1 Naga states a hypothesis.

"Most people read more than 100 books a year."

She asks a sample of five people in a book club how many books they read last month.
The table shows the results.

	Lynn	Ali	Paul	Chen	Ruth
Number of books	10	11	8	10	13

1 (a) Show how Naga could use the data to support her hypothesis.

[2 marks]

In a year : $10 \times 12 = 120$, $11 \times 12 = 132$, $8 \times 12 = 96$,
$10 \times 12 = 120$, $13 \times 12 = 156$. (1)

4 out of 5 people from the data is estimated to read more than 100 books a year. (1)

1 (b) Give two reasons why this sample should **not** be used to support her hypothesis.

[2 marks]

Reason 1 The sample is biased as people in book club tends to read more books. (1)

Reason 2 The sample is too small, needs to ask more people (1)

2 p is a positive number.

n is a negative number.

For each statement, tick the correct box.

[4 marks]

	Always true	Sometimes true	Never true
$p + n$ is positive	☐	✓ (1)	☐
$p - n$ is positive	✓ (1)	☐	☐
$p^2 + n^2$ is positive	✓ (1)	☐	☐
$p^3 \div n^3$ is positive	☐	☐	✓ (1)

3 Circle the triangular number.

[1 mark]

9 12 15 18

1

4 In the grid, the **product** of each row, column and diagonal is 1

8	$\frac{1}{4}$	$\frac{1}{2}$
$\frac{1}{16}$	1	16
2	4	$\frac{1}{8}$

(2)

Complete the grid.

[2 marks]

5 Work out how many 5-digit **odd** numbers can be made using these digits **once** each.

2 4 6 7 9

Do **not** list them.

[2 marks]

last digit must be odd : either 7 or 9 (2 options)

first digit has 4 options left (4 options)

remaining 3 digit = $3 \times 2 \times 1 = 6$

Total = $2 \times 4 \times 6 = 48$ (1)

Answer 48 (1)

6 (a) $9k + 7$ and $2k^2 + 3$ are consecutive integers.
$9k + 7$ is the smaller integer.

Work out the value of the **next** consecutive integer.

[5 marks]

$2k^2 + 3 - (9k + 7) = 1$ ✓ (1)

$2k^2 - 9k - 5 = 0$ ✓ (1)

$(2k + 1)(k - 5) = 0$

$k = 5$ or $k = -\frac{1}{2}$ ✓ (1) ✓ (1)

Since $(9k + 7)$ and $(2k^2 + 3)$ are integers,
we can eliminate $k = -\frac{1}{2}$

$2(5^2) + 3 = 53$

The next integer is 54. ✓ (1)

Answer 54

6 (b) x is a square number.

Show that the **next** square number is $x + 2\sqrt{x} + 1$

[2 marks]

$x = n^2$ ✓ (1)

Subs $x = n^2$ into $x + 2\sqrt{x} + 1$

$= n^2 + 2\sqrt{n^2} + 1$ ✓ (1)

$= n^2 + 2n + 1$

$= (n + 1)^2$