Name :_____

Teacher :_____

SYDNEY TECHNICAL HIGH SCHOOL

Celebrating 100 years of Public Education 1911 – 2011

2011 Trial School Certificate

Mathematics

Section 2

PART B (20 marks)

Calculators may be used in this section

Write using black or blue pen

Questions 81 to 84 to be answered in the spaces provided

Show all working

Questions 1 - 25	Questions 26 - 80	Question 81	Question 82	Question 83	Question 84	TOTAL

Question 81 (5 marks)

(a) Solve $3x^2 + 4x - 4 = 0$ 1

.....

.....

.....

(b) Calculate the value of an investment of \$3000 after 2 years if it earns interest at 9% p.a. compounded monthly. 1

.....

.....

.....

(c) A two digit number is to be formed at random from the digits **2** , **3** , **5** , **7** , **9** .
No digit is to be used more than once.

(i) How many different two digit numbers can be formed ? 1

.....

.....

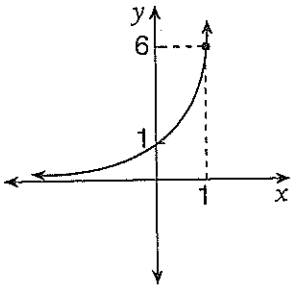
(ii) Find the probability that the number formed is greater than 57 . 1

.....

.....

.....

(d) Write down a possible equation of the curve shown. 1



.....

.....

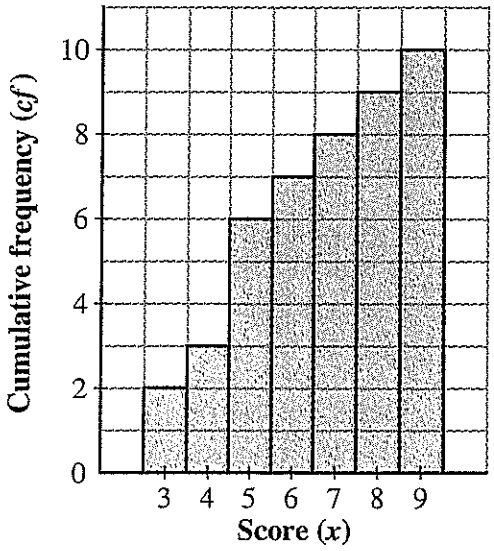
.....

Question 82 (5 marks)

(a) Sketch the parabola $y = x^2 - 4x - 5$, 2

showing clearly the coordinates of the vertex and the x intercepts.

(b) Find the mode of the following scores. 1



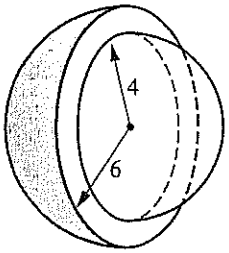
.....

.....

.....

(c) Two hemispheres, with radii 6 cm and 4 cm, are joined together. 2

Find the total surface area of the solid (in cm^2 correct to 2 decimal places).



.....

.....

.....

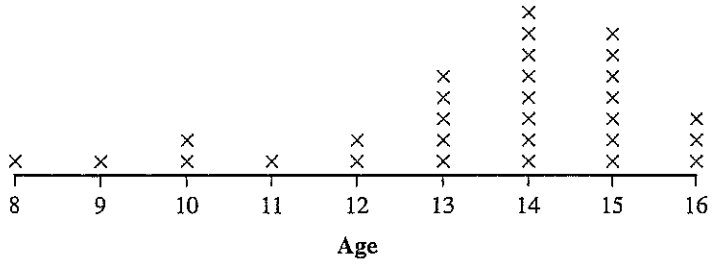
.....

.....

.....

Question 83 (5 marks)

(a) For the following scores, calculate the median 1



.....

.....

(b) Over the period of a ten year loan a reducible interest rate of 9% p.a. is equivalent to an annual flat interest rate of 5.2%. 2

A loan of $300 000 is taken out at a reducible interest rate of 9% p.a.

The loan is to be repaid in equal monthly instalments over 10 years.

Calculate the amount of each monthly repayment. (correct to the nearest cent)

.....

.....

.....

.....

.....

.....

(c) A right angle triangle has hypotenuse of length $\sqrt{10}$. 1

The lengths of the other two sides are a and b.

Find a pair of numbers which are possible values for a and b.

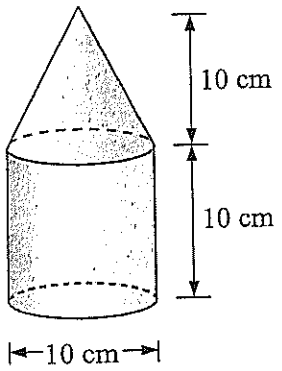
.....

.....

.....

(d) Find the volume of the following figure 1

(in cm^3 correct to 2 decimal places)



.....

.....

.....

.....

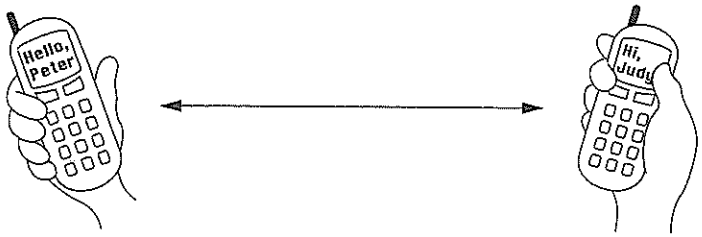
.....

.....

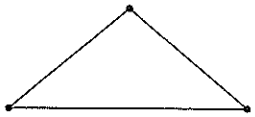
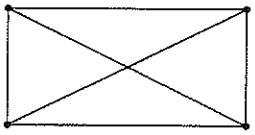
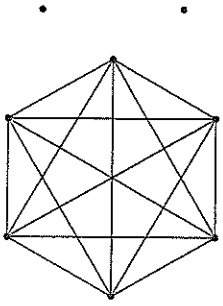
Question 84 (5 marks)

People can use mobile phones to send text messages to each other.

Two people sending a message to each other makes a total of two messages.



This can be represented geometrically as a line as shown in the table.

Number of people sending messages to each other	*Diagram*	*Number of messages*
2		2
3		6
4		12
5		20
6		?

Marks

Question 84 (continued)

(a) Complete the diagram for 5 people. 1

(b) How many messages will there be for 6 people? 1

.....

.....

(c) How many messages will there be for 10 people? 1

.....

.....

(d) How many messages will there be for n people? 1

.....

.....

(e) There were 240 messages sent. 1

How many people were involved?

.....

.....

End of test

SOLUTIONS

Name :_____

Teacher :_____

SYDNEY TECHNICAL HIGH SCHOOL

Celebrating 100 years of Public Education 1911 – 2011

2011 Trial School Certificate

Mathematics

Section 2

PART B (20 marks)

Calculators may be used in this section

Write using black or blue pen

Questions 81 to 84 to be answered in the spaces provided

Show all working

Questions 1 - 25	Questions 26 - 80	Question 81	Question 82	Question 83	Question 84	TOTAL

Question 81 (5 marks)

(a) Solve $3x^2 + 4x - 4 = 0$ 1

$(3x - 2)(x + 2) = 0$

$x = \frac{2}{3}, -2$

(b) Calculate the value of an investment of \$3000 after 2 years if it earns interest at 9% p.a. compounded monthly. 1

$A = 3000 \times (1.0075)^{24}$

$= \$3589.24$

(c) A two digit number is to be formed at random from the digits **2 , 3 , 5 , 7 , 9** . No digit is to be used more than once.

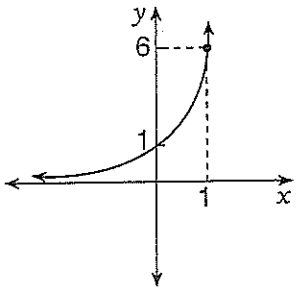
(i) How many different two digit numbers can be formed ? 1

20

(ii) Find the probability that the number formed is greater than 57 . 1

$\frac{9}{20}$

(d) Write down a possible equation of the curve shown. 1

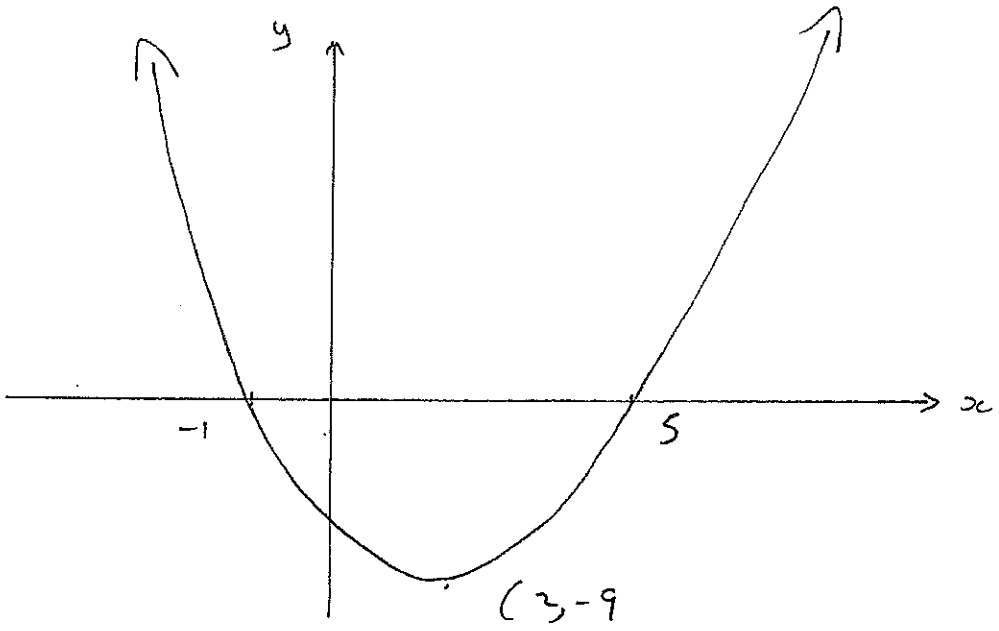


$y = 6^x$

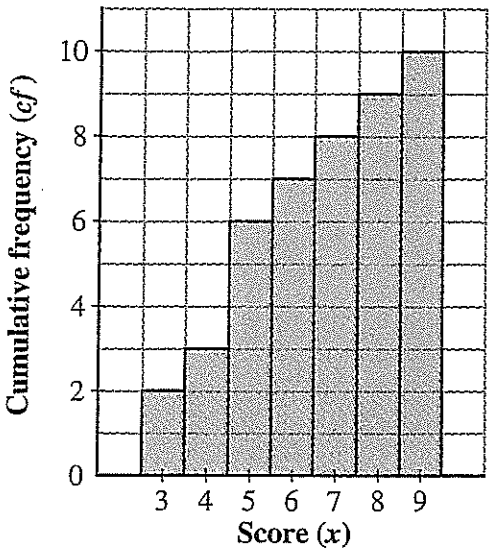
Question 82 (5 marks)

(a) Sketch the parabola $y = x^2 - 4x - 5$, 2

showing clearly the coordinates of the vertex and the x intercepts.



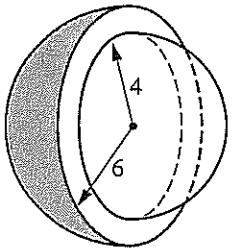
(b) Find the mode of the following scores. 1



5

(c) Two hemispheres, with radii 6 cm and 4 cm, are joined together. 2

Find the total surface area of the solid (in cm^2 correct to 2 decimal places).



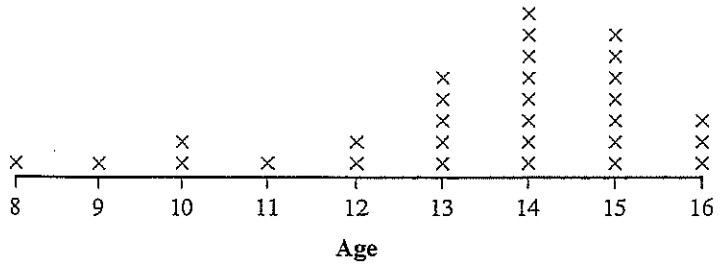
$A = \frac{1}{2} \times 4\pi \times 6^2 + \frac{1}{2} \times 4\pi \times 4^2$

$+ (\pi \cdot 6^2 - \pi \cdot 4^2)$

$= 389.56 \text{ cm}^2$

Question 83 (5 marks)

(a) For the following scores, calculate the median 1



14

(b) Over the period of a ten year loan a reducible interest rate of 9% p.a. is equivalent to an annual flat interest rate of 5.2%. 2

A loan of $300 000 is taken out at a reducible interest rate of 9% p.a.

The loan is to be repaid in equal monthly instalments over 10 years.

Calculate the amount of each monthly repayment. (correct to the nearest cent)

Total (to be repayed) = $300000 + 300000 \times 0.052 \times 10$

$= \$456000$

$\therefore$ repayments $= \$3800$

(c) A right angle triangle has hypotenuse of length $\sqrt{10}$. 1

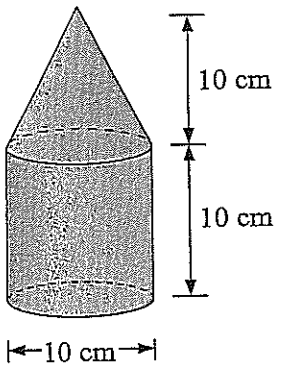
The lengths of the other two sides are a and b.

Find a pair of numbers which are possible values for a and b.

$a = 3, b = 1$ etc.

(d) Find the volume of the following figure 1

(in cm^3 correct to 2 decimal places)



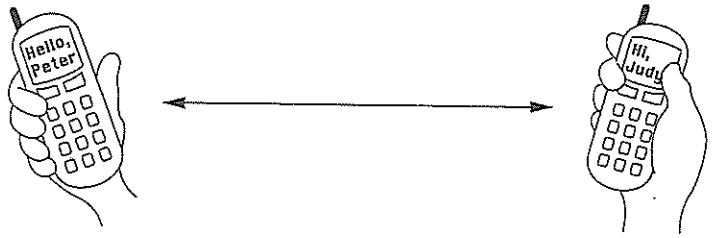
$V = \frac{1}{3} \times \pi \times 5^2 \times 10 + \pi \times 5^2 \times 10$

$= 1047.20 \text{ cm}^3$

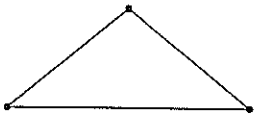
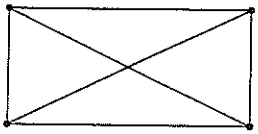
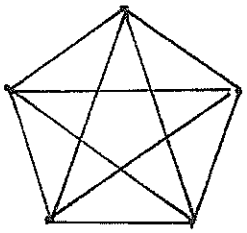
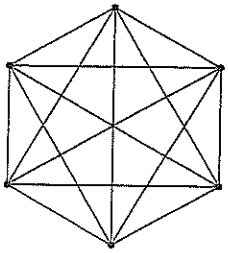
Question 84 (5 marks)

People can use mobile phones to send text messages to each other.

Two people sending a message to each other makes a total of two messages.



This can be represented geometrically as a line as shown in the table.

Number of people sending messages to each other	*Diagram*	*Number of messages*
2		2
3		6
4		12
5		20
6		?

Marks

Question 84 (continued)

(a) Complete the diagram for 5 people. **1**

(b) How many messages will there be for 6 people? **1**

30

(c) How many messages will there be for 10 people? **1**

90

(d) How many messages will there be for n people? **1**

$n^2 - n$

(e) There were 240 messages sent. **1**

How many people were involved?

16

End of test