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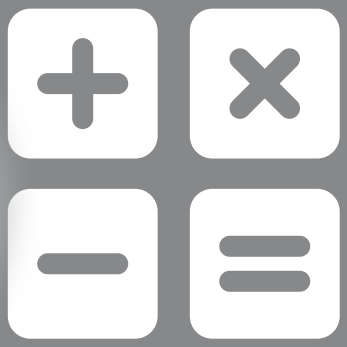
UNSW Global
THE UNIVERSITY OF NEW SOUTH WALES
SYDNEY • AUSTRALIA

PAPER I

Practice Questions



ICAS International Competitions and Assessments for Schools

DO NOT OPEN THIS BOOKLET UNTIL INSTRUCTED.

STUDENT'S NAME:

Read the instructions on the **ANSWER SHEET** and fill in your **NAME, SCHOOL** and **OTHER INFORMATION**.
Use a 2B or B pencil.
Do **NOT** use a pen.
Rub out any mistakes completely.

You **MUST** record your answers on the **ANSWER SHEET**.

MATHEMATICS

Mark only **ONE** answer for each question.
Your score will be the number of correct answers.
Marks are **NOT** deducted for incorrect answers.

MULTIPLE-CHOICE QUESTIONS:
Use the information provided to choose the **BEST** answer from the four possible options.
On your **ANSWER SHEET** fill in the oval that matches your answer.

FREE-RESPONSE QUESTIONS:
Write your answer in the boxes provided on the **ANSWER SHEET** and fill in the oval that matches your answer.

You may use a ruler and spare paper.
A **CALCULATOR** is required.

Educational Assessment

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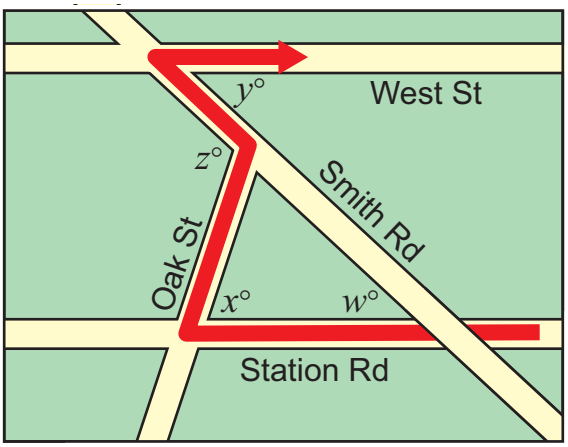
1. Terry is in Station Rd and is going to a party in West St, which runs parallel to Station Rd. The angles between some of the streets are shown.



NOT TO SCALE

Which of these statements must be true?

(A) $w = y$

(B) $x = w$

(C) $y = x$

(D) $z = y$

2. A company uses this formula to predict total profit *P* based on the number of products *n* sold.

$$P = n^2 + 60n - 4000$$

How many products are sold if there is zero profit?

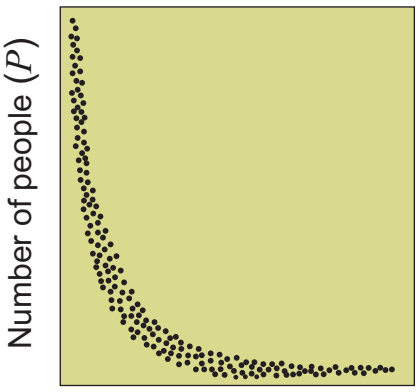
(A) 0
(B) 40
(C) 100
(D) 4000

3. $7.101 \div (3.019 - 0$

What is the value of this expression correct to three significant figures?

(A) 3.19
(B) 3.197
(C) 3.20
(D) 3.200

4. This scatter diagram shows the relationship between the air temperature T and the number of people P visiting a beachside shopping centre.



Which formula could describe the relationship between the air temperature and the number of people?

(A) $P = 5T^2$

(B) $P = -5T$

(C) $P = -\frac{T}{5}$

(D) $P = \frac{5}{T}$

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QUESTION 5 IS FREE RESPONSE.

Write your answer in the boxes provided on the ANSWER SHEET and fill in the ovals that match your answer.

5. Mario knows that a number is divisible by nine if the sum of its digits is divisible by nine.

He has eight cards with the digits 1 to 8 written on them as shown.

Mario selects three of these cards to make a three-digit number that is divisible by nine. He then replaces these three cards and repeats this selection procedure to select different three-digit numbers divisible by nine.

How many **even** three-digit numbers is it possible for him to find in this way?

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The following year levels should sit THIS Paper:

Australia	Year 11
Brunei	Pre-University 1
Indonesia	Year 12
Malaysia	Form 5 & Lower 6
New Zealand	Year 12
Pacific	Year 11
Singapore	Secondary 4 & 5
South Africa	Grade 11

PAPER I

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PAPER I M

ICAS International Competitions and Assessments for Schools

UNSW THE UNIVERSITY OF SYDNEY

HOW TO FILL OUT THIS SHEET:

USE 2B OR B PENCIL

- Rub out all mistakes completely.
- Print your details clearly in the boxes provided.
- Make sure you fill in only one oval in each column.

EXAMPLE 1: Debbie Bach

FIRST NAME	LAST NAME
DEBBIE	BACH

EXAMPLE 2: Chan Ai Beng

FIRST NAME	LAST NAME
CHAN	AI BENG

EXAMPLE 3: Jamal bin Abas

FIRST NAME	LAST NAME
JAMAL BIN	ABAS

FIRST NAME to appear on certificate

LAST NAME to appear on certificate

PRACTICE QUESTIONS

Are you male or female?

○ Male ○ Female

Does anyone in your home usually speak a language other than English?

○ Yes ○ No

School name: _____

DATE OF BIRTH

Day	Month	Year
0 0	0 0	0 0
1 1	1 1	1 1
2 2		2 2
3 3		3 3
4		4 4
5		5 5
6		6 6

CLASS (optional)

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TO ANSWER THE QUESTIONS

MULTIPLE CHOICE

Example: 6 + 4 =

(A) 2
(B) 9
(C) 10
(D) 24

START

The answer is 10, so fill in the oval Ⓒ, as shown.

Ⓐ Ⓑ ● Ⓓ

USE 2B OR B PENCIL

1 Ⓐ Ⓑ Ⓒ Ⓓ

2 Ⓐ Ⓑ Ⓒ Ⓓ

3 Ⓐ Ⓑ Ⓒ Ⓓ

4 Ⓐ Ⓑ Ⓒ Ⓓ

5

⓪	⓪	⓪
①	①	①
②	②	②
③	③	③
④	④	④
⑤	⑤	⑤
⑥	⑥	⑥
⑦	⑦	⑦
⑧	⑧	⑧
⑨	⑨	⑨

FREE RESPONSE

Example: 6 + 6 =

- The answer is 12, so WRITE your answer in the boxes.
- Write only ONE digit in each box, as shown, and fill in the correct oval, as shown.

	1	2
⓪	⓪	⓪
①	●	①
②	②	●
③	③	③
④	④	④
⑤	⑤	⑤
⑥	⑥	⑥
⑦	⑦	⑦
⑧	⑧	⑧
⑨	⑨	⑨

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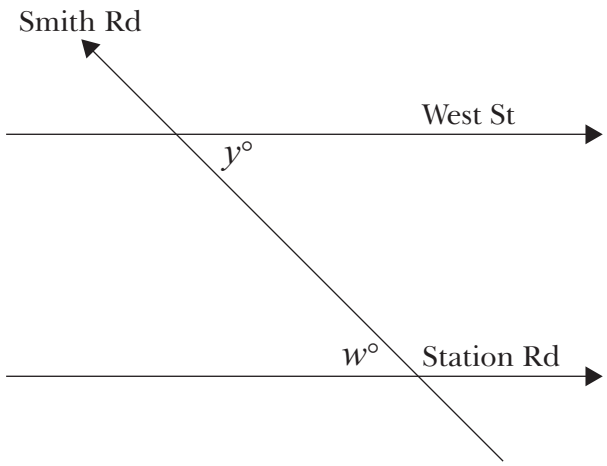
QUESTION	KEY	SOLUTION	STRAND	OF TY
1	A	 Station Rd and West St are parallel, while Smith Rd crosses them. This results in angle y and angle w, that are alternate, being equal. Therefore, statement A is the correct statement.	Space and Geometry	Easy
2	B	This is a quadratic equation. It factorises to $(n + 100)(n - 40) = 0$ The solutions for this equation are $n = -100$ and $n = 40$. As n is the number of products, it cannot be negative. Hence, $n = 40$ is the correct solution. Alternatively, substituting the options will show that $n = 40$ gives $P = 0$.	Algebra and Patterns	Easy
3	C	The result of the calculation is 3.197208465. This number rounded to three significant figures is 3.20.	Number and Arithmetic	Medium
4	D	The diagram shows an inverse relation between the air temperature, T, and the number of people, P. As T increases, P decreases. Note that the relation is not linear. Option A is a quadratic equation that gives a parabola when graphed, where the relation is positive (considering positive values of T). This does not describe the given data. Options B and C are both linear equations that give straight lines sloping downwards when graphed. Again, these do not describe the given data. Option D is an equation that gives a hyperbola when graphed. For small values of T, P has a large value. As the values of T increase, the values of P decrease. This correctly describes the given data.	Chance and Data	Medium

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<table>
<tr>
<td>5</td>
<td>18</td>
<td>
Numbers to be considered are numbers with a digit sum that is divisible by 9. So the sum of the digits must be multiples of 9: 9, 18, 27... The highest digit sum that can be obtained from the numbers 1 to 8 is 8 + 7 + 6 = 21. So only numbers whose digits sum to 9 or 18 need to be considered.

The numbers must be even, so they must be of the form: _ _ 2, _ _ 4, _ _ 6 and _ _ 8.

Take for example _ _ 2. To make this number's digits sum to 9, the first two digits must sum to 7. We can therefore have 342, or 432. We cannot have 252 or 522 as the number 2 cannot be used twice.

This table summarises the solutions.
<table>
<tr><th rowspan="2">Possible numbers</th><th>Sum to 9</th><th rowspan="2">Solutions</th><th>Sum to 18</th><th rowspan="2">Solutions</th></tr>
<tr><th>First two digits sum to:</th><th>First two digits sum to:</th></tr>
<tr><td rowspan="4">_ _ 2</td><td rowspan="4">7</td><td>432</td><td rowspan="4">16</td><td rowspan="4">-</td></tr>
<tr><td>342</td></tr>
<tr><td>162</td></tr>
<tr><td>612</td></tr>
<tr><td rowspan="2">_ _ 4</td><td rowspan="2">5</td><td>234</td><td rowspan="2">14</td><td>684</td></tr>
<tr><td>324</td><td>864</td></tr>
<tr><td rowspan="4">_ _ 6</td><td rowspan="4">3</td><td rowspan="2">126</td><td rowspan="4">12</td><td>486</td></tr>
<tr><td>846</td></tr>
<tr><td rowspan="2">216</td><td>756</td></tr>
<tr><td>576</td></tr>
<tr><td rowspan="4">_ _ 8</td><td rowspan="4">1</td><td rowspan="4">-</td><td rowspan="4">10</td><td>468</td></tr>
<tr><td>648</td></tr>
<tr><td>738</td></tr>
<tr><td>378</td></tr>
</table>
Therefore there are 18 possible numbers that Mario can find.
Note: This is one possible method. The question can be solved using other methods.
</td>
<td>Chance and Data</td>
<td>Hard</td>
</tr>
</table>

Level of difficulty refers to the expected level of difficulty for the question.

Easy	more than 70% of candidates will choose the correct option
Medium	about 50–70% of candidates will choose the correct option
Medium/Hard	about 30–50% of candidates will choose the correct option
Hard	less than 30% of candidates will choose the correct option

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