.

$\longleftarrow$ _____|_____ $\longrightarrow$
 0 [1]

(b) Solve the following inequalities.

(i) $-3x > 15$

Ans (b)(i) : .... [1]

(ii) $2 + 2x > 9$

Ans (b)(ii) : .... [1]

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8 The diagram below shows the bank interest rates for 2008 to 2012.
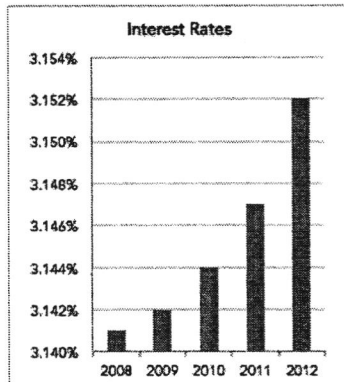
State one aspect of the graph that may be misleading and explain how this may lead to a misinterpretation of the graph.

Answer: ....

....

....[2]

For Examiner's Use Only

9   **(a)**   Express 42 and 98 as products of their prime factors.

Ans (a) : 42 = ……………………… [1]

98 = ……………………… [1]

(b)   Find the highest common factor of 42 and 98.

Ans (b) : …………………… [1]

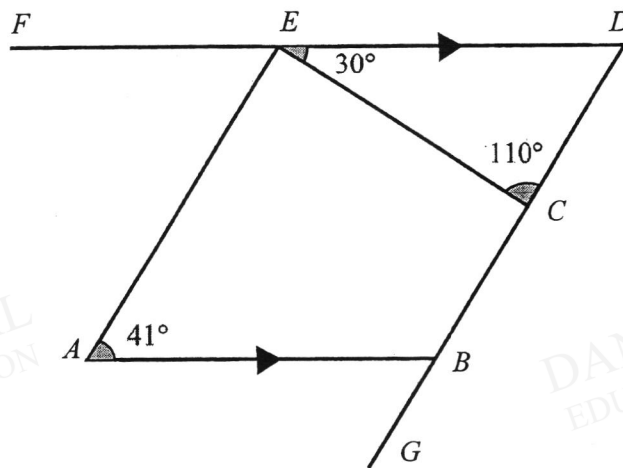**(c)**   Find, **as a product of its prime factors**, the lowest common multiple of 42 and 98.

Ans (c) : ………………… [1]

(d)   Find the smallest integer n such that $\dfrac{98}{n}$ is a perfect square.

Ans (d) : n = ………………… [1]

10   In the diagram below, AB is parallel to FED, and $GBCD$ is a straight line.
$\angle BAE = 41°$, $\angle DCE = 110°$ and $\angle CED = 30°$.

(a)   Calculate

     (i) $\angle CDE$,

     (ii) $\angle ABG$,

     (iii) $\angle AEC$.

Ans (ai) : ....° [1]

Ans (aii) : ....° [1]

Ans (aiii) : ....° [2]

(b)   Explain clearly if AE is parallel to $GBCD$.

Answer: (b) ....

....

....[1]
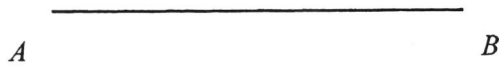
For Examiner's Use Only

11 ABC is a triangle where $AB = 6$ cm, $\angle BAC = 65°$ and $AC = 9$ cm.

    (a)   Construct triangle ABC.   [2]

    (b)   Measure the length of BC.

    (c)   Construct the

          (i)   perpendicular bisector of BC,   [1]

          (ii)   angle bisector of $\angle BAC$ [1]

    (d)   The perpendicular bisector of BC and the angle bisector of $\angle BAC$

         intersect at X. Mark the point X.   [1]

Answer (a), (c) and (d)

A   *B*

Ans (b) : $BC =$ ....cm [1]

End of Paper

GREENDALE SECONDARY SCHOOL
End of Year Examination 2018

MATHEMATICS   **4048/02**

Paper 2   02 Oct 2018

Sec 1 Express / SBB (Express)   **1 hour 15 minutes**

Additional Materials :   Writing Paper
                         Graph Paper

Candidates are to answer on the writing paper provided.

READ THESE INSTRUCTIONS FIRST

Write your index number and name on all the work you hand in.
Write in dark or blue pen.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
Start each question on a new page.

Answer **all** questions.

If working is needed for any question it must be shown with the answer.
Omission of essential working may result in loss of marks.
You are expected to use a scientific calculator to evaluate explicit numerical expressions.
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 required the answer in terms of π.

At the end of the examination, fasten all your work securely together.
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 **50**.

This document consists of **6** printed pages, including this cover page.

Mathematical Formulae

Compound Interest

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

Mensuration

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

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

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

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

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

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

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

Trigonometry

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

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

Statistics

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

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

Answer **all** questions and **start each question on a fresh page.**

1   **(a)**   Using a calculator, evaluate $(0.5)^2 \times \dfrac{\sqrt[3]{125}}{5}$.   [1]

    (b)   Given the following:

$$\frac{\pi}{15}, \quad 25\%, \quad \frac{\sqrt{2}}{7}, \quad 0.2\dot{4}.$$

        Write down

        (i)   the following in order of size, smallest first.   [2]

        (ii)   the irrational number(s).   [1]

        (iii)   the recurring number(s).   [1]

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2   Mr Tan is 3 times as old as his son, Ben, this year.

    (a)   Given that Ben is x years old now, write down, in terms of x, Mr Tan's present age.   [1]

    (b)   Write down an expression, in terms of x, for Mr Tan's age two years ago.   [1]

    (c)   Given that two years ago, Mr Tan was 3.5 times as old as Ben, form an equation in x and solve for x.   [3]

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3   A lorry travels 48 km at a speed of 54 km/h from **Changi** to **Jurong**.

    (a)   Express this speed in m/s.   [2]

    (b)   Find the time taken for the lorry to travel from Changi to Jurong in **minutes and seconds**.   [3]

The lorry then travelled 37 km from **Jurong** to **Bedok** in 36 minutes 40 seconds.

    (c)   Find the average speed of the lorry in **km/h**, for its journey from **Changi** to **Bedok**. Correct your answer to 3 significant figures.   [3]
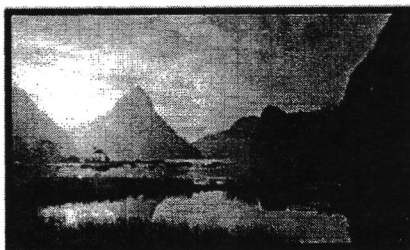
4   It is given that the interior angle of a regular polygon is $x°$ and the exterior angle is $(0.5x - 45)°$.

Find the

    (a)   value of x,   [2]

    (b)   number of sides of the polygon.   [2]

5

The cash price of a television set is \$2000. Mr Tan decides to buy the television on hire purchase. He pays a deposit of 40% of the cash price and pays monthly instalments of \$100 over a period of 24 months. Calculate

    (a)   the deposit he has to pay.   [1]

    (b)   the difference between the hire purchase price and the cash price.   [2]

**6**   **Answer the whole of this question on a sheet of graph paper.**

A packet of frozen food is removed from the freezer. Its temperature y °C after x hours is given by the equation $y = -5 + 2x$ for $0 \le x \le 5$.

x (hrs)	0	1	2	3	4
y °C	−5	p	−1	1	3

    (a)   Calculate the value of p.   [1]

    (b)   Draw the graph of $y = -5 + 2x$ for $0 \le x \le 4$, using 2 cm to represent 1 unit for both the horizontal x axis and vertical y axis.   [3]

    (c)   **Using your graph,** find

        (i)   the temperature of the frozen food when $x = 1.5$,   [1]

        (ii)   the time when the frozen food is $0°C$,   [1]

        (iii)   the gradient of the line and explain the meaning of the gradient   [3]

7   Mr Tan travelled to Europe for a holiday.

The pie chart shows the estimated breakdown of his expenses for the trip.
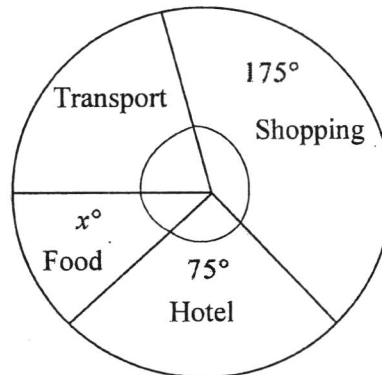
(a)   (i)   Express the amount Mr Tan spent on hotel as a ratio of the amount spent on
             shopping.   [1]

      (ii)   Calculate the amount spent on hotel if he spent €525 on shopping.   [1]

      (iii) Find $x°$, given that the amount spent on transport is 3 times the amount spent
             on food.   [2]

(b)   Mr Tan changed S$2000 into Euro (€) for this trip. The table below shows the
      currency exchange rate at the money changer.

Money Changer
S$1 = €0.65
<u>Extra charges:</u>
• 2% extra charge on the total amount of Euro changed.

Calculate the amount of Euros (€) that Mr Tan received.   [2]

8   **Diagram I** shows a closed container. The container is a prism whose cross-section is a trapezium $ABCD$. $AB = 1.5$ m, $DC = 0.5$ m, perpendicular height $DE = 0.75$ m, $AD = BC = 0.8$ m and $CF = 2.2$ m.
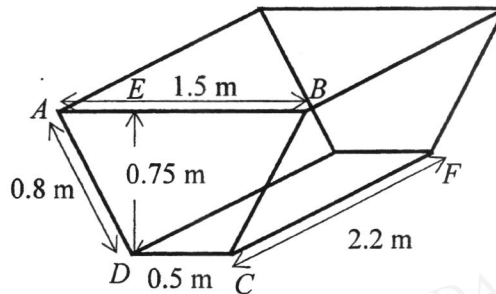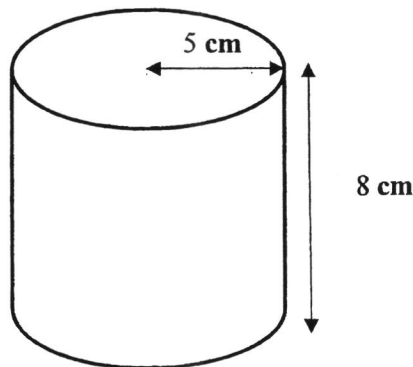

Diagram I (not drawn to scale)

(a)   Calculate the area of trapezium $ABCD$.   [1]

(b)   Find the total surface area of the container.   ·   [2]

(c)   Calculate the total volume of the container.   [2]

At the Games Carnival, the container is filled entirely with Milo drink. Mr Tan needs to buy paper cups for this event.

(d)   Using the information below, calculate the **minimum number** of paper cups he needs to buy.   [5]

- Each cup can be modelled by a cylinder with radius of 5 cm and height of 8 cm as shown in Diagram II below.

- Each cup can only be filled up to 80% to avoid spillage.

Diagram II (not drawn to scale)

End of Paper

Greendale Secondary School
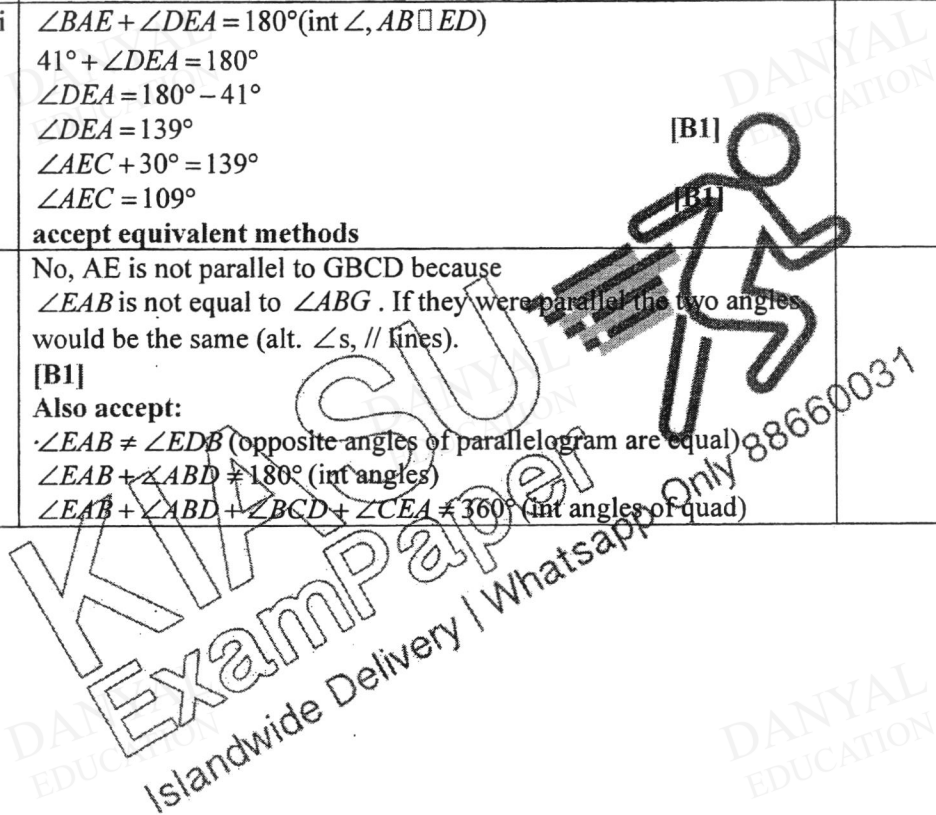**2018 Sec 1 Express End-of-Year Examination Marking Scheme [PAPER 1]**

General comments:
1. Algebra is a major concern. Many students are unable to manipulate algebraic expressions.

Qns	Marking Scheme		Marker's comments
1a	12.8	[B1]	
1b	$\dfrac{290 \times 5.59}{\sqrt{107}} = \dfrac{300 \times 6}{\sqrt{100}}$ $= \dfrac{1800}{10} = 180$	[B1]	
2a	$2x^3 + 6xy^2$ $= 2(x^3 + 3xy^2)$ $= 2x(x^2 + 3y^2)$	[M1] for factorizing 2 or x [A1] or B2	
b	$a(x - 2y) + b(2y - x)$ $= a(x - 2y) - b(x - 2y)$ $= (x - 2y)(a - b)$	[M1] [A1] also accept $(2y - x)(b - a)$	
3a	$\dfrac{2x}{3} - \dfrac{(x-3)}{4}$ $= \dfrac{4(2x) - 3(x-3)}{12}$ $= \dfrac{8x - 3x + 9}{12}$ $= \dfrac{5x + 9}{12}$	[M1] common denominator [A1]	
3b	$L = \dfrac{1}{2}m(v^2 - u^2)$ $L = \dfrac{1}{2}(3)(10^2 - 4^2)$ $L = \dfrac{3}{2}(100 - 16) = 126$	[M1] [A1]	
4a	$\dfrac{2x + 4}{3} = 2$ $2x + 4 = 6$ $2x = 6 - 4$ $2x = 2$ $x = 1$	[M1] ..... remove fraction [A1]	
4b	$\dfrac{50}{x} = \dfrac{1}{8}$ $\dfrac{50}{x} \times \dfrac{8}{1} = \dfrac{1}{8} \times \dfrac{8}{1}$		

	$\dfrac{400}{x} = \dfrac{1}{1}$ [M1] $\dfrac{400}{x} \times \dfrac{x}{1} = \dfrac{1}{1} \times \dfrac{x}{1}$ $400 = x$ [A1]	
5a	$6(4x+y)+2(x-y)$ $= 24x+6y+2x-2y$ [M1] $= 26x+4y$ [A1]	
5b	$5p-3(p-2)$ $= 5p-3p+6$ $= 2p+6$ [B1]	
6	Ahmad : Brad : Candy 2 : 11 : 5 \$72 $\rightarrow$ (11-2) units [M1] \$72 $\rightarrow$ 9 units \$8 $\rightarrow$ 1 unit 5 units $\rightarrow$ 8x5 = \$40 [A1]	
7a	$x \geq -3$ -3 0 [B1]	
7bi	$-3x > 15$ $\dfrac{-3x}{-3} < \dfrac{15}{-3}$ $x < -5$ [B1]	
7bii	$2 + 2x > 9$ $2x > 9 - 2$ $2x > 7$ $\dfrac{2x}{2} > \dfrac{7}{2}$ $x > \dfrac{7}{2}$ [B1]	
8	The y axis showing the interest rates does not start from zero. [B1] Thus, based on the bar graph, the reader might be misled to think that the interest rates increased drastically from 2008 to 2012. [B1] [accept other possible answers]	
9a	$42 = 2 \times 3 \times 7$ [B1] $98 = 2 \times 7^2$ [B1]	
9b	HCF $= 2 \times 7 = 14$ [B1] accept value of index notation	
9c	LCM $= 2 \times 3 \times 7^2$ [B1]	

9d	$\dfrac{98}{n} = \dfrac{2 \times 7^2}{n}$	
	Thus for $\dfrac{98}{n}$ to be a perfect square, n should $= 2$ **[B1]**	
	so that	
	$\dfrac{98}{2} = \dfrac{2 \times 7^2}{2}$	
	$= 49$	
10ai	$\angle CDE = 180° - 110° - 30° = 40°$ ($\angle sum$ of triangle) **[B1]**	
10aii	$\angle ABG = 40°$ (corresponding $\angle$, $AB\,\square\,ED$) **[B1]**	
10aiii	$\angle BAE + \angle DEA = 180°$(int $\angle$, $AB\,\square\,ED$)	
	$41° + \angle DEA = 180°$	
	$\angle DEA = 180° - 41°$	
	$\angle DEA = 139°$ **[B1]**	
	$\angle AEC + 30° = 139°$	
	$\angle AEC = 109°$ **[B1]**	
	accept equivalent methods	
10b	No, AE is not parallel to GBCD because $\angle EAB$ is not equal to $\angle ABG$. If they were parallel the two angles would be the same (alt. $\angle$s, // lines). **[B1]**	
	Also accept:	
	$\cdot\angle EAB \neq \angle EDB$ (opposite angles of parallelogram are equal)	
	$\angle EAB + \angle ABD \neq 180°$ (int angles)	
	$\angle EAB + \angle ABD + \angle BCD + \angle CEA \neq 360°$ (int angles of quad)	

11

Ans (b) : $BC =$ .... $8\cdot5\ (\pm0\cdot1)$ .... cm [1]

Qns	Marking Scheme	Marker's comments
1a	$(0.5)^2 \times \dfrac{\sqrt[3]{125}}{5}$ $= 0.25 \times \dfrac{5}{5}$ $= 0.25$ **[B1]**	
1bi	Convert all the numbers to decimal form for ease of comparison. $\dfrac{\pi}{15} = 0.20943951\ldots$ $25\% = 0.25$ $\dfrac{\sqrt{2}}{7} = 0.202030508\ldots$ $0.2\dot{4} = 0.2444444\ldots$ In ascending order: $\dfrac{\sqrt{2}}{7}$, $\dfrac{\pi}{15}$, $0.2\dot{4}$, 25% **[B1 for 2 correct positions, b2 if all 4 are correct]**	
1bii	$\dfrac{\pi}{15}$ and $\dfrac{\sqrt{2}}{7}$ **[B1]**	
1biii	$0.2\dot{4}$ **[B1]**	
2a	Ben's present age $= x$ Mr Tan's present age $= 3x$ **[B1]**	
2b	Mr Tan's age two years ago $= 3x - 2$ **[B1]**	
2c	Mr Tan's age two years ago $= 3x - 2$ Ben's age two years ago $= x - 2$ $3x - 2 = 3.5(x - 2)$ **[M1]** $3x - 2 = 3.5x - 7$ **[M1] for expansion** $7 - 2 = 3.5x - 3x$ $5 = 0.5x$ $\dfrac{5}{0.5} = x$ $10 = x$ **[A1]**	
3a	$\dfrac{54km}{1hr} = \dfrac{54000m}{60\min s}$ $\dfrac{54000m}{60\min s} = \dfrac{54000m}{60 \times 60 \sec s}$ **[M1]** $\dfrac{54000m}{60\min s} = \dfrac{54000m}{3600s} = 15 m/s$	

	$= 15m/s$	[A1]
3b	Time taken $= \dfrac{48km}{15m/s} = \dfrac{48000m}{15m/s}$ [M1] – ecf $= 3200$ seconds [M1] $= \dfrac{3200}{60}$ minutes $= 53\dfrac{1}{3}$ minutes $= 53$ minutes 20 seconds $[\dfrac{1}{3}\min s = \dfrac{1}{3}\times 60 = 20s]$ [A1]	
3c	Total time taken from Changi to Jurong to Bedok $= 53$min 20s $+$ 36min 40s $= 90$mins $= \dfrac{90}{60}$ $= 1.5$ hrs [M1] Total distance $= 48 + 37 = 85$ km [M1] Average speed $= \dfrac{85km}{1.5hr} = 56.666...$ $= 56.7 km/h$ (3sf) [A1]	
4a	Interior angle $+$ Exterior angle $= 180°$ $x + 0.5x + 45 = 180$ [M1] $1.5x + 45 = 180$ $1.5x = 225$ $x = \dfrac{225}{1.5}$ $x = 150$ (interior angle) [A1]	
4b	Ext angle $= 180° - 150° = 30°$ $30 = \dfrac{360}{n}$ [M1] ecf $\dfrac{30}{1} = \dfrac{360}{n}$ $30n = 360$ $n = 12$ [A1]	
5a	Deposit $= \dfrac{40}{100} \times 2000 = \$800$ [B1]	
5b	Hire purchase price $= \$800 + 100(24) = \$3200$ [M1] Difference in price $= \$3200 - \$2000 = \$1200$ [A1]	

6	

6) $y/°C$

6a) $y = -5 + 2x$
when $x = 1$,
$y = -5 + 2(1)$
$= -3$
$\therefore p = -3$ ✳ (B1)

(B1) pts

6b) see graph, axis, scale, line (B1)

6c i) when $x = 1.5 hrs$,
$y = -2°C$ ✳ (B1)

c ii) when $y = 0°C$,
$x = 2.5 hrs$ ✳ (B1)

(iii) $= \dfrac{y_1 - y_2}{x_1 - x_2}$

$= \dfrac{-1}{2}$

$= -3$ (B1)

x (hrs)

gradient $= \dfrac{\Delta \text{ in } y}{\Delta \text{ in } x}$

$= \dfrac{\Delta \text{ of temp}}{\Delta \text{ of time}}$

The gradient represent the rate of change of temp with time. (B1)

7ai	$\dfrac{75}{175} = \dfrac{3}{7}$	
	$3:7$ **[B1]**	
7aii	$175° \rightarrow €500$	
	$1° \rightarrow \dfrac{500}{175}$	
	$75° \rightarrow \dfrac{525}{175} \times 75 = 225$	**[B1]**
7aiii	Amount spent on food $= x$	
	Amount spent on transport $= 3x$	
	$3x + x + 75 + 175 = 360$	**[M1]**
	$4x = 360 - 75 - 175$	
	$4x = 110$	

	$x = 27.5$ **[A1]**	
7b	S\$1 = €0.65 S\$2000 = €(2000 × 0.65) = €1300 **[B1]** Total amount of Euro Mr Tan will receive $= €1300 - (\frac{2}{100} \times 1300)$ $= €1274$ **[B1]**	
8a	Area of trapezium *ABCD* $= \frac{1}{2}(0.5 + 1.5)(0.75)$ $= 0.75m^2$ **[B1]**	
8b	Surface area = 2 x Trapezium ABDC + 2 big rectangles + 1 smaller rectangle + top rectangle $= (0.75 \times 2) + (2.2 \times 0.8 \times 2) + (0.5 \times 2.2) + (1.5 \times 2.2)$ **[M1]** ecf **from 8a** $= 1.5 + 3.52 + 1.1 + 3.3$ $= 9.42m^2$ **[A1]**	
8c	Volume of container = Area of trapezium $ABCD \times 2.2m$ $= 0.75m^2 \times 2.2m$ **[M1]** ecf from 8b $= 1.65m^3$ **[A1]**	
8d	Total volume of cup $= \pi r^2 h$ $= \pi \times (0.05m)^2 \times (0.08m)$ **[M1]** $= 0.000628318m^3$ **[M1]** o.e. Max amount of drink for 1 cup $= 0.8 \times 0.000628318m^3 = 0.000502654m^3$. **[M1]** o.e. $\frac{1.65}{0.000502654} = 3282.57$ **[M1]** Mr Tan would need to buy 3283 cups. **[A1]**	