

Long Multiplication, Division & Decimal Operations

Topic: Short/Long Multiplication, Bus-Stop Division with Remainders | Time Allowed: 45 Minutes | Total Marks: 35

Candidate Name: _____ Date: _____ Score: _____

1. CORE MATHEMATICAL CONCEPTS & RULES

- Long multiplication: multiply by the units first, place a zero placeholder in the next row, then multiply by the tens, and sum the rows.
- Division (bus-stop method): divide left to right, carry remainders forward. Interpret remainders as fractions or decimals (e.g. $17 \div 4 = 4 \text{ r}1 = 4.25$).
- Multiplying/Dividing by 10, 100, 1000: digits shift left when multiplying and right when dividing (never 'add zeroes' with decimals!).
- Prime numbers have exactly two distinct factors: 1 and itself (2, 3, 5, 7, 11, 13, 17, 19, 23, 29...).

2. STEP-BY-STEP EXAMINER WORKED EXAMPLE: FORMAL LONG MULTIPLICATION (3-DIGIT BY 2-DIGIT)

Problem: Calculate 348×26 using the formal column method.

Method & Steps:

1. Row 1: Multiply 348 by 6 (units): $8 \times 6 = 48$ (write 8, carry 4); $4 \times 6 = 24 + 4 = 28$ (write 8, carry 2); $3 \times 6 = 18 + 2 = 20 \rightarrow 2,088$.
2. Row 2: Multiply 348 by 20 (tens): Place placeholder 0 first! $348 \times 2 = 696 \rightarrow 6,960$.
3. Row 3: Add the two partial products: $2,088 + 6,960 = 9,048$.

Final Solution: 9,048

3. 11+ EXAM TECHNIQUE & SPEED CALCULATION STRATEGIES

1. Always show full written working: examiners award partial method marks even if arithmetic slips occur.
2. Estimate your answer before calculating to check if your final magnitude makes realistic sense.
3. Watch units carefully (e.g. converting cm to m, millilitres to litres, hours to minutes).
4. In timed exam conditions, spend ~1 minute per mark and flag difficult problems for the end.
5. Specialist 1-to-1 Maths & Science tuition available: www.themathsandsciencetutor.co.uk

Section A: Practice Exercises & Exam Questions

Show all calculations clearly. Write your final answer in the box. Total: 20 Marks

[FLUENCY]

Question 1: Long Multiplication

[2 marks]

Calculate: 462×37 using formal written methods.

Answer / Working:

[FLUENCY]

Question 2: Short Division

[2 marks]

Divide: $3,745 \div 7$. Express any remainder as a whole number.

Answer / Working:

[FLUENCY]

Question 3: Prime Factors

[3 marks]

List all prime numbers between 20 and 40. Write 60 as a product of its prime factors.

Answer / Working:

[REASONING]

Question 4: Decimal Place Value

[2 marks]

What is 4.07×100 ? What is $52.8 \div 1,000$? Explain the digit shifts.

Answer / Working:

[WORD PROB]

Question 5: School Trip Coaches

[3 marks]

A year group of 268 students and 18 teachers are going on a theatre trip. Each coach can seat 52 passengers. How many coaches must the school book so everyone gets a seat?

Answer / Working:

[REASONING]

Question 6: Missing Operations

[3 marks]

Insert brackets () into the expression $6 + 4 \times 9 - 3$ to make the total equal 60.

Answer / Working:

Section B: 11+ Grammar & Independent School Challenges

Advanced multi-step reasoning problems from top UK selective entrance exams.

CHALLENGE 1: THE CONSECUTIVE PAGE NUMBERS PUZZLE [3 MARKS]

A reader opens a book. The product of the two facing page numbers is 1,892.
Find the two page numbers without using a calculator, showing your algebraic or estimation method.

Final Answer:

CHALLENGE 2: GRAND BAKERY ORDER ALLOCATION [3 MARKS]

Boxes of cupcakes cost GBP 14 each. Trays of cookies cost GBP 9 each. A school spend exactly GBP 182 on a mixture of both items.
Find how many boxes of cupcakes and trays of cookies were purchased.

Final Answer:

ROUGH WORKING / TRIAL & IMPROVEMENT SPACE

Section C: Examiner Mark Scheme & Method Solutions

Step-by-step methods, mark allocations, and alternative approaches.

Question 1 [Fluency]

Answer: 17,094

Method: $462 \times 7 = 3,234$. $462 \times 30 = 13,860$. Sum = $3,234 + 13,860 = 17,094$.

Question 2 [Fluency]

Answer: 535

Method: $37 \div 7 = 5 \text{ r}2$; $24 \div 7 = 3 \text{ r}3$; $35 \div 7 = 5$. Exact answer = 535.

Question 3 [Fluency]

Answer: Primes: 23, 29, 31, 37 | Prime factorisation: $60 = 2 \times 2 \times 3 \times 5$ (or $2^2 \times 3 \times 5$)

Method: Test factor divisibility up to square root of target.

Question 4 [Reasoning]

Answer: $4.07 \times 100 = 407$ | $52.8 \div 1,000 = 0.0528$

Method: Multiplying by 100 shifts digits 2 places left; dividing by 1,000 shifts digits 3 places right.

Question 5 [Word Prob]

Answer: 6 coaches

Method: Total passengers = $268 + 18 = 286$. $286 \div 52 = 5$ with remainder 26. Must round UP to 6 coaches so no passenger is left behind.

Question 6 [Reasoning]

Answer: $(6 + 4) \times (9 - 3) = 60$

Method: $(6 + 4) = 10$; $(9 - 3) = 6$; $10 \times 6 = 60$ (Applying BIDMAS).

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