SYDNEY BOYS HIGH
MOORE PARK, SURRY HILLS

2006
YEAR 10 YEARLY EXAMINATION

Advanced Mathematics

Directions to Candidates:

- Answer all questions in the spaces provided in this question booklet.
- Full marks may not be awarded for careless or badly arranged work.
- Use black or blue pen for written answers, but pencil for diagrams and graphs.
- If additional working space is needed, use the spare pages at the end of the booklet. Show clearly which question you are continuing.
- Board-approved calculators may be used.

Time allowed: 2 Hours
Examiner: Mr C. Kourtesis

Name: _____

Your Mathematics Class (Tick the box)		
10Ma**A**	Mr Fuller	
10Ma**B**	Ms Ward	
10Ma**C**	Mr Boros	
10Ma**D**	Ms Evans	
10Ma**E**	Mr McQuillan	
10Ma**F**	Mr Gainford	

Marker Use Only

Section	Mark
A	/20

Question 1 (20 marks) **Answers** **Marks**

(a) Simplify:

(i) $3k + 2 + k$ 1

(ii) $\dfrac{3a}{8} + \dfrac{a}{4}$ 1

(b) Find 8% of \$2 700. 1

(c) Simplify:

(i) $\dfrac{\sqrt{130}}{\sqrt{5}}$ 1

(ii) $\dfrac{4 + 8m}{4}$ 1

(d) Factorise $ab + 2a^2$. 1

(e) Solve $4t - 1 = \frac{1}{2}$. 1

(f) Evaluate $\dfrac{\sqrt{22\,500}}{2{\cdot}5 \times 6{\cdot}4}$. 1

(g) Simplify $\dfrac{(a^4)^4}{a^2}$ 1

(h) Solve simultaneously 1

$$y = 2 \quad \text{and}$$
$$y + 6 = 2x$$

(i) Find $\tan 124°15'$ to one decimal place. 1

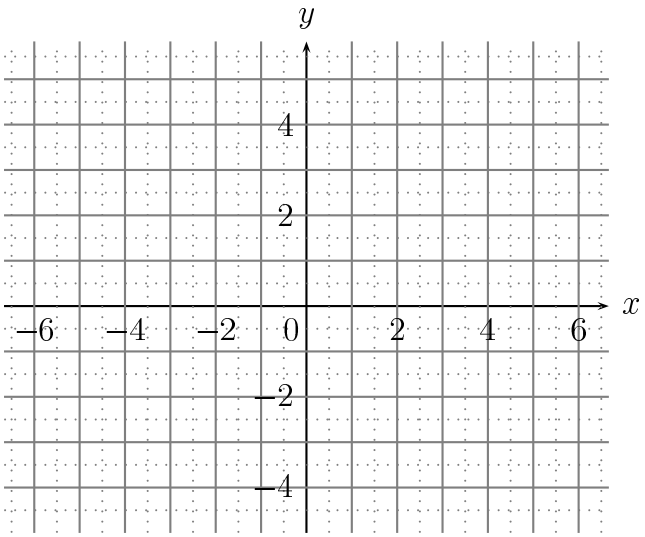
(j) (i) Solve $-2x + 1 > 5$. 1

(ii) Graph the solution set on a number-line. 1

(k) Sketch the graphs of:

(i) $y = x^2 + 1$ 1

(ii) $y = \dfrac{4}{x}$ 1



(l) Evaluate $10 - 2x^2$ when $x = -1$. 1

(m) Express $x\%$ of $\$m$ in cents. 1

(n) Simplify $8n^2 \div 4n^{-2}$. 1

(o) If $\sin\theta = 0{\cdot}147$ and θ is acute, find θ to the nearest minute. 1

(p) Solve $2m^2 = 18$. 1

End of Section A

Extra working page

SYDNEY BOYS HIGH
MOORE PARK, SURRY HILLS

2006
YEAR 10 YEARLY EXAMINATION

Advanced Mathematics

Directions to Candidates:

- Answer all questions in the spaces provided in this question booklet.
- Full marks may not be awarded for careless or badly arranged work.
- Use black or blue pen for written answers, but pencil for diagrams and graphs.
- If additional working space is needed, use the spare pages at the end of the booklet. Show clearly which question you are continuing.
- Board-approved calculators may be used.

Time allowed: 2 Hours
Examiner: Mr C. Kourtesis

Name: _____

Your Mathematics Class (Tick the box)		
10Ma**A**	Mr Fuller	
10Ma**B**	Ms Ward	
10Ma**C**	Mr Boros	
10Ma**D**	Ms Evans	
10Ma**E**	Mr McQuillan	
10Ma**F**	Mr Gainford	

Marker Use Only

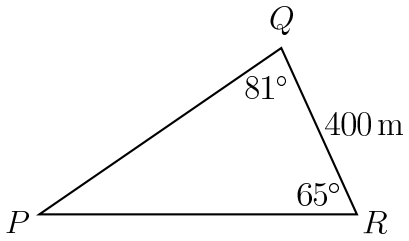
Section	Mark
B	/20

Question 2 (20 marks) **Answers**

(a) Theo invested \$8 000 for a period of four years to earn compound interest of 8% p.a. What is the amount of interest that Theo will earn? 2

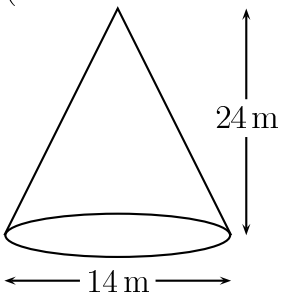
(b) Solve the equation $(2m+1)(4-m)=0$. 1

(c) 2



Use the Sine rule to calculate the length of the side PQ correct to the nearest metre.

(d) Find the area of the curved surface of the cone. 2
(Answer in terms of π.)



(e) If $V=\dfrac{G^2h}{4\pi}\quad (G>0)$, 2

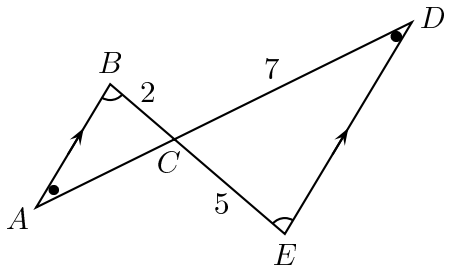
express this with G as the subject.

(f) A sphere has a diameter of 10 cm. Find the

(i) volume (in terms of π), 1

(ii) surface area (in terms of π). 1

(g) 2



Find the ratio of areas, $\triangle ABC : \triangle DEC$.

(h) A circle has the equation

$$(x-4)^2 + (y+5)^2 = 100$$

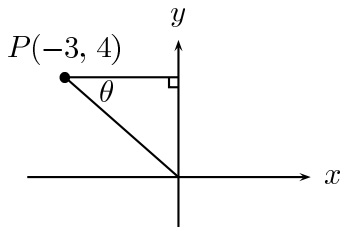
Find the

(i) coördinates of the centre, 1

(ii) radius. 1

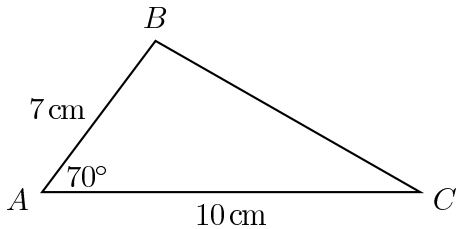
(i) If $\sqrt{A} = n + 4$, find the value of $3A$. 2

(j) 2



Find the exact value of $\cos\theta + \sin\theta$.

(k) 1



Use the Cosine rule to find the length of BC (correct to 2 dec. pl.).

End of Section B

Extra working page

SYDNEY BOYS HIGH
MOORE PARK, SURRY HILLS

2006
YEAR 10 YEARLY EXAMINATION

Advanced Mathematics

Directions to Candidates:

- Answer all questions in the spaces provided in this question booklet.
- Full marks may not be awarded for careless or badly arranged work.
- Use black or blue pen for written answers, but pencil for diagrams and graphs.
- If additional working space is needed, use the spare pages at the end of the booklet. Show clearly which question you are continuing.
- Board-approved calculators may be used.

Time allowed: 2 Hours
Examiner: Mr C. Kourtesis

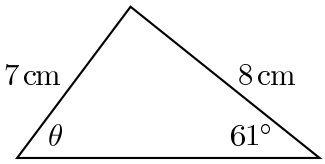
Name: _____

Your Mathematics Class (Tick the box)		
10Ma**A**	Mr Fuller	
10Ma**B**	Ms Ward	
10Ma**C**	Mr Boros	
10Ma**D**	Ms Evans	
10Ma**E**	Mr McQuillan	
10Ma**F**	Mr Gainford	

Marker Use Only

Section	Mark
C	/20

Question 3 (20 marks) **Answers**

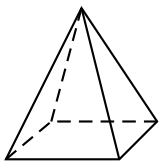
(a) 

Find the size of θ (to the nearest degree). 2

(b) Two similar rectangles have areas of $160\,\text{cm}^2$ and $90\,\text{cm}^2$.

(i) Express the ratio of these areas in simplest form. 1

(ii) What is the ratio of the sides of the two rectangles? 1

(c) 

A square pyramid has a base of 10 cm and vertical height of 12 cm.
Find the:

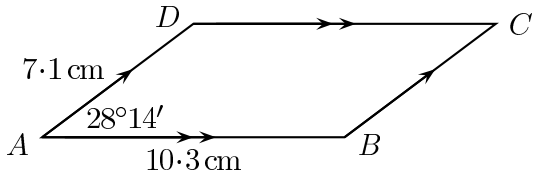
(i) volume of the pyramid, 1

(ii) surface area of the pyramid. 3

(d) Light travels at $3 \times 10^8\,\text{m/s}$. How many kilometres does light travel in one hour? 1

(e) Use the quadratic formula to solve the equation $2x^2 - 5x - 1 = 0$ (answer in exact form). [2]

(f) Find the area of the parallelogram $ABCD$. [3]



(g) If $(x+2)(x+k) \equiv x^2 + nx + 8$, find the values of k and n. [2]

(h) Simplify $\dfrac{2^{-1} + 5^{-1}}{2^{-1} - 5^{-1}}$. [2]

(i) Express with a rational denominator [2]

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

End of Section C

Extra working page

SYDNEY BOYS HIGH
MOORE PARK, SURRY HILLS

2006
YEAR 10 YEARLY EXAMINATION

Advanced Mathematics

Directions to Candidates:

- Answer all questions in the spaces provided in this question booklet.
- Full marks may not be awarded for careless or badly arranged work.
- Use black or blue pen for written answers, but pencil for diagrams and graphs.
- If additional working space is needed, use the spare pages at the end of the booklet. Show clearly which question you are continuing.
- Board-approved calculators may be used.

Time allowed: 2 Hours
Examiner: Mr C. Kourtesis

Name: _____

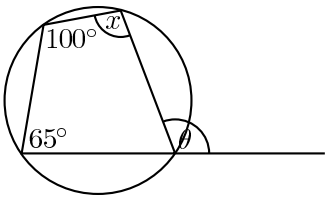
Your Mathematics Class (Tick the box)		
10Ma**A**	Mr Fuller	
10Ma**B**	Ms Ward	
10Ma**C**	Mr Boros	
10Ma**D**	Ms Evans	
10Ma**E**	Mr McQuillan	
10Ma**F**	Mr Gainford	

Marker Use Only

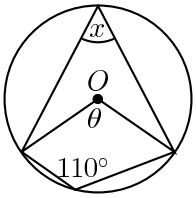
Section	Mark
D	/20

Question 4 (20 marks) **Answers**

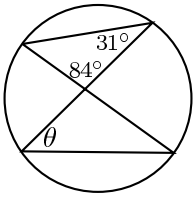
(a) Find the values of the pronumerals in each case. (Do NOT give reasons.) In each diagram O is the centre of the circle.

(i) 

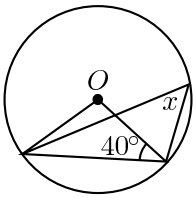
2

(ii) 

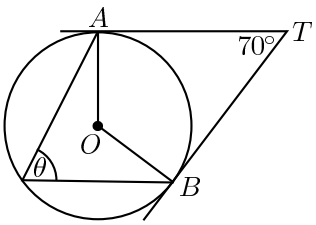
2

(iii) 

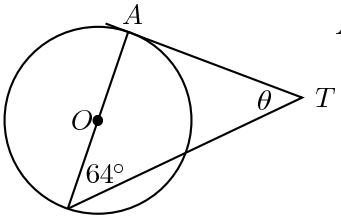
2

(iv) 

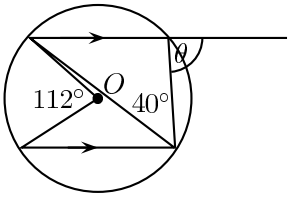
2

(v) 

AT and BT are tangents.
2

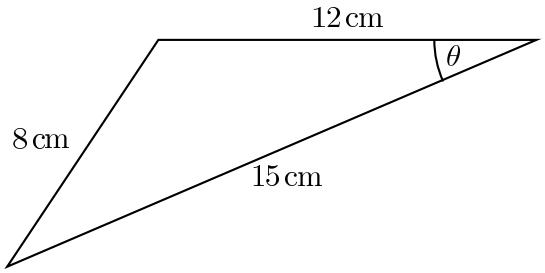
(vi) 

AT is a tangent.
2

(vii) 

2

(b) Use the Cosine rule to find the size of θ (correct to the nearest degree). 3



(c) The surface area of two similar solids is in the ratio 4 : 9. If the volume of the larger one is $243\,\text{cm}^3$, find the volume of the smaller one. 3

End of Section D

Extra working page

SYDNEY BOYS HIGH
MOORE PARK, SURRY HILLS

2006
YEAR 10 YEARLY EXAMINATION

Advanced Mathematics

Directions to Candidates:

- Answer all questions in the spaces provided in this question booklet.
- Full marks may not be awarded for careless or badly arranged work.
- Use black or blue pen for written answers, but pencil for diagrams and graphs.
- If additional working space is needed, use the spare pages at the end of the booklet. Show clearly which question you are continuing.
- Board-approved calculators may be used.

Time allowed: 2 Hours
Examiner: Mr C. Kourtesis

Name: _____

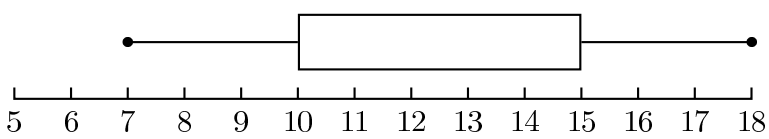
Your Mathematics Class (Tick the box)		
10Ma**A**	Mr Fuller	
10Ma**B**	Ms Ward	
10Ma**C**	Mr Boros	
10Ma**D**	Ms Evans	
10Ma**E**	Mr McQuillan	
10Ma**F**	Mr Gainford	

Marker Use Only

Section	Mark
E	/20

Question 5 (20 marks) **Answers**

(a)



Consider the *box-and-whisker* diagram above.
Find the:

(i) interquartile range, _____ 1

(ii) percentage of the scores that are from 3 to 15. _____ 1

(b) Given the following two sets of scores:

A : 80 75 70 65 60
B : 72 71 70 69 68

(i) Find the mean and standard deviation in each case. 4

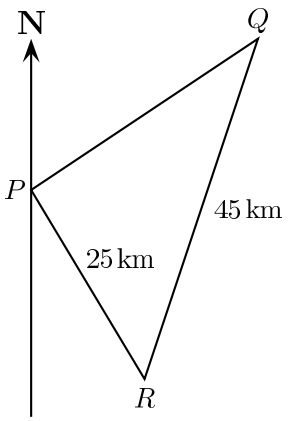
(ii) Which is the better result, a score of 75 from A or 72 from B? Give reasons. 2

(c) What restrictions are there on x in each of the following?

(i) $\dfrac{x+4}{1-6x}$ 1

(ii) $\sqrt{N^2-4x}$ 1

(d)



A tourist drives 25 km from town P on a bearing of 150°T to town R.

He then drives 45 km on a bearing of 022° to town Q.

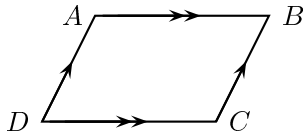
(i) Find the size of $\angle PRQ$. 1

(ii) Calculate the distance of town Q from town P to the nearest kilometre. 2

(e) If $A(5, k)$, $B(2, 7)$, $C(2, 1)$ are vertices of a triangle, find the area of the triangle. 3

(f) Find the next term of the sequence 1, 9, 35, 91, ... 2

(g) $ABCD$ is any parallelogram where $\sin A = k$. 1



Find $\sin B$.

(h) Simplify $\dfrac{m(m-c)-3(c-m)}{m^2-c^2}$. 1

End of Section E

Extra working page

SYDNEY BOYS HIGH
MOORE PARK, SURRY HILLS

2006
YEAR 10 YEARLY EXAMINATION

Advanced Mathematics

Directions to Candidates:

- Answer all questions in the spaces provided in this question booklet.
- Full marks may not be awarded for careless or badly arranged work.
- Use black or blue pen for written answers, but pencil for diagrams and graphs.
- If additional working space is needed, use the spare pages at the end of the booklet. Show clearly which question you are continuing.
- Board-approved calculators may be used.

Time allowed: 2 Hours
Examiner: Mr C. Kourtesis

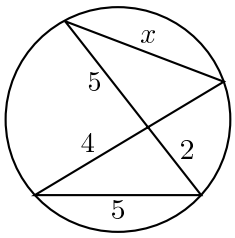
Name: _____

Your Mathematics Class (Tick the box)		
10Ma**A**	Mr Fuller	
10Ma**B**	Ms Ward	
10Ma**C**	Mr Boros	
10Ma**D**	Ms Evans	
10Ma**E**	Mr McQuillan	
10Ma**F**	Mr Gainford	

Marker Use Only

Section	Mark
F	/20

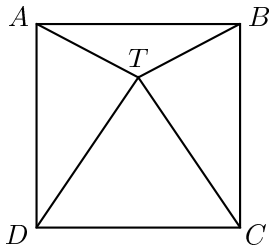
Question 6 (20 marks) **Answers**

(a) 

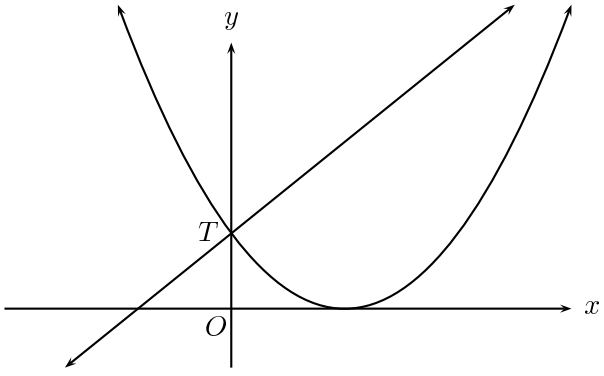
Find the value of x. 2

(b) (i) Expand and simplify $(x+y)^3$. 1

(ii) If $x+y=1$ and $x^3+y^3=19$, find the value of x^2+y^2. 2

(c) 

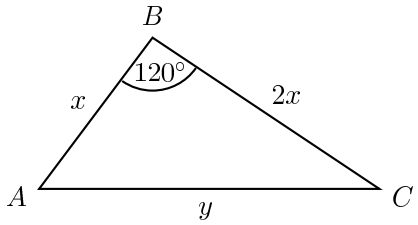
$ABCD$ is a square with point T inside the square such that $DT = CT = DC$. Prove that triangle ATB is isosceles. 3

(d) 

The diagram shows the graph of $y=(x-c)^2$ and $y=x+t$, where C and t are positive. The graphs intersect on the y-axis at T. Find the equation relating c and t. 2

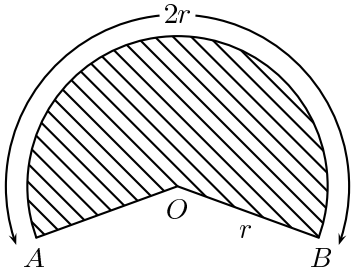
(e) A train left Sydney at r a.m. and arrived at its destination at t p.m. the same day. Find an expression for the number of hours taken. 1

(f) 3

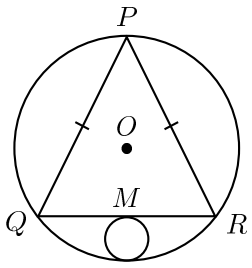


In the triangle ABC, find the exact value of $\dfrac{x}{y}$.

(g) The diagram shows a major sector of a circle with centre O and radius r. Find the area of the shaded region. 3



(h)



A circle of radius 6 and centre O has an isosceles triangle PQR inscribed in it, where $PQ = PR$.
A second circle touches the first circle and the mid point of the base QR of the triangle as shown.
The side PQ has a length $4\sqrt{5}$.
M is the midpoint of QR.
Let $OM = x$ and $QR = 2y$.

(i) Explain why $x^2 + y^2 = 36$. 1

(ii) Find the radius of the smaller circle. 2

End of Section F

Extra working page