Name:_____ ( )	Class:_____

SERVE·LEAD·EXCEL

GREENDALE SECONDARY SCHOOL
Mid-Year Examination 2018

60

MATHEMATICS **4045/01**

Paper 1 10 May 2018

Secondary Two Normal Academic / SBB (NT) **1 hour 30 minutes**

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.
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 may result in loss of marks.
The total number of marks for this paper is **60**.

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 requires the answer in terms of π.

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

Question	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Strand	A	N	N	N	S	A	A	A
Marks								

Question	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17
Strand	A	A	S	A	S	A	A	A	S
Marks									

This document consists of 13 printed pages, including this cover page.

Mathematical Formulae

Compound interest

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

Mensuration

$$\text{Curve surface area of a cone} = \pi rl$$

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

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

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

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

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

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

Trigonometry

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

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

Statistics

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

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

For Examiner's Use Only

Answer **all** the questions.

1 Simplify

(a) $5-(3x+4)$,

Answer (a) _____ [2]

(b) $x-\frac{x}{6}+\frac{x}{12}$.

Answer (b) _____ [2]

---

2 Write the number 493.6175 correct to

(a) to 2 decimal places,

Answer (a) _____ [1]

(b) to 3 significant figures.

Answer (b) _____ [1]

For Examiner's Use Only

3 A rope is cut into three pieces in the ratio of 7 : 2 : 4.

The longest piece is 35 cm.

What is the length of the whole rope?

Answer _____ cm [2]

---

4 Express

(a) 62% as a fraction in its simplest form,

Answer (a) _____ [1]

(b) 45 minutes as a percentage of 3 hours.

Answer (b) _____ % [2]

For Examiner's Use Only

5 The height of 5 students are 162 cm, 135 cm, 171 cm, 158 cm and 160 cm.

(a) Find the mean height of the 5 students.

Answer (a) _____ cm [2]

(b) Ray's height is measured to be x cm.
Given that the new mean height of Ray and the 5 students is 155 cm, find the value of x.

Answer (b) $x =$ _____ [2]

---

6 **(a)** Solve the inequality $8x - 2x \geq -24$.

Answer (a) _____ [2]

(b) Represent the solution in part **(a)** on a number line below.

Answer (b)

[2]

For Examiner's Use Only

7 Simplify the following expressions.

(a) $\frac{5n}{8} \times \frac{2m}{35n}$

Answer (a) _____ [2]

(b) $\frac{4(a+b)}{p} \div \frac{a+b}{5p^2}$

Answer (b) _____ [2]

---

8 Solve the following equations.

(a) $\frac{8}{x+3} = 4$

Answer (a) $x =$ _____ [2]

(b) $\frac{7x-3}{5} - \frac{2x+1}{2} = 4$

Answer (b) $x =$ _____ [2]

For Examiner's Use Only

9 Expand and simplify the following expressions.

(a) $(7x-2)(3x-5)$

Answer (a) _____ [2]

(b) $(y+8)^2$

Answer (b) _____ [2]

For Examiner's Use Only

10 Factorise the following expressions.

(a) $x^2 - 5x - 14$

Answer (a) _____ [2]

(b) $36p^2 - 25$

Answer (b) _____ [2]

---

11 The table shows the number of families and the number of children each family brought to the zoo on a particular day.

No. of children	1	2	3	4
No. of families	12	30	x	25

(a) If the mode is 2, state the largest possible value of x.

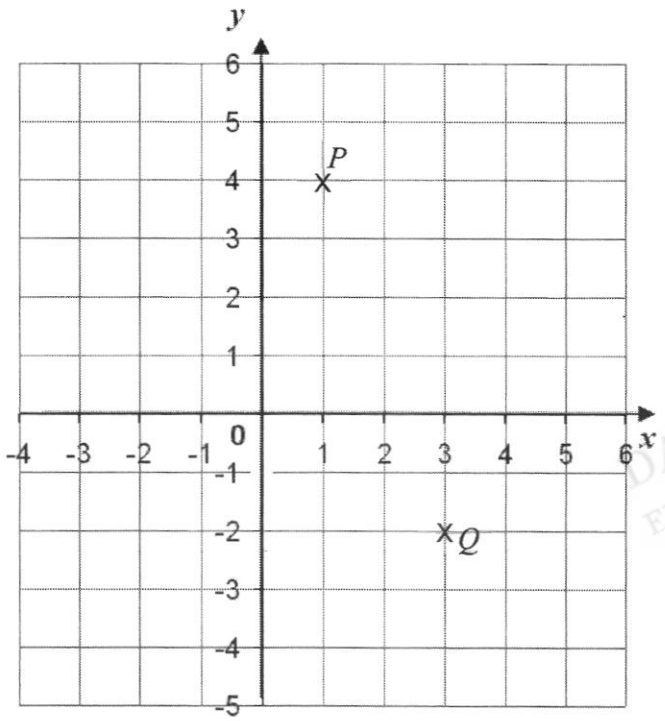
Answer (a) $x =$ _____ [1]

(b) If the median is 3, state the smallest possible value of x.

Answer (b) $x =$ _____ [1]

For Examiner's Use Only

12



(a) Write down the coordinates of points P and Q.

Answer (a) $P($ _____ , _____ $)$ [1]

$Q($ _____ , _____ $)$ [1]

(b) Find the gradient of the line PQ.

Answer (b) _____ [2]

For Examiner's Use Only

13 The following stem-and-leaf diagram shows the weekly expenses of a group of students.

Stem	Leaf
2	4 6 9
3	1 5 5 7 8
4	2 4 6
5	6 9

Key : 2 | 4 means \$24

(a) Find the total number of students in the group.

Answer (a) _____ [1]

(b) Find the mean weekly expenses.

Answer (b) \$_____ [2]

(c) Find the median weekly expenses.

Answer (c) \$_____ [1]

For Examiner's Use Only

14 A fruit seller had $6x$ oranges in his stall. At the end of the day, he had $\frac{3(x-2)}{5}$ oranges left. Find the number of oranges he sold in terms of x, simplified into a single fraction.

Answer _____ [3]

---

15 Given that the formula $v = \frac{2m+n}{5}$, find

(a) the value of v if $m = 12$ and $n = 31$.

Answer (a) $v =$ _____ [2]

(b) the value of m if $v = 18$ and $n = 8$.

Answer (b) $m =$ _____ [2]

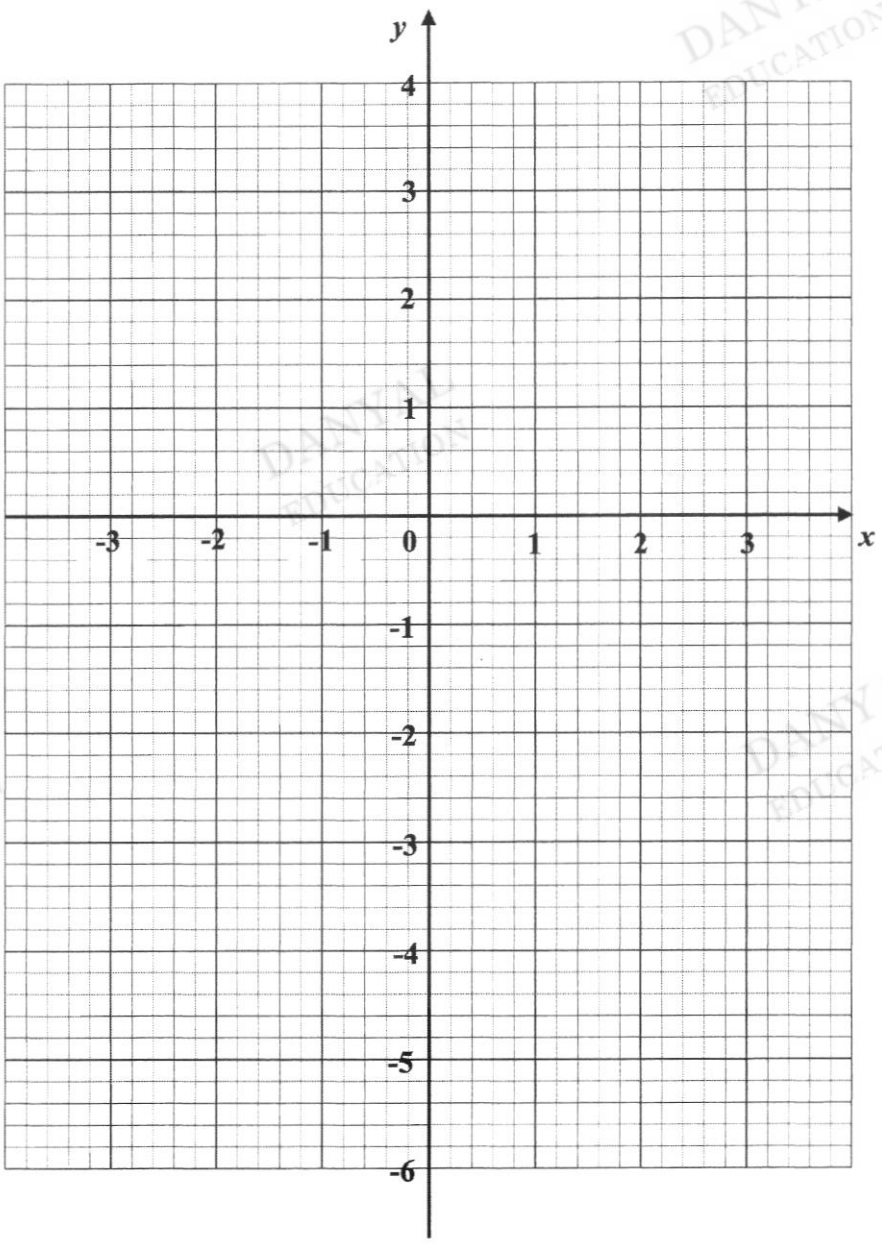
For Examiner's Use Only

16 **(a)** Complete the table of values for $y = -2x + 2$.

x	–1	0	3
$y = -2x + 2$		2	

[2]

(b) Draw the graph of $y = -2x + 2$.



[2]

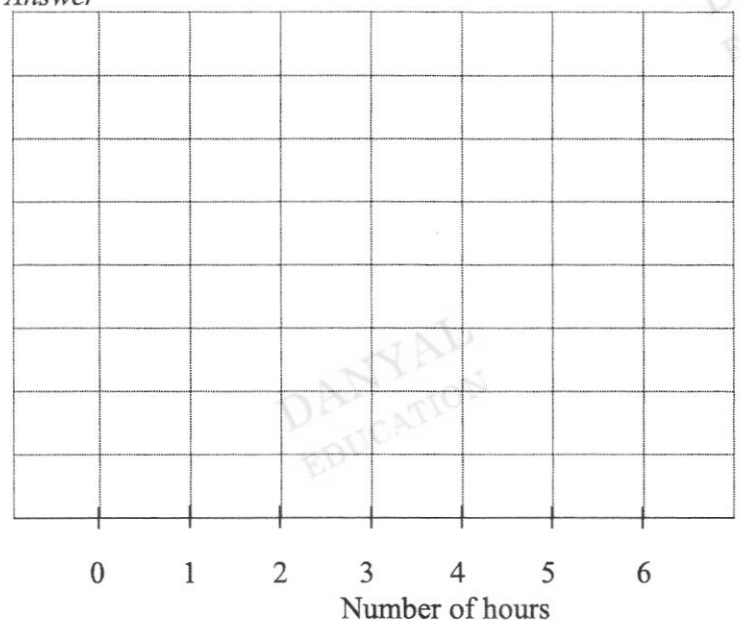
For Examiner's Use Only

17 The following data shows the number of hours 20 students in a class spent studying per day.

4	3	0	3	1
3	4	1	4	6
4	0	1	4	4
0	3	0	5	5

(a) Draw a dot diagram to represent the above data.

Answer



[2]

(b) How many students studied for more than 3 hours?

Answer (b) _____ [1]

(c) Calculate the percentage of students who did not study.

Answer (c) _____% [1]

End of Paper

Name:_____ ( )	Class: S2A_____

SERVE·LEAD·EXCEL

GREENDALE SECONDARY SCHOOL
Mid-Year Examination 2018

MATHEMATICS **4045/02**

Paper 2 3 May 2018

Secondary Two Normal Academic / SBB (NT) **1 hour 30 minutes**

Additional Materials : 4 Writing Paper
1 Graph 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.
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 requires 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 **45**.

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

Mathematical Formulae

Compound Interest

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Mensuration

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

Statistics

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

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

Answer **all** the questions.

1 Simplify the following.

(a) $\dfrac{6a^2b}{30a^3}$ [1]

(b) $\dfrac{4cx+10cy}{14dx+35dy}$ [2]

(c) $\dfrac{x^2+11x+24}{2y^3} \div \dfrac{x+8}{10y}$ [3]

---

2 **(i)** Simplify $5(x+7)+4(2-3x)$. [2]

(ii) Hence, solve the inequality $5(x+7)+4(2-3x)>29$. [2]

(iii) State the largest integer value of x that satisfies the inequality in **(ii)**. [1]

---

3 **(a)** **(i)** Expand $(x-y)^2$. [1]

(ii) Hence, without using a calculator, find the value of 499^2. [2]

(b) If $(x+y)^2=56$ and $xy=17$, find the value of x^2+y^2. [2]

---

4 **(i)** Factorise $3x^2-17x+20$. [2]

(ii) Hence, simplify $\dfrac{3x^2-17x+20}{x^2-16}$ [2]

---

5 A train travels at the speed of $(85-2x)$ km/h for $(x+3)$ hours.

(a) Express, in its simplest form, the distance travelled by the train in terms of x. [2]

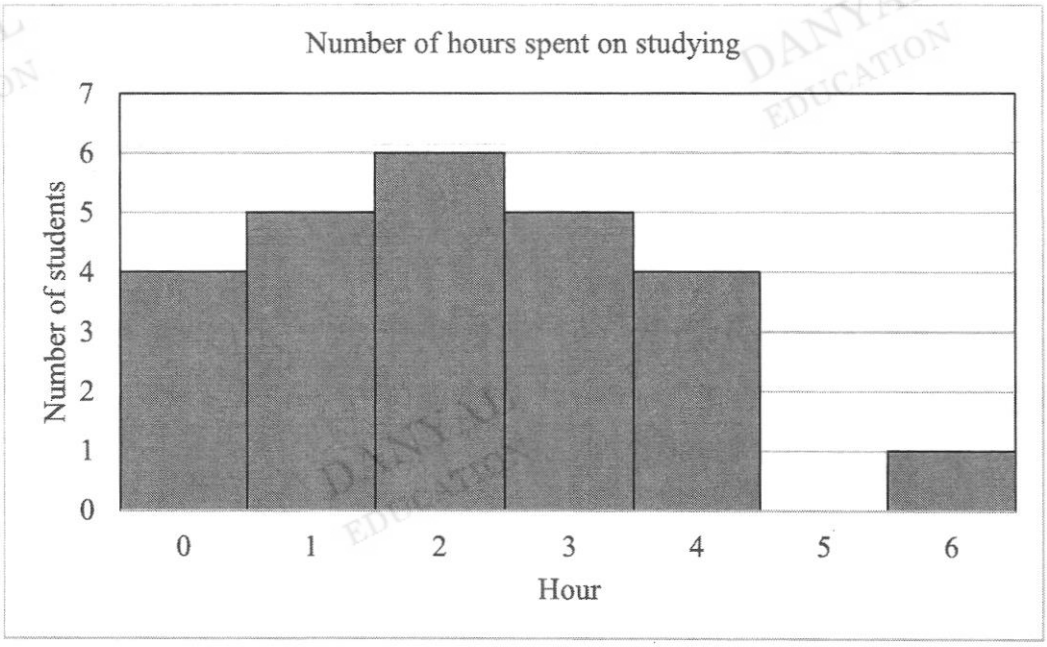
(b) If $x=7$, find the distance travelled. [2]

---

6 **(a)** **(i)** Find the highest common factor of 48 and 80. [1]

(ii) Susan eats a sweet every 20 minutes and a chocolate every 50 minutes. If she eats both together at 8.00 a.m., what is the next time that she will eat both together? [2]

(b) The histogram below shows the number of hours spent by students in a class on studying per day.



(i) How many students are there in the class? [1]

(ii) Find the percentage of students who spent at most 2 hours per day. [2]

(iii) Describe briefly the distribution of the number of hours spent by students in the class on studying per day. [2]

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

7 The volume of air, V cm^3, left in a punctured tyre at the end of the t minutes is given by the function $V = 700 - 40t$ for $0 \leq t \leq 8$.

(a) **(i)** Copy and complete the following table.

t	0	5	8
V		500	

[1]

(ii) Using a scale of 2 cm to 1 unit on the t-axis and 2 cm to 100 units on the V-axis, draw the graph of V against t. [3]

(b) State the gradient of the graph. [1]

(c) Using your graph, find the value of t when $V = 600$. [1]

(d) Under the safety regulation, it is considered unsafe to drive a car with volume of less than 450 cm^3 in each tyre. State, with explanation, if it is safe to drive a car when a tyre is punctured after 7 minutes? [1]

8 Mr and Mrs Ng and their three children will be flying from Singapore to Tokyo. Below are the prices provided by Premier Airlines and the Airport Tax.

Premier Airlines	Economy	First Class
Adult	\$788.50	\$1288.50
Child	\$620.80	\$942.00

* Prices listed above do not include Goods and Services Tax (GST).
* All tickets purchase will be subjected to 7% GST.

Airport Tax	Peak Period	Non-Peak Period
Adult	\$68	\$59
Child	\$55	\$46

* Airport Tax is not subjected to GST.

(a) Mr Ng and his family decide to travel to Tokyo on First Class during the peak period.

(i) What is the total cost of the air tickets? (excluding GST) [2]

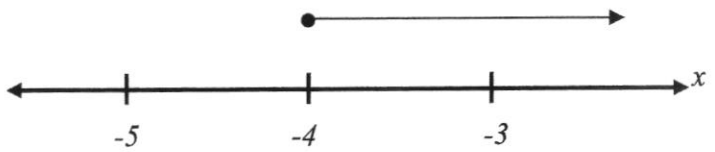
(ii) What is the total cost of the trip including GST and Airport Tax? [2]

(b) There is a discount of 10% for all Economy tickets (excluding GST). Calculate the difference in the total cost of the air tickets (excluding GST) if Mr Ng and his family decide to switch to Economy Class instead. [2]

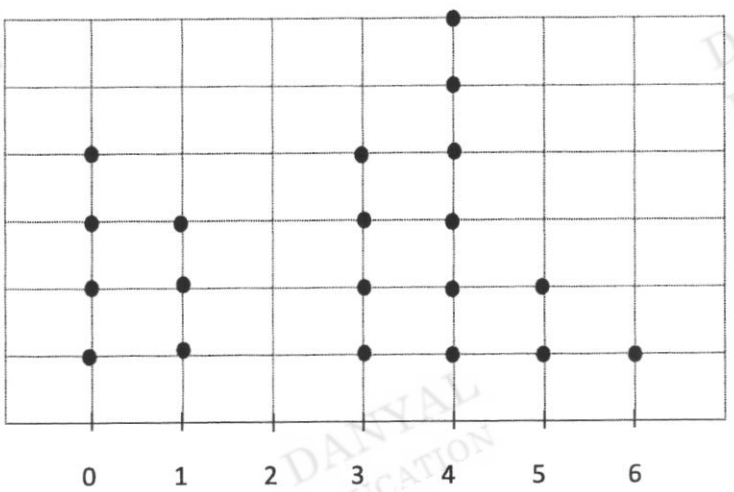
End of Paper

Greendale Secondary School
2018 Mid-Year Examination
Sec 2 Normal (Academic) Mathematics Syllabus A
Marking Scheme for Paper 1

Qn no.	Solution	Marks
1.		
(a)	$5-3x-4$	M1
	$=-3x+1$	A1
(b)	$\frac{12x}{12}-\frac{2x}{12}+\frac{x}{12}$	M1
	$=\frac{11x}{12}$	A1
2.		
(a)	493.62	B1
(b)	494	B1
3.		
	7 units → 35 cm	
	13 units → $\frac{35}{7}\times 13$	M1
	$= 65$ cm	A1
4.		
(a)	$\frac{31}{50}$	B1
(b)	$\frac{45}{180}\times 100\%$	M1
	$=25\%$	A1
5.		
(a)	$\frac{162+135+171+158+160}{5}$	M1
	$=\frac{786}{5}$	
	$= 157.2$ cm	A1
(b)	$x=(155\times 6)-786$	M1
	$= 144$ cm	A1
6.		
(a)	$6x \geq -24$	M1
	$x \geq -4$	A1

(b)		B1 – correct direction B1 – shaded circle (e.c.f)
7. (a)	$\frac{5n}{8}\times\frac{2m}{35n}$ $=\frac{m}{28}$	B2 (B1 – correct cancellation of numbers and n)
(b)	$\frac{4(a+b)}{p}\times\frac{5p^2}{a+b}$ $=20p$	M1 A1
8. (a)	$4x+12=8$ $x=-1$	M1 A1
(b)	$\frac{14x-6-10x-5}{10}=4$ $4x-11=40$ $x=12.75$ or $12\frac{3}{4}$	M1 A1
9. (a)	$21x^2-35x-6x+10$ $=21x^2-41x+10$	M1 A1
(b)	$y^2+2(y)(8)+8^2$ $=y^2+16y+64$	M1 A1
10. (a)	x -7 $-7x$ x $+2$ $+2x$ x^2 -14 $-5x$ $x^2-5x-14=(x-7)(x+2)$	M1 A1

(b)	$(6p)^2-(5)^2$ $=(6p+5)(6p-5)$	M1 A1
11. (a) (b)	29 18	B1 B1
12. (a) (b)	$P\,(1\,,\,4)$ $Q\,(3\,,\,-2)$ Gradient $=\dfrac{4-(-2)}{1-3}$ $=-3$	B1 B1 M1 A1
13. (a) (b) (c)	13 $\dfrac{24+26+29+31+35+35+37+38+42+44+46+56+59}{13}$ $=\$\,38.62,\,38.6$ or $38\dfrac{8}{13}$ $\$\,37$	B1 M1 A1 B1
14.	$6x-\dfrac{3(x-2)}{5}$ $=\dfrac{30x-3x+6}{5}$ $=\dfrac{27x+6}{5}$	M1 M1 A1
15. (a) (b) 	$v=\dfrac{2(12)+31}{5}$ $v=11$ $18=\dfrac{2m+8}{5}$ $2m+8=90$ $m=41$	M1 A1 M1 A1

16. (a)		
	x | –1 | 0 | 3 y | 4 | 2 | –4	B1 for each
(b)	Correct ruled straight line	P2 (P1 – correct points plotted)
17. (a)	 	B2 – all correct B1 – one error
(b)	9	B1
(c)	$\frac{4}{20} \times 100\% = 20\%$	B1

Greendale Secondary School
2018 Mid-Year Examination
Sec 2 Normal (Academic) Mathematics Syllabus A
Marking Scheme for Paper 2

Qn no.	Solution	Marks
1.		
(a)	$\frac{b}{5a}$	B1
(b)	$\frac{2c(2x+5y)}{7d(2x+5y)}$	M1
	$=\frac{2c}{7d}$	A1
(c)	$\frac{(x+8)(x+3)}{2y^3} \div \frac{x+8}{10y}$	M1
	$=\frac{(x+8)(x+3)}{2y^3} \times \frac{10y}{x+8}$	M1
	$=\frac{5(x+3)}{y^2}$	A1
2.		
(i)	$5x+35+8-12x$	M1
	$=-7x+43$	A1
(ii)	$-7x+43>29$	
	$-7x>-14$	M1 (e.c.f.)
	$x<\frac{-14}{-7}$	
	$x<2$	A1
(iii)	1	B1 (e.c.f.)

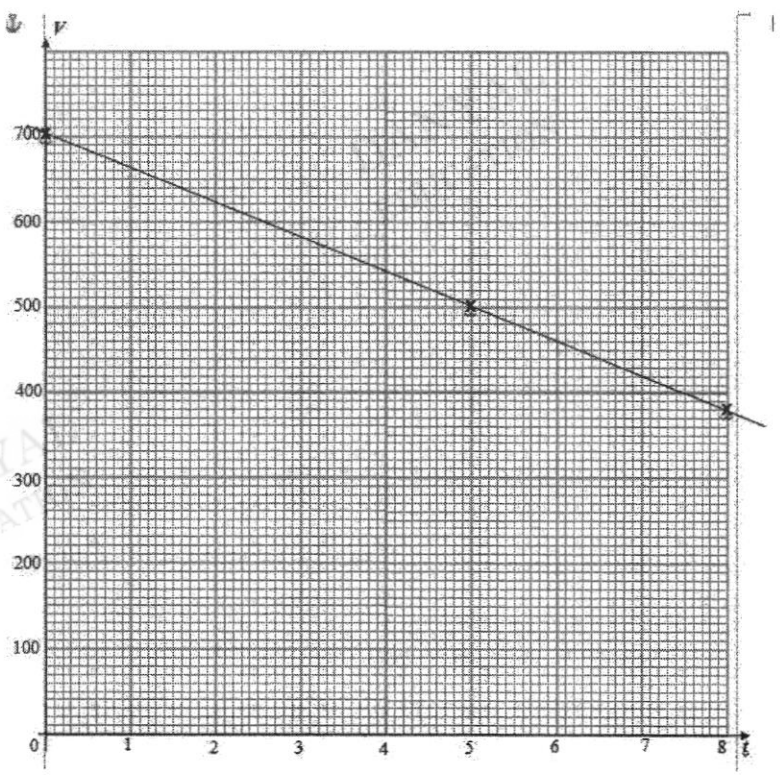
3. (a)(i)	$(x-y)^2 = x^2 - 2xy + y^2$	B1
(ii)	$499 = (500-1)^2 = (500)^2 - 2(500)(1) + (1)^2$ $= 249001$	M1 (e.c.f.) A1
(b)	$(x+y)^2 = x^2 + 2xy + y^2$ $x^2 + y^2 = (x+y)^2 - 2xy$ $= 56 - 2(17)$ $= 22$	M1 (e.c.f.) A1
4. (i)	$3x$ -5 $-5x$ x -4 $-12x$ $3x^2$ $+20$ $-17x$ $3x^2 - 17x + 20 = (3x-5)(x-4)$	M1 A1
(ii)	$\frac{(3x-5)(x-4)}{(x+4)(x-4)}$ $= \frac{3x-5}{x+4}$	M1 for $(x+4)(x-4)$ A1
5. (a)	$(85-2x)(x+3)$ $= 85x + 255 - 2x^2 - 6x$ $= -2x^2 + 79x + 255$	M1 A1
(b)	$-2(7)^2 + 79(7) + 255$ $= 710$	M1 (e.c.f.) A1
6. (a)(i)	$48 = 2^4 \times 3$, $80 = 2^4 \times 5$ HCF $= 2^4 = 16$	B1
(ii)	$20 = 2^2 \times 5$, $50 = 2 \times 5^2$ LCM $= 2^2 \times 5^2 = 200$ Time = 0800 + 3h 20min = 11.20 a.m.	M1 A1

(b)(i)	25	B1
(ii)	$\frac{15}{25}\times 100\%$ $= 60\%$	M1 A1
(iii)	Most of the students spent between 0 to 4 hours per day on studying. The distribution is symmetrical between 0 to 4 hours. The most common number of studying hours is 2. There is only 1 student who study for 6 hours per day.	B1 – general description of distribution B1 – mention of max/min value or outlier
7. (a)(i)		

t	0	5	8
V	**700**	500	**380**

B1 – both correct

(ii)



B1 – correct scale

B1 – correct plotting of points

B1 – correct drawing of line

B1

(b) –40

B1

(c) $t = 2.5$ min

B1

(d) Unsafe, because when the time is 7 min, the volume left in the tyre is only 420 cm^3 which is less than the required 450 cm^3.

8. (a)(i)	$(1288.50\times 2)+(942\times 3)$ $=\$5403$	M1 A1
(ii)	$\left(\frac{107}{100}\times \$5403\right)+(\$68\times 2)+(\$55\times 3)$ $=\$6082.21$	M1 A1
(b)	$\left(\frac{90}{100}\times \$788.50\times 2\right)+\left(\frac{90}{100}\times \$620.80\times 3\right)$ $=\$3095.46$ $\$5403-\$3095.46=\$2307.54$	M1 A1