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

GCSE Mathematics – Higher Tier

Spot the Mistake

Ratio, Proportion and Rates of Change

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) In a sale, all prices are reduced by 15%. A jacket costs £68 in the sale.
Work out the original price of the jacket.

Alfie's working

Line 1	15% of 68 = 0.15 × 68 = 10.20
Line 2	Original price = 68 + 10.20
Line 3	= £78.20

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

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 1: 4 marks]

2) Maya invests £3000 at 2.5% compound interest per year.
Work out the value of her investment after 4 years.

Ben's working

Line 1	2.5% of 3000 = 75
Line 2	Interest over 4 years = 75 × 4 = 300
Line 3	Value = 3000 + 300 = £3300

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

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 2: 4 marks]

3) A car is bought for £18 000. Its value depreciates by 12% each year.
Work out its value after 3 years.

Chloe's working

Line 1	Multiplier = 1.12
Line 2	$18\,000 \times 1.12^3$
Line 3	= £25 288.70

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

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 3: 4 marks]

4) Money is shared between Ali and Beth in the ratio 3 : 5. Beth gets £120 more than Ali. How much does each person get?

Dan's working

Line 1	Total parts = 3 + 5 = 8
Line 2	One part = 120 ÷ 8 = 15
Line 3	Ali = 3 × 15 = £45, Beth = 5 × 15 = £75

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

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 4: 4 marks]

5) y is directly proportional to x^2. When $x = 5$, $y = 50$.
Find y when $x = 2$.

Ella's working

Line 1	$y = Kx^2$
Line 2	$50 = K \times 5$, so $K = 10$
Line 3	$y = 10 \times 2^2 = 40$

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

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 5: 4 marks]

6) F is inversely proportional to the square of d. When $d = 3$, $F = 20$.
Find F when $d = 6$.

Finn's working

Line 1	$F = \frac{K}{d^2}$
Line 2	$20 = \frac{K}{9}$, so $K = 180$
Line 3	$F = 180 \div 6 = 30$

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

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 6: 4 marks]

7) A train travels at 72 km/h. Convert this speed to metres per second.

Grace's working

Line 1	72 Km = 72000 m
Line 2	72000 m per hour
Line 3	72000 ÷ 60 = 1200 m/s

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

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 7: 4 marks]

8) A force of 240 N acts on a rectangle measuring 40 cm by 30 cm.

Work out the pressure in N/m^2. (pressure = $\frac{\text{force}}{\text{area}}$)

Harry's working

Line 1	Area = 40 × 30 = 1200 cm^2
Line 2	1200 cm^2 = 1200 ÷ 100 = 12 m^2
Line 3	Pressure = 240 ÷ 12 = 20 N/m^2

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

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 8: 4 marks]

9) The price of a bike rises from £240 to £276.
Work out the percentage increase.

Isla's working

Line 1	Increase = 276 − 240 = £36
Line 2	Percentage increase = $\frac{36}{276} \times 100$
Line 3	= 13.0%

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

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 9: 4 marks]

10) Two solids are mathematically similar. Their surface areas are 45 cm^2 and 180 cm^2. The smaller solid has a volume of 20 cm^3. Work out the volume of the larger solid.

Jack's working

Line 1	Area scale factor = 180 ÷ 45 = 4
Line 2	So the volume scale factor = 4
Line 3	Volume = 20 × 4 = 80 cm^3

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

.....

(1)

(b) Explain the mistake.

.....

.....

(1)

(c) Write out a correct solution.

.....

(2)

[Question 10: 4 marks]

End of paper – 40 marks in total