



SYDNEY BOYS HIGH SCHOOL
MOORE PARK, SURRY HILLS

Year 10

Half Yearly Examination 2005

Advanced

Mathematics

Examiner: *F. Nesbitt*

General Instructions

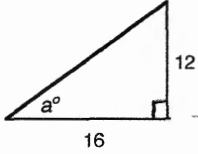
- Working time – 90 minutes
- Write using black or blue pen.
- *Approved* calculators may be used.
- All necessary working should be shown in every question if full marks are to be awarded.
- Marks may not be awarded for messy or badly arranged work.
- If more space is required, clearly write the number 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

NAME:

Class	Teacher	
10 A	Mr Choy	
10 B	Mr Kourtesis	
10 C	Ms Ward	
10 D	Mr Gainford	
10 E	Mr Parker	
10 F	Mr Boros	

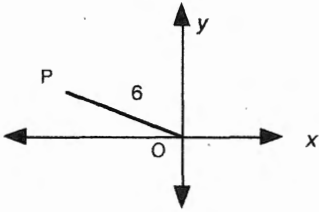
Section	Mark
A	/25
B	/15
C	/15
D	/15
E	/15
F	/15
Total	/100

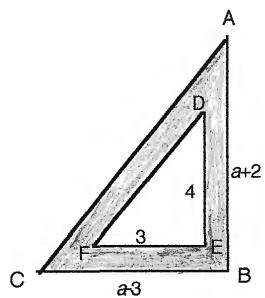
SECTION A (25 MARKS)

<div style="text-align: center;">  </div> <p>Find the value of a to 2 decimal places.</p>	
<p>Expand and simplify fully:</p> <p>(i) $-3(2 - m)$</p> <p>(ii) $(2m - 5)(3m - 4)$</p>	
<p>Norah's normal pay is \$18 per hour. On Saturday she is paid time-and-a-half and on Sunday she is paid double time.</p> <p>How much pay does Norah earn in a week in which she works for six hours on Wednesday, five hours on Saturday and four hours on Sunday?</p>	
<p>Write 0.00000632 in scientific notation.</p>	
<p>Factorise fully $xy + xz - y^2 - yz$.</p>	
<p>This year (2005) the first day of February was on a Tuesday. If a February date was picked at random, what is the probability that it was:</p> <p>(a) a weekday?</p> <p>(b) a Sunday or an even numbered date?</p>	

7.	<p>Use the back-to-back stem and leaf plot below to answer the following questions.</p> <table border="1" data-bbox="384 376 922 528"> <thead> <tr> <th data-bbox="384 376 579 405">Boys</th> <th data-bbox="579 376 687 405"></th> <th data-bbox="687 376 922 405">Girls</th> </tr> </thead> <tbody> <tr> <td data-bbox="384 405 579 434">9 8 8 4</td> <td data-bbox="579 405 687 434">0</td> <td data-bbox="687 405 922 434">8 9</td> </tr> <tr> <td data-bbox="384 434 579 463"><i>m</i> 8 6 1</td> <td data-bbox="579 434 687 463">1</td> <td data-bbox="687 434 922 463">3 3 4 5 5</td> </tr> <tr> <td data-bbox="384 463 579 492">9 2 2 1 1</td> <td data-bbox="579 463 687 492">2</td> <td data-bbox="687 463 922 492">1 3 7 7 7</td> </tr> <tr> <td data-bbox="384 492 579 521">5 3 2</td> <td data-bbox="579 492 687 521">3</td> <td data-bbox="687 492 922 521">4 5 5</td> </tr> </tbody> </table> <p>(a) What is the range in this class test? 1</p> <p>(b) Find the mode for the girls' scores? 1</p> <p>(c) what is the value of <i>m</i> if the median score for boys is 20? 2</p> <p>Show working.</p>	Boys		Girls	9 8 8 4	0	8 9	<i>m</i> 8 6 1	1	3 3 4 5 5	9 2 2 1 1	2	1 3 7 7 7	5 3 2	3	4 5 5	
Boys		Girls															
9 8 8 4	0	8 9															
<i>m</i> 8 6 1	1	3 3 4 5 5															
9 2 2 1 1	2	1 3 7 7 7															
5 3 2	3	4 5 5															
8.	Find <i>a</i> to the nearest minute if $\sin a = 0.556$.	1															
9.	$d = \sqrt{\frac{ac}{b}}$ <p>Write <i>d</i> as a simplified fraction if $a = \frac{5}{4}, b = \frac{3}{10}$ and $c = \frac{2}{3}$</p>	2															
10.	What percentage is 175 m of 3.5 km ?	1															
11.	<p>A rectangle is 2 cm longer than it is wide and has area 255 cm^2.</p> <p>(a) Write a quadratic equation to express this relationship.</p> <p>(b) Calculate the dimensions of the rectangle.</p>	3															
12.	The minute hand of a clock is 10 cm long. Through what exact distance does the tip move between 12:00 and 12:20 p.m.?	2															

SECTION B (15 MARKS)

3.	Solve the equation $\sqrt{3b} = 12$	1
4.	What is the volume of a sphere whose surface area is $144\pi \text{ cm}^2$?	2
5.	Write 43860 to two significant figures.	1
6.	 <p>Find the y coordinate of the point P if the line PO is 6 units long and makes an angle of 150° with the positive direction of the x axis.</p>	1



The triangles ABC and DEF are right angled at $\angle ABC$ and $\angle DEF$.

(a) Find the shaded area in terms of a .

2

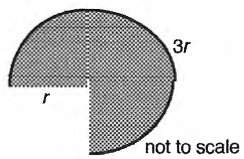
(b) Find the value of a if the triangles are similar.

2

3. Express x^{-3} in positive index form

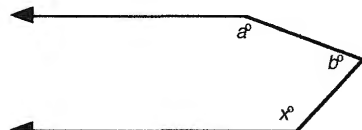
1

3. The arc length of the shaded circle segment below is three times its radius.



Show that the area of the shaded sector is $\frac{3r^2}{2}$

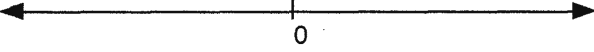
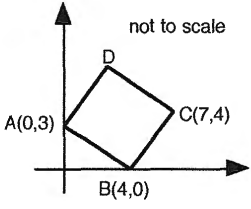
2

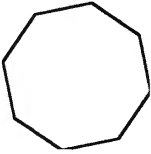


Show that $b = 360 - a - x$

2

SECTION C (15 marks)

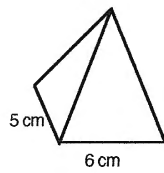
1.	Express 2.8 cm^3 in cubic millimetres (mm^3).	1
2.	How much would it cost to fill a cone shaped can with petrol if the can had height 40 cm and diameter 24 cm and petrol cost 99.5 cents per litre?	2
3.	(a) Solve the inequation $3 - 2m \leq -6$ (b) Graph your answer on the number line below. 	2 1
4.	 <p>ABCD is a square. Find the coordinates of the point D.</p>	2

25.	 <p>Find the size of each angle in a regular octagon, giving reasons for your answer.</p>	2																				
26.	<p>For each table below, find the relationship between x and y</p> <p>(a)</p> <table border="1" data-bbox="405 725 745 792"> <tbody> <tr> <td>x</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> </tr> <tr> <td>y</td> <td>-7</td> <td>-4</td> <td>-1</td> <td>2</td> </tr> </tbody> </table> <p>(b)</p> <table border="1" data-bbox="405 824 745 891"> <tbody> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>y</td> <td>-3</td> <td>-1</td> <td>5</td> <td>15</td> </tr> </tbody> </table>	x	-2	-1	0	1	y	-7	-4	-1	2	x	0	1	2	3	y	-3	-1	5	15	3
x	-2	-1	0	1																		
y	-7	-4	-1	2																		
x	0	1	2	3																		
y	-3	-1	5	15																		
27.	<p>Given the points $A(-4,5)$ and $B(-6, -2)$, find the</p> <p>(a) gradient of AB</p> <p>(b) length of the interval AB</p>	2																				

SECTION D (15 MARKS)

28.

Find the surface area of the rectangular pyramid below.



It has length 6cm, width 5cm and perpendicular height 8cm.

answer to the nearest cm.

3

29.

Tam receives time-and-a-half for any extra hours worked over his normal 38 hour week. His normal hourly rate is \$15.50. How many hours of overtime did he work in a week when his pay was \$728.50

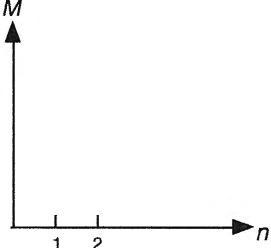
2

30.

A car is bought for \$36 000. It is estimated that its value will depreciate by 15% in the first year and 10% p.a. after that. If this estimate is correct

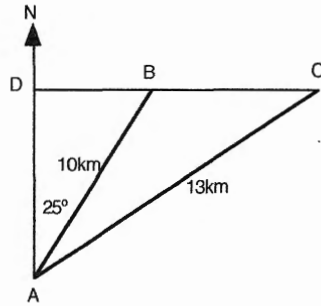
- (a) find the value of the car after three years.
- (b) During which year after purchase would the value of the car fall below \$20 000?

2

<p>31. M varies inversely as n and $M = 40$ when $n = 7$.</p> <p>(a) find: (i) the formula connecting M and n (ii) n when $M=9$</p> <p>(b) Draw a graph of M against n.</p> 	<p>3</p> <p>1</p>
<p>32. solve simultaneously:</p> $5a + b = -6$ $a + 2b = 24$	<p>2</p>
<p>33. The surface areas of two cubes are in the ratio 4 : 9.</p> <p>What is the ratio of their volumes?</p>	<p>1</p>

SECTION E (15 MARKS)

1. A, B and C are 3 villages. B is 10km and on a bearing of N 25°E from A. C is east of B and D and 13km from A.



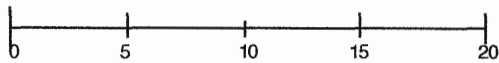
- (a) Find the distance AD.
(b) Find the bearing of C from A.

4

5. Below are 11 scores arranged in ascending order.

6, 8, 9, 10, 12, 12, 13, 14, 14, 15, 17.

- (a) In the space below draw a box and whisker plot of these scores, marking the Median, Quartile 1 and Quartile 3



- (b) Calculate the Interquartile Range

4

3. Express as a simplified fraction with a rational denominator

$$\frac{2\sqrt{3}}{3\sqrt{5}-2}$$

7. If the equation of a line is

$$21x - 24y - 32 = 0, \text{ find, in simplified form}$$

(a) its gradient

(b) its y intercept

3. A pair of standard dice is tossed (numbered 1 to 6). Using the

table below or otherwise, find the probability of throwing:

1, 1	1, 2	1, 3	1, 4	1, 5	1, 6
2, 1	2, 2	2, 3	2, 4	2, 5	2, 6

(a) a total of 7

(b) a pair or a total of 6.

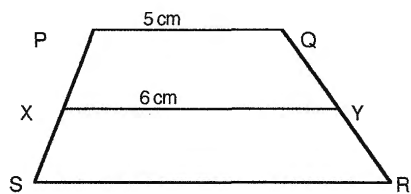
SECTION F (15 MARKS)

9.	If $\frac{3a+4b}{2a-2b} = 5$, find the value of $\frac{a^2+2b^2}{ab}$	2
10.	Ten years ago Jim's mother was seven times his age. Now she is three times his age. (a) Write equations using this information. (b) Solve the equations to find Jim's age now	4
11.	One worker completes a job in five hours. Another worker takes 7 hours to do the same job. Show that, if they work on it together, they will finish the job in 2 hours and 55 minutes.	3

Write as a single simplified fraction

3

$$\frac{x^{-1} + y^{-1}}{x + y} - \frac{x^{-1} - y^{-1}}{x - y}$$



In the diagram above XY which is parallel to PQ and SR divides the trapezium PQRS into two equal areas.

Show that the length of SR is $\sqrt{47}$ cm.

3

THIS IS THE END OF THE PAPER .