



SYDNEY BOYS HIGH SCHOOL
MOORE PARK, SURRY HILLS

Year 7

Yearly Examination 2011

Mathematics

General Instructions

- Working time – 90 minutes
- Write using black or blue pen.
- Approved calculators may be used.
- All necessary working **MUST** be shown in every question if full marks are to be awarded.
- Marks may not be awarded for careless 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
- Unless otherwise stated, all answers should be given in simplest exact form.

Examiner: *A. M. Gainford*

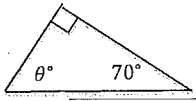
NAME:

Class	Teacher	
7E	Mr Elliott	
7F	Ms Kilmore	
7M	Ms Nesbitt	
7R	Ms Ward	
7S	Mr Boros	
7T	Mr Comben	

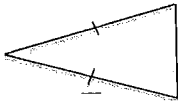
Section	Mark
A	/17
B	/16
C	/16
D	/17
E	/21
F	/20
Total	/107


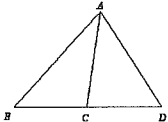
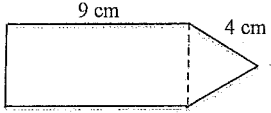
Section A (17 Marks)

Section A	Question	Answer
1 1 mark	Simplify $3a+a+2a$	
2 1 mark	Evaluate $1\frac{1}{3} + \frac{3}{4}$	
3 1 mark	Express 47.5% as a common fraction in lowest terms.	
4 1 mark	If $A = \{2, 3, 5, 7\}$ state the value of $n(A)$.	
5 1 mark	Express 9.57961 correct to two decimal places.	
6 1 mark	Write the ordinary numeral for $5 \times 10^3 + 7 \times 10^2 + 6$.	
7 1 mark	If Stuart scored 74 marks out of 80 in a Maths test, what was his percentage mark?	
8 1 mark	What is $\frac{1}{5}$ of $3\frac{3}{4}$?	

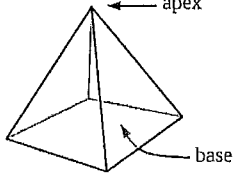
Section A		
9	Write an expression for the number three less than twice x .	
1 mark		
10	Arrange in increasing order: $2\frac{3}{7}$, 3.142, $3\frac{1}{7}$.	
1 mark		
11	State the value of θ :	
		
1 mark		
12	Express in Roman numerals:	
	(i) 2012	(i)
	(ii) 1948	(ii)
2 marks		
13	Evaluate $20 \times 6.35 + (1.03 + 5.57)$	
1 mark		
14	Convert the base 2 numeral 101101 into base 10.	
1 mark		
15	Simplify $9 \times 0.1222 \dots$	
1 mark		
16	Evaluate $36 - (14 - 22)$	
1 mark		

Section B (16 marks)


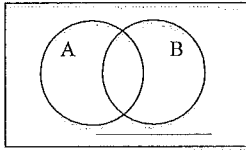
Section B	Question	Answer
17	If $2x + y = 8$, find y when $x = 5$.	
2 mark		
18	Express $\frac{13}{90}$ as a decimal in exact form.	
1 mark		
19	Given the sets $A = \{p, q, r, s\}$ and $B = \{m, n, o, p, q\}$, list the elements of $A \cap B$.	
1 mark		
20	If $a = 3$, $b = -8$, and $c = 4$ find the value of $5ab + c$.	
2 marks		
21	Name this shape:	
		
1 mark		

Section B	Questions	Answer
22 2 marks	On the regular figure at right, sketch the axes of symmetry.	
23 2 marks	Sketch an obtuse angled triangle.	
24 2 marks	Name two angles with vertex A.	
25 1 mark	Simplify $-3 \times (-7 + 2)$.	
26 2 marks	Find the perimeter of this figure, consisting of a rectangle and an equilateral triangle.	

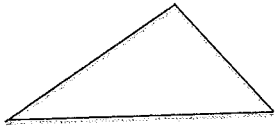
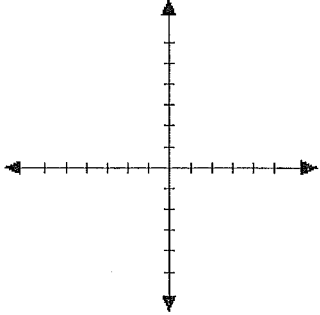
Section C (16 marks)

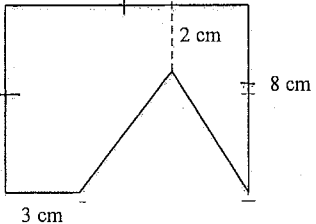
Section C	Question	Answer
27 2 marks	If the winner of a motor rally finished at 4:48 pm, and took 6 hours and 36 minutes to complete the course, at what time did she start?	
28 2 marks	How many centimetres are in 3.74 km?	
29 2 marks	State the name of this solid figure.	
30 2 marks	In the answer box draw the net of a triangular prism.	
31 2 marks	State the union of $\{a, b\}$ and $\{b, c, d\}$.	
32 3 marks	List the prime numbers less than 30.	
33 3 marks	Express 280 as a product of its prime factors (using index notation).	

Section D (17 marks)

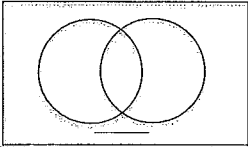
Section D	Question	Answer
34 3 marks	Find the HCF of 80 and 96.	
35 2 marks	Painted cube of side 3 cm is sawn up into 1 cm cubes. How many of these small cubes are painted on exactly two faces?	
36 3marks	Measure the length of this interval to the nearest millimetre: 	
37 2 marks	What was the date ninety days before today (31 October)?	
38 3 marks	On the Venn diagram at right shade the region defined by $\bar{A} \cap B$.	
39 4 marks	A standard cubical die is rolled. The number on the upper face noted. Find the probability (as a fraction) that the number is: (i) even (ii) less than 5 (iii) not a six	(i) (ii) (iii)

Section E (21 marks)

Section E	Question	Answer
40 4 marks	Using a ruler and compasses (or otherwise) neatly construct a triangle of sides 3 cm, 4 cm, and 5 cm. (Leave construction lines visible for the marker.)	
41 2 marks	Find the measure of the smallest angle of this triangle, to the nearest degree. 	
42 6 marks	(a) On the given axes graph the points A(3, 3), B(2, -1), C(-3, -1), and D(-2, 3). (b) Name the figure ABCD.	 (b)
43 2 marks	A bin full of oats will feed 9 horses for 10 days. For how many days will the same amount of oats feed 15 horses?	

44	Find the next term in each of the following sequences: (i) {1, 2, 4, 7, 11, ...} (ii) {1, 1, 2, 3, 5, ...} (iii) {3, 4, 6, 8, 12, 14, 18, ...}	(i) (ii) (iii)
4 marks	45 Determine the area of this figure: 	
3 marks		

Section F (20 marks)

Section F	Question	Answer
46 2 marks	John eats three fifths of the Smarties in a dish, Jill eats two thirds of what remains, and Freddie is left with only twelve. How many Smarties were there originally?	
47 3 marks	Of the 180 boys in Year 9 at a certain school, 106 study neither Latin nor Greek. Latin is studied by 58, of whom 10 also study Greek. (a) Represent the situation on the Venn diagram at right. (b) How many study Greek, Latin, or both? (c) How many study Greek, but not Latin?	(a)  (b) (c)
48 4 marks	A car travels 640 km on a tank of 45 litres of fuel. (a) Calculate its fuel consumption in litres per 100 km, correct to two decimal places. (b) How much fuel will be required to travel 2500 km?	(a) (b)
49 4 marks	Consider the pattern: $1 = 1$ $4 = 1 + 3$ $9 = 1 + 3 + 5$ What is the sum of the first 1000 odd numbers?	

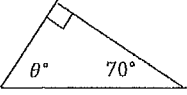
Section F	Question	Answer
50	<p>What is the greatest number of pieces (not necessarily the same size) that a circle can be divided into using six straight lines.</p> <p>(Use a simple case, and a table.)</p>	
3 marks	<p>51 A dodecahedron is a regular solid with 12 faces, each of which is a regular pentagon.</p> <p>How many diagonals does it have?</p> <p>(Note: the diagonals of a solid do not lie within its faces.)</p>	
4 marks		

Overflow working area

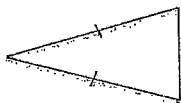
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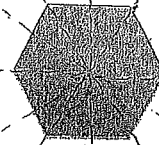
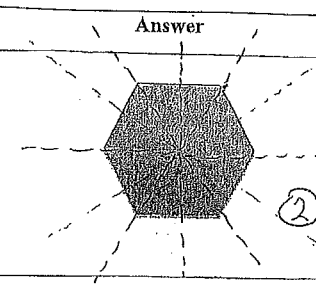

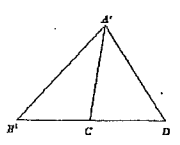
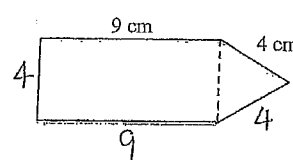
Section A (17 Marks)

Section A	Question	Answer
1 1 mark	Simplify $3a+a+2a$ $3a+a+2a$	$12a$
2 1 mark	Evaluate $1\frac{1}{3} + \frac{3}{4}$	$2\frac{1}{12}$ $\frac{1}{2}$ mark for $\frac{25}{12}$
3 1 mark	Express 47.5% as a common fraction in lowest terms.	$\frac{19}{40}$ $\frac{1}{2}$ mark for $\frac{475}{1000}, \frac{19}{4}$
4 1 mark	If $A = \{2, 3, 5, 7\}$ state the value of $n(A)$.	4
5 1 mark	Express 9.57961 correct to two decimal places.	9.58
6 1 mark	Write the ordinary numeral for $5 \times 10^3 + 7 \times 10^2 + 6$.	5706
7 1 mark	If Stuart scored 74 marks out of 80 in a Maths test, what was his percentage mark?	92.5% $\frac{1}{2}$ mark for 0.925
8 1 mark	What is $\frac{1}{5}$ of $3\frac{3}{4}$?	$\frac{3}{4}$ or 0.75

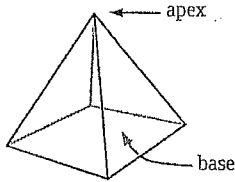
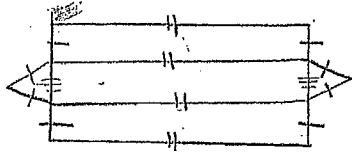
Section A	Question	Answer
9 1 mark	Write an expression for the number three less than twice x.	$2x - 3$
10 1 mark	Arrange in increasing order: $2\frac{3}{7}, 3.142, 3\frac{1}{7}$.	$3.142, 3\frac{1}{7}, \frac{23}{7}$ or $3.142, 3\frac{1}{7}, 3\frac{2}{7}$
11 1 mark	State the value of θ : 	20°
12 2 marks	Express in Roman numerals: (i) 2012 (ii) 1948	(i) MMXII (ii) MCMXLVIII
13 1 mark	Evaluate $20 \times 6.35 \div (1.03 + 5.57)$	19.24 or $19\frac{8}{33}$ $\frac{1}{2}$ mark for 19.2424 or similar Must indicate repetition of 2 and 4
14 1 mark	Convert the base 2 numeral 101101 into base 10.	45
15 1 mark	Simplify $9 \times 0.1222 \dots$	$1\frac{1}{10}$ or 1.1 $\frac{1}{2}$ mark for $\frac{11}{10}$
16 1 mark	Evaluate $36 - (14 - 22)$	44

Section B (16 marks)


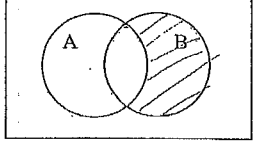
Section B	Question	Answer
17 2 mark	If $2x + y = 8$, find y when $x = 5$.	$10 + y = 8$ $y = -2$ (2)
18 1 mark	Express $\frac{13}{90}$ as a decimal in exact form.	$0.1\dot{4}$ (1)
19 1 mark	Given the sets $A = \{p, q, r, s\}$ and $B = \{m, n, o, p, q\}$, list the elements of $A \cap B$.	$A \cap B = \{p, q\}$ (1)
20 2 marks	If $a = 3$, $b = -8$, and $c = 4$ find the value of $5ab + c$.	$5 \times 3 \times -8 = -30$ 4 (2)
21 1 mark	Name this shape: 	isosceles triangle (1)

Section B	Questions	Answer
22 2 marks	On the regular figure at right, sketch the axes of symmetry. 	 (2)
23 2 marks	Sketch an obtuse angled triangle.	 (2)
24 2 marks	Name two angles with vertex A. 	\hat{BAC} \hat{BAD} \hat{CAD} (2)
25 1 mark	Simplify $-3 \times (-7 + 2)$.	$-3 \times -5 = 15$ (1)
26 2 marks	Find the perimeter of this figure, consisting of a rectangle and an equilateral triangle. 	$P = 30 \text{ cm}$ (2)

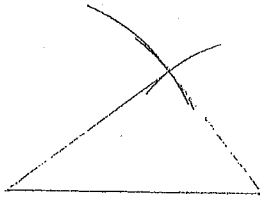
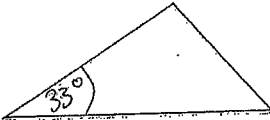
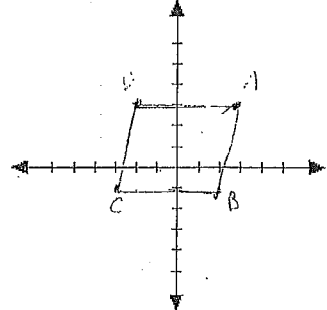
Section C (16 marks)

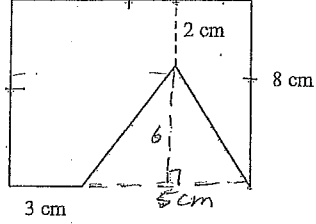
Section C	Question	Answer
27 2 marks	If the winner of a motor rally finished at 4:48 pm, and took 6 hours and 36 minutes to complete the course, at what time did she start?	10:12am
28 2 marks	How many centimetres are in 3.74 km?	374,000 cm
29 2 marks	State the name of this solid figure. 	square pyramid
30 2 marks	In the answer box draw the net of a triangular prism. 	
31 2 marks	State the union of $\{a, b\}$ and $\{b, c, d\}$.	$\{a, b, c, d\}$
32 3 marks	List the prime numbers less than 30.	2, 3, 5, 7, 11, 13, 17, 19, 23, 29
33 3 marks	Express 280 as a product of its prime factors (using index notation). $\begin{array}{r} 2 \overline{)280} \\ \underline{2 \ 140} \\ 2 \overline{)70} \\ \underline{2 \ 70} \\ 0 \end{array}$	$2^3 \times 5 \times 7$

Section D (17 marks)

Section D	Question	Answer
34 3 marks	Find the HCF of 80 and 96.	16
35 2 marks	Painted cube of side 3 cm is sawn up into 1 cm cubes. How many of these small cubes are painted on exactly two faces?	12
36 3 marks	Measure the length of this interval to the nearest millimetre: 	58 mm
37 2 marks	What was the date ninety days before today (31 October)?	2nd Aug
38 3 marks	On the Venn diagram at right shade the region defined by $\bar{A} \cap B$. 	
39 4 marks	A standard cubical die is rolled. The number on the upper face noted. Find the probability (as a fraction) that the number is: (i) even (ii) less than 5 (iii) not a six	(i) $\frac{1}{2}$ (ii) $\frac{2}{3}$ (iii) $\frac{5}{6}$

Section E (21 marks)

Section E	Question	Answer
40 4 marks	Using a ruler and compasses (or otherwise) neatly construct a triangle of sides 3 cm, 4 cm, and 5 cm. (Leave construction lines visible for the marker.) 	
41 2 marks	Find the measure of the smallest angle of this triangle, to the nearest degree. 	33°
42 6 marks	(a) On the given axes graph the points A(3, 3), B(2, -1), C(-3, -1), and D(-2, 3).  (b) Name the figure ABCD.	parallelogram
43 2 marks	A bin full of oats will feed 9 horses for 10 days. For how many days will the same amount of oats feed 15 horses? Bin feeds 9h for 10d 1h for 90d 15h for $\frac{90}{15} = 6d$	6 days.

44 4 marks	Find the next term in each of the following sequences: (i) {1, 2, 4, 7, 11, ...} (ii) {1, 1, 2, 3, 5, ...} (iii) {3, 4, 6, 8, 12, 14, 18, ...}	(i) 16 (ii) 8 (iii) 20 Prime + 1
45 3 marks	Determine the area of this figure: 	A = square - Δ A = 64 - Δ = 64 - $\frac{1}{2} \times 5 \times 6$ = 64 - 15 = 49 cm ²

Section F	Question	Answer														
50	What is the greatest number of pieces (not necessarily the same size) that a circle can be divided into using six straight lines. (Use a simple case, and a table.)	<table border="1"> <thead> <tr> <th>NO OF LINES</th> <th>NO. OF PIECES</th> </tr> </thead> <tbody> <tr><td>1</td><td>2</td></tr> <tr><td>2</td><td>4</td></tr> <tr><td>3</td><td>7</td></tr> <tr><td>4</td><td>11</td></tr> <tr><td>5</td><td>16</td></tr> <tr><td>6</td><td>22</td></tr> </tbody> </table> <p>22 PIECES</p>	NO OF LINES	NO. OF PIECES	1	2	2	4	3	7	4	11	5	16	6	22
NO OF LINES	NO. OF PIECES															
1	2															
2	4															
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4	11															
5	16															
6	22															
3 marks																
51	A dodecahedron is a regular solid with 12 faces, each of which is a regular pentagon. How many diagonals does it have? (Note: the diagonals of a solid do not lie within its faces.)	<p>THIS SOLID HAS 12 FACES. 30 EDGES AND 20 VERTICES FROM EACH VERTEX WE CAN DRAW 19 LINES TO EVERY OTHER VERTEX BUT MUST DIVIDE THIS TOTAL BY 2 TO AVOID DOUBLE COUNTING. WE MUST SUBTRACT 30 EDGES AND 12x5 FOR THE ONES DRAWN ON EACH FACE</p> $12 \times \frac{20 \times 19}{2} - 30 - 12 \times 5 = 100$														
4 marks																

END OF PAPER

Section F (20 marks)	Question	Answer
46	John eats three fifths of the Smarties in a dish, Jill eats two thirds of what remains, and Freddie is left with only twelve. How many Smarties were there originally?	<p>$x = \text{No of Smarties}$ John eats $\frac{3x}{5}$ Jill eats $\frac{2}{3}$ of $\frac{2x}{5} = \frac{4x}{15}$ Fred has $x - \frac{3x}{5} - \frac{4x}{15}$ $= \frac{2x}{15} = 12$ $\therefore \frac{2x}{15} = 6 \quad \therefore x = 90$</p>
2 marks		
47	Of the 180 boys in Year 9 at a certain school, 106 study neither Latin nor Greek. Latin is studied by 58, of whom 10 also study Greek.	<p>(a) $n(U) = 180$</p> <p>(a) Represent the situation on the Venn diagram at right.</p> <p>(b) How many study Greek, Latin, or both?</p> <p>(c) How many study Greek, but not Latin?</p>
3 marks		<p>(b) 74 (c) 11</p>
48	A car travels 640 km on a tank of 45 litres of fuel.	<p>640 km on 45 litres</p> <p>(a) Calculate its fuel consumption in litres per 100 km, correct to two decimal places.</p> <p>(b) How much fuel will be required to travel 2500 km?</p>
4 marks		<p>(a) $\therefore 100 \text{ km on } \frac{45}{6.4} \text{ litres}$ 7.03 L/100 km</p> <p>(b) Fuel consumed $= 175.8 \text{ L.}$</p>
49	Consider the pattern: $1 = 1$ $4 = 1 + 3$ $9 = 1 + 3 + 5$ What is the sum of the first 1000 odd numbers?	<p>$S_1 \text{ odd} = 1$ $S_2 \text{ odd} = 4 = 2^2$ $S_3 \text{ odd} = 9 = 3^2$ \vdots $S_{1000} \text{ odd} = 1000^2$ $= 1,000,000$</p>
4 marks		