Name	.....
Class	.....

GCSE Mathematics – Higher Tier

Spot the Mistake

Statistics

Calculator allowed

Suggested time: 45 minutes

Equipment needed: a pen, a pencil, a rubber, a ruler and a scientific calculator.

How this paper works

- Each question shows a student's worked solution, set out in numbered lines.
- Every solution contains **exactly one** mistake.
- For each question: (a) find the line with the mistake, (b) explain what went wrong, and (c) write a correct solution.

Before you start

- Fill in your name and class at the top of this page.
- Write in black pen. Attempt every question.
- Set out your method clearly in part (c). Marks are given for correct working.
- Diagrams are sketches and are not drawn to scale.

About this paper

- There are 10 questions, worth 40 marks altogether.
- The number in brackets, for example (2), tells you how many marks a part is worth.

Solutions are provided separately.

1) The table shows the time, t minutes, that 20 students spent on homework.

Time (t minutes)	Frequency
$0 < t \leqslant 10$	4
$10 < t \leqslant 20$	9
$20 < t \leqslant 30$	5
$30 < t \leqslant 40$	2

Work out an estimate for the mean time.

Ava's working

Line 1	Use the values 10, 20, 30, 40 for each group
Line 2	4 × 10 + 9 × 20 + 5 × 30 + 2 × 40 = 450
Line 3	Mean = 450 ÷ 20 = 22.5 minutes

(a) Write down the line where Ava makes the mistake.

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 1: 4 marks]

2) Find the median of 7, 3, 9, 12, 5, 8

Brandon's working

Line 1	*There are 6 values, so the median is halfway between the 3rd and 4th values*
Line 2	*The 3rd and 4th values are 9 and 12*
Line 3	*Median = (9 + 12) ÷ 2 = 10.5*

(a) Write down the line where Brandon makes the mistake.

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 2: 4 marks]

3) Class A has 20 students with a mean test score of 64.
Class B has 30 students with a mean test score of 54.
Work out the mean score of all 50 students.

Casey's working

Line 1	Mean of class A = 64
Line 2	Mean of class B = 54
Line 3	Combined mean = (64 + 54) ÷ 2 = 59

(a) Write down the line where Casey makes the mistake.

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 3: 4 marks]

4) A data set has a lower quartile of 20 and an upper quartile of 32.
An outlier is a value more than 1.5× IQR above the upper quartile.
Is the value 49 an outlier?

Dylan's working

Line 1	Outlier limit = 1.5 × 32
Line 2	= 48
Line 3	49 > 48, so 49 is an outlier

(a) Write down the line where Dylan makes the mistake.

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 4: 4 marks]

5) In a histogram, the bar for the class $10 < x \leqslant 25$ has a frequency density of 2.4
Work out the frequency for this class.

Eva's working

Line 1	Class width = 25 − 10 = 15
Line 2	Frequency = frequency density ÷ class width
Line 3	= 2.4 ÷ 15 = 0.16

(a) Write down the line where Eva makes the mistake.

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 5: 4 marks]

6) The table shows the time, t minutes, that 20 students spent on homework.

Time (t minutes)	Frequency
$0 < t \leqslant 10$	4
$10 < t \leqslant 20$	9
$20 < t \leqslant 30$	5
$30 < t \leqslant 40$	2

Fin wants to draw a cumulative frequency graph for this data.

Fin's working

Line 1 *Cumulative frequencies: 4, 13, 18, 20*

Line 2 *Plot the points at the midpoints: (5, 4), (15, 13), (25, 18), (35, 20)*

Line 3 *Join the points with a smooth curve*

(a) Write down the line where Fin makes the mistake.

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 6: 4 marks]

7) Two box plots are drawn for groups A and B.
Group A: median 34, IQR 12. Group B: median 30, IQR 8.
Compare the two distributions.

Gina's working

Line 1	*Group A has a higher median than group B*
Line 2	*So on average, group A has higher values*
Line 3	*Group B is more consistent because its median is lower*

(a) Write down the line where Gina makes the mistake.

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(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 7: 4 marks]

8) A scatter graph shows strong positive correlation between daily ice cream sales and the number of sunburn cases at a beach.

What can you conclude?

Hugo's working

Line 1	As ice cream sales go up, sunburn cases go up
Line 2	This is strong positive correlation
Line 3	So eating ice cream causes sunburn

(a) Write down the line where Hugo makes the mistake.

.....

(1)

(b) Explain the mistake.

.....

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(1)

(c) Write out a correct solution.

.....

(2)

[Question 8: 4 marks]

9) A school has 1200 students, of whom 280 are in Year 10.
A sample of 60 students is taken, stratified by year group.
How many Year 10 students should be in the sample?

Iris's working

Line 1	Year 10 has 280 students
Line 2	280 ÷ 60 = 4.67
Line 3	So 5 Year 10 students

(a) Write down the line where Iris makes the mistake.

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 9: 4 marks]

10) The table shows the shoe sizes of 30 students.

Shoe size	4	5	6	7	8
Frequency	2	4	5	12	7

Find the median shoe size.

Joe's working

Line 1	The shoe sizes are 4, 5, 6, 7, 8
Line 2	The middle size in this list is 6
Line 3	Median = size 6

(a) Write down the line where Joe makes the mistake.

.....

(1)

(b) Explain the mistake.

.....

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(1)

(c) Write out a correct solution.

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(2)

[Question 10: 4 marks]

End of paper – 40 marks in total