SYDNEY BOYS HIGH SCHOOL

MOORE PARK, SURRY HILLS

Year 7

Half Yearly Examination 2008

Mathematics

General Instructions
- Working time – 60 minutes
- Write using black or blue pen.
- All necessary working MUST be shown in every question if full marks are to be awarded.
- Marks may not be awarded for untidy or badly arranged work.
- If more space is required, clearly write the number of the QUESTION on one of the back pages and answer it there. Indicate that you have done so.
- Clearly indicate your class by placing an X, next to your class

Examiner: *D. McQuillan*

NAME:

Class	Teacher	
7 E	Mr Gainford	
7 F	Mr Kourtesis	
7 M	Ms Nesbitt	
7 R	Ms Evans	
7 S	Ms Roessler	
7 T	Ms Ward	

Section	Mark
A	/12
B	/11
C	/11
D	/11
E	/11
F	/11
Total	/67

Section A | Marks

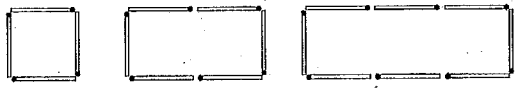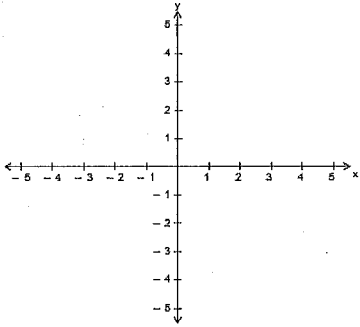|			
1	(I) The Egyptian numeral 𓏺𓏺𓏺𓏺 𓎢 𓎢999∩∩||| is equal to 𓏺𓏺𓎢𓏺 𓎢99∩∩𓊖|||. (II) The Roman numeral LXVI is equal to XLIV.	(A) Both statement (I) and (II) are true. (B) Statement (I) is true and statement (II) is false. (C) Statement (I) is false and statement (II) is true. (D) Both statement (I) and (II) are false.	1
2	Convert the following to Hindu-Arabic numerals. (a) 𓎢 𓎢𓎢𓎢𓎢𓎢9999∩ (b) CCLXIV (c) $\overline{V}$DVII		1 1 1
3	Write $5\times10^4 + 3\times10^2 + 7\times10 + 3\times1$ as a numeral.		1
4	Simplify the following expressions (a) $x - x - 2x + x - x$ (b) $10\times f \times 5\times h \times f$ (c) $8\times b \div (b-4)$		1 1 1
5	How many terms are in the expression $6b + c - 8 + 3a$?		1
6	When Alex first notices a spider, it is sitting 3cm below a light switch on the wall. He watches the spider move about 12cm up the wall then 5cm down where it stops for a few seconds. The spider then travels a further 9cm down, followed by 2cm up and finally 6cm down. What is the spider's position on the wall in relation to the light switch?		1
7	Use the numbers 2, 3, 6, 8 exactly once to correctly complete the statement. __ × [(__ − __) ÷ __] = 12		1
8	Find $\dfrac{2}{3}$ of 873 .		1

Section B		Marks
1	How many times bigger is the first '5' than the second '5' in the number 1 512 753?	1
2	What is the base 10 value of the largest 8 digit binary number?	1
3	Write 3 490 in expanded notation.	1
4	$123\ 456 \times 999\ 999 = ?$	1
5	Simplify the following numerical expressions (a) $18 + 2 \times -3 + 5 - 2$ (b) $(7-10) \times 20 \div -5$ (c) -7^2	1 1 1
6	Use the rule $y = 10 - 2x$ to complete the table.	2
7	Write the first 5 terms of the sequence with the general term $16 - n^2$.	2

For question 6:

x	0	2	4	6
y				

Section C		Marks
1	Write an expression for the average of a, b, c.	1
2	Convert 10010_2 to base 10.	1
3	Convert 87 to base 2.	1
4	The sum of ten numbers is 2624. If one of the numbers is changed from 456 to 654, what will be the new sum?	1
5	Plot the elements of $\{1, -3, 0, |-2|\}$ on a number line.	2
6	Given the number pattern $-4, -1, 2, 5, \ldots$ find the 101st term.	2
7	Complete the table and find the rule for the following matchstick pattern.	3

For question 7:

length (l)	1	2	3	77
matches (m)				

Rule: $m =$

Section D		Marks
1	If $x > 3$ and $y < 5$ state whether the following expressions are positive or negative.	1
	(a) $x - 3$	1
	(b) $(3 - x)^2 (y - 5)$	1
2	Evaluate	
	(a) $15 - \|2 - 5\|$	1
	(b) $\|-4\| - \|9\|$	1
3	$1101_2 - 111_2 = ?$	2
4	Plot the following points on the number plane and join them up in order to form a closed polygon. $(3, 2)$ $(4, -2)$ $(0, -4)$ $(-5, -2)$ $(-4, 0)$	3
5	A street of houses with numbers 1 to 100 inclusive is to be numbered with new brass numerals. How many twos (as digits) would be needed to complete the job?	2

Section E		Marks
1	An integer has an odd number of digits and the first digit is a 3. What is the first digit of the square root of the integer?	1
2	The average minimum temperature for a week in Jindabyne is 4°. The minimum temperatures for six days were, 7°, 6°, 2°, 7°, 3°, 0°. What was the minimum temperature on the 7th day?	2
3	How many two–digit numbers can be formed with the digits (using each digit once) 8, 5, 3, 0?	2
4	Students in a group dancing class are spaced evenly around a circle and are counted consecutively from number 1. If Student 20 is directly opposite Student 53. How many students are in the group?	2
5	Robert has an average of 88% over his past four maths tests. What must he score in his next test to raise his average to 90%.	2
6	Mr Newton counted his class in groups of 4 and there were 2 left over. He then counted them in groups of 5 and there was 1 left over. If 15 of his class were girls and he had more girls than boys, what is the number of boys in his class?	2

Section F

		Marks
1	In a basketball game, there were at all times 5 players on the court and 3 reserves on the bench for one of the teams. Each of the eight members of this team was on the court for the same amount of time. How many minutes did each team member play if the game lasted 48 minutes?	2
2	How many three digit numbers from 100 to 999 inclusive have one digit which is the average of the other two?	3
3	Using the square root algorithm evaluate $\sqrt{9216}$.	3

4	A, B, C, D, E represent unique digits (from 0 to 9) of a five digit number such that $$\begin{array}{r} ABCDE \\ \times 4 \\ \hline EDCBA \end{array}$$ Find the digits represented by each letter.	3

End of Exam

Extra Working Space

Question		

Extra Working Space

Question		

Section A			Marks
1	(I) The Egyptian numeral $\text{ⲓⲓⲓⲓ}\,\text{𓆼𓆼}\,999\cap\cap\text{ⲓⲓⲓ}$ is equal to $\text{ⲓⲓⲓ𓆼ⲓ𓆼}99\cap\cap9\text{ⲓⲓⲓ}$. (II) The Roman numeral LXVI is equal to XLIV.	(A) Both statement (I) and (II) are true. (B) Statement (I) is true and statement (II) is false. ⟵(circled) (C) Statement (I) is false and statement (II) is true. (D) Both statement (I) and (II) are false.	1
2	Convert the following to Hindu-Arabic numerals. (a) $\text{𓆼}\,\text{𓆼𓆼𓆼𓆼}9999\cap$	1005410	1
	(b) CCLXIV	264	1
	(c) $\overline{\text{V}}$DVII	5507.	1
3	Write $5\times10^4+3\times10^2+7\times10+3\times1$ as a numeral.	50373.	1
4	Simplify the following expressions (a) $x-x-2x+x-x$	$-2x$.	1
	(b) $10\times f\times5\times h\times f$	$50f^2h$.	1
	(c) $8\times b\div(b-4)$	$\dfrac{8b}{b-4}$.	1
5	How many terms are in the expression $6b+c-8+3a$?	4.	1
6	When Alex first notices a spider, it is sitting 3cm below a light switch on the wall. He watches the spider move about 12cm up the wall then 5cm down where it stops for a few seconds. The spider then travels a further 9cm down, followed by 2cm up and finally 6cm down. What is the spider's position on the wall in relation to the light switch?	$-3+12-5-9+2-6=-9$ 9 cm below.	1
7	Use the numbers 2, 3, 6, 8 exactly once to correctly complete the statement.	$\underline{6}\times[(\underline{8}-\underline{2})\div\underline{3}]=12$ $8\times[(\underline{6}-\underline{3})\div\underline{2}]=12$	1
8	Find $\dfrac{2}{3}$ of 873.	582.	1

Section B			Marks
1	How many times bigger is the first '5' than the second '5' in the number 1 512 753?	10 000	1
2	What is the base 10 value of the largest 8 digit binary number? 1 1 1 1 1 1 1 1	$1+2+2^2+2^3+2^4+2^5+2^6+2^7$ 255	1
3	Write 3 490 in expanded notation.	$3\times1000+4\times100+9\times10$	1
4	$123\,456\times999\,999=?$	123 456 000 000 $-\quad$ 123 456 123455876544	1
5	Simplify the following numerical expressions (a) $18+2\times-3+5-2$	15	1
	(b) $(7-10)\times20\div-5$	12	1
	(c) -7^2	-49	1
6	Use the rule $y=10-2x$ to complete the table. 	x	0	2	4	6
y	10	6	2	-2			2
7	Write the first 5 terms of the sequence with the general term $16-n^2$. $16-1^2$ $\quad$ $16-4^2$ $16-2^2$ $\quad$ $16-5^2$ $16-3^2$	15, 12, 7, 0, -9	2

Section C		Marks
1	Write an expression for the average of a, b, c. $$\frac{a+b+c}{3}$$	1
2	Convert 10010_2 to base 10. $1\overset{16}{0}\overset{8}{0}\overset{4}{0}1\overset{2}{0}\overset{1}{0}1$ 18	1
3	Convert 87 to base 2. $\begin{array}{ccccccc}64 & 32 & 16 & 8 & 4 & 2 & 1\end{array}$ $\begin{array}{c}87 \\ 64 \\ \overline{23} \\ 16 \end{array}$ $\begin{array}{ccccccc}1 & 0 & 1 & 0 & 1 & 1 & 1\end{array}$ $\begin{array}{c}7 \\ \underline{4} \\ 3\end{array}$ 1010111	1
4	The sum of ten numbers is 2624. If one of the numbers is changed from 456 to 654, what will be the new sum? $\begin{array}{cc}2624- & 2168+ \\ 456 & 654 \\ \overline{2168} & \overline{2822}\end{array}$ $2624-456+654$ $= 2822$	1
5	Plot the elements of $\{1, -3, 0, |{-2}|\}$ on a number line. ½ mark for each.	2
6	Given the number pattern $-4, -1, 2, 5, \ldots$ find the 101st term. 1st term = -4 difference = 3 $296.$ $299 - 1$ mark	2
7	Complete the table and find the rule for the following matchstick pattern.	3

length (l)	1	2	3	77
matches (m)	4	6	8	156

Rule: $m = 2l + 2$ $2l + 2$

Section D		Marks
1	If $x > 3$ and $y < 5$ state whether the following expressions are positive or negative. (a) $x - 3$ → positive (b) $(3-x)^2(y-5)$ → negative	1 1
2	Evaluate (a) $15 - |2 - 5|$ → $15 - \overset{-3}{3} = 12$ (b) $|-4| - |9|$ → $4 - 9 = -5$	1 1
3	$1101_2 - 111_2 = ?$ $\begin{array}{r}1101 \\ -\ 111 \\ \hline 110_2\end{array}$	2
4	Plot the following points on the number plane and join them up in order to form a closed polygon. $(3, 2)\ (4, -2)\ (0, -4)\ (-5, -2)\ (-4, 0)$ 	3
5	A street of houses with numbers 1 to 100 inclusive is to be numbered with new brass numerals. How many twos (as digits) would be needed to complete the job? $\begin{array}{ll}1 - 10 & 1 \\ 11 - 20 & 2 \\ 21 - 30 & 10 \\ 31 - 91 & 7\end{array}$ 20	2

Section E		Marks
1	An integer has an odd number of digits and the first digit is a 3. What is the first digit of the square root of the integer?	1
	①	
2	The average minimum temperature for a week in Jindabyne is 4°. The minimum temperatures for six days were, 7°, 6°, 2°, 7°, 3°, 0°. What was the minimum temperature on the 7th day?	2
	TOTAL $= 7 \times 4 = 28$ $\dfrac{25 + x}{7} = 4$ $x = 3$	
3	How many two-digit numbers can be formed with the digits (using each digit once) 8, 5, 3, 0?	2
	85 35 83 38 80 30 58 53 50 ⑨	
4	Students in a group dancing class are spaced evenly around a circle and are counted consecutively from number 1. If Student 20 is directly opposite Student 53. How many students are in the group?	2
	⑥⑥	
5	Robert has an average of 88% over his past four maths tests. What must he score in his next test to raise his average to 90%.	2
	90% over 5 tests ⟹ total marks 450 $4 \times 88 + x = 450$ $352 + x = 450$ $x = 98\%$	
6	Mr Newton counted his class in groups of 4 and there were 2 left over. He then counted them in groups of 5 and there was 1 left over. If 15 of his class were girls and he had more girls than boys, what is the number of boys in his class?	2
	11 boys	

Section F		Marks
1	In a basketball game, there were at all times 5 players on the court and 3 reserves on the bench for one of the teams. Each of the eight members of this team was on the court for the same amount of time. How many minutes did each team member play if the game lasted 48 minutes?	2
	On court playing time $= 5 \times 48$ $= 240$ ∴ Time per player $= 240 \div 8$ $= 30$ mins	30 mins
2	How many three digit numbers from 100 to 999 inclusive have one digit which is the average of the other two?	3
	$(0,1,2) ; (1,2,3) \cdots (7,8,9)$ 1+7 $(0,2,4) ; (1,3,5), \cdots (5,7,9)$ 1+5 $(0,3,6) ; (1,4,7)(2,5,8),(3,6,9)$ 1+3 $(0,4,8) ; (1,5,9)$ 1+1 4 arrangements 6 arrangements 4+16 $4 \times 4 + 6 \times 16 = 112$ + 9	121
3	Using the square root algorithm evaluate $\sqrt{9216}$.	3
	$\begin{array}{r} 9\ 6 \\ \sqrt{92\,16} \\ 81 \\ \hline \end{array}$ $180+6 = 186 \quad \big| \begin{array}{r} 11\ 16 \\ 11\ 16 \\ \hline 0 \end{array}$ $\times 6$ ∴ $\sqrt{9216} = 96$	96

| 4 | A, B, C, D, E represent unique digits (from 0 to 9) of a five digit number such that | | 3 |
| | | | |

ABCDE
× 4
_____
EDCBA

Find the digits represented by each letter.

21978
× 4
_____
87912

End of Exam

Extra Working Space

Question	