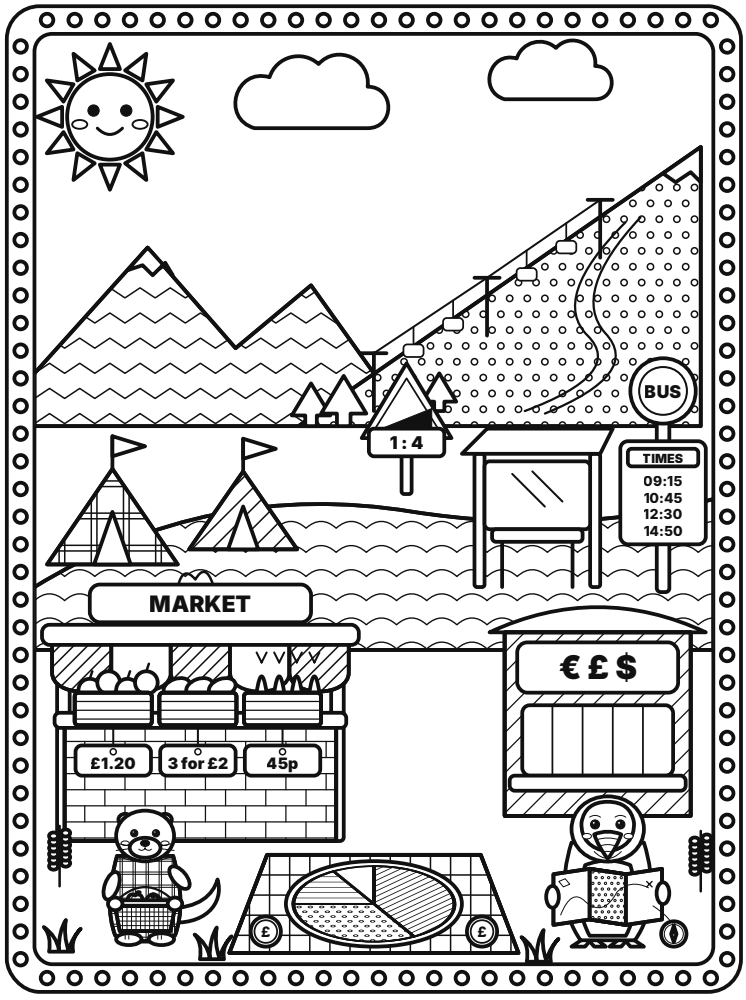
REAL-LIFE MATHS

National 5 Applications of Mathematics

Revision Guide

Notes, worked examples, exam-style questions and two practice papers, with full answers



C. Blewis

Blewis LEARNING

Contents

GETTING STARTED		
	How to use this guide	4
	The exam	5
	Exam skills	6
	Formulae	9
NUMERACY		
1.1	Numbers, notation and rounding	12
1.2	Fractions, decimals and percentages	15
1.3	Ratio and proportion	18
1.4	Speed, distance, time and time management	21
FINANCE		
2.1	Budgets and best deals	25
2.2	Pay, deductions and payslips	29
2.3	Foreign currency	33
2.4	Savings and borrowing	36
MEASUREMENT AND GEOMETRY		
3.1	Scales, tolerance and rates	40
3.2	Scale drawings and bearings	44
3.3	Packing and planning	47
3.4	Area, perimeter and volume	51
3.5	Gradient and Pythagoras	55
STATISTICS AND PROBABILITY		
4.1	Averages and spread	60
4.2	Charts and graphs	64
4.3	Probability and risk	69
4.4	Interpreting data and making decisions	73
PRACTICE AND ANSWERS		
	Practice exam 1 (Papers 1 and 2)	78
	Practice exam 2 (Papers 1 and 2)	85
	Answers	92
	Practice exam marking	101

How to use this guide

This guide covers the whole National 5 Applications of Mathematics course in four areas, with reasoning and real-life decisions throughout. Each key area follows the same pattern, so you always know what comes next.

EACH KEY AREA HAS

Notes	the ideas you need, in short sections with diagrams
Methods	each skill with a clear method and a worked example set out step by step
Exam tips	common mistakes and how to pick up every mark
Quick check	short questions to test yourself straight away
Exam-style questions	longer questions with marks, like the real exam

A GOOD WAY TO REVISE

1. Read the notes and cover the worked example. Can you do it yourself?
2. Try the quick check without looking back. Mark it using the answers at the back.
3. Do the exam-style questions in your jotter, with full working. Then mark them carefully against the marking guidance.
4. Tick the key area off on the tracker at the start of each area: **1** need more work, **2** getting there, **3** confident.
5. When you have revised everything, sit the practice papers under exam conditions.

ANSWERS

All answers are at the back. For exam-style questions the marking guidance shows where each mark comes from, so you can see exactly what examiners look for.

CHECK THE COURSE

Exam arrangements and course content can change. Your teacher and the latest course documents always come first.

The exam

National 5 Applications of Mathematics is assessed by two question papers. Almost every question is set in a real-life context, and many ask you to make a decision and justify it. **Arrangements can change, so check the latest arrangements with your teacher.**

Paper	What it is	Time	Marks
Paper 1	**Non-calculator.** Short and longer questions, mostly set in real-life contexts.	50 minutes	35
Paper 2	**Calculator allowed.** Short and longer questions and **case studies**: a page of information followed by several linked questions. The time includes reading the case-study information.	1 hour 40 minutes	55
Total			90

Command words

Command word	What you need to do
Calculate, find, work out	work out the answer and show your working
Show that	the answer is given: show every step so the final line matches it
Explain	give a reason in words, using your working or the context
Justify, give a reason	make a decision and back it up with numbers: "Yes, because …"
Which is the better (best) deal / option?	work out a value for **every** option, compare them, then state your choice clearly
Comment on, compare	describe what the numbers mean in the context, e.g. which data set is more consistent
Estimate	use rounded numbers or read a value from a graph or line of best fit
Draw, construct	use a ruler and protractor accurately, with a scale and labels

ON THE DAY

- Paper 1: about **1.4 minutes per mark**. Paper 2: about **1.8 minutes per mark**, including reading time for the case studies.
- Read the whole question and underline what you are asked to find, the units and any rounding instruction.
- Show all your working. Clear working can earn most of the marks even if the final answer is wrong.
- When asked to choose or decide, always finish with a sentence that states your decision and the reason.

Exam skills

Showing working and earning the justify mark

Marks are given for each stage: choosing a method, carrying out each calculation, and communicating the answer. In "which is better" questions, the final mark is usually for a **decision that matches your working**.

HOW A 3-MARK ANSWER IS MARKED

A pack of 6 rolls costs £1.86 and a pack of 10 costs £2.95. Which is the better buy? Use your working to justify your answer.

Strategy	find the price of one roll for each pack (1)
Process	£1.86 ÷ 6 = £0.31 and £2.95 ÷ 10 = £0.295 (1)
Decision	**The pack of 10 is better value, because each roll costs less (29.5p compared with 31p).** (1)

> **EXAM TIP**
> A decision on its own gets no marks. "Pack B" is not enough: say why, using your numbers. If an earlier calculation is wrong, a decision that matches your own working can still get the final mark.

Working without a calculator (Paper 1)

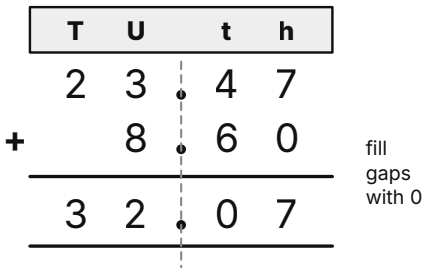
- **Decimals:** line up the decimal points to add or subtract. To multiply 2.35 × 4, work out 235 × 4 = 940, then put back two decimal places: 9.40.
- **Dividing by 10, 100, 1000:** move the digits right: 47.5 ÷ 100 = 0.475.
- **Percentages:** build from 10%, 5% and 1%. 35% of £80 = £24 + £4 = £28.
- **Fractions of an amount:** divide by the bottom, multiply by the top. $\frac{2}{3}$ of 42 = 42 ÷ 3 × 2 = 28.
- **Mixed numbers:** $2\frac{1}{2} + 1\frac{3}{4} = 3 + \frac{2}{4} + \frac{3}{4} = 4\frac{1}{4}$.
- **Converting:** $\frac{1}{4} = 0.25 = 25\%$, $\frac{1}{8} = 0.125 = 12.5\%$, $\frac{2}{5} = 0.4 = 40\%$.

Rounding, money and units

Instruction	Example
money	always 2 decimal places: £14.5 is written £14.50
to 3 significant figures	0.004 728 → 0.004 73 and 52 670 → 52 700
to 3 decimal places	2.718 28 → 2.718
rounding up in context	13.2 buses are needed, so you need **14** buses, not 13

1.1 Numbers, notation and rounding

Paper 1 has **no calculator**, so you must be confident working with decimals by hand. Most questions are about money or measurements, so answers usually have **two decimal places**.



KEY POINTS

- Line up the **decimal points** when you add or subtract. Fill empty places with 0.
- To multiply by 10, 100 or 1000, digits move 1, 2 or 3 places to the left. Dividing moves them to the right.
- To multiply by 40, multiply by 4 then by 10. To divide by 300, divide by 3 then by 100.
- Money answers need two decimal places: £5.6 is written £5.60.

Multiplying and dividing by a single digit

WORKED EXAMPLE

Find 4.36 × 7 without a calculator.

Ignore the point	436 × 7 = 3052
Count places	4.36 has 2 decimal places
Answer	**30.52**

WORKED EXAMPLE

Six friends share a bill of £85.20 equally. How much does each pay?

Divide	85.20 ÷ 6: 8 ÷ 6 = 1 r 2, 25 ÷ 6 = 4 r 1, 12 ÷ 6 = 2, 0 ÷ 6 = 0
Answer	**£14.20**

WORKED EXAMPLE

Find 3.25 × 400.

× 4	3.25 × 4 = 13
× 100	13 × 100 = **1300**

WORKED EXAMPLE

Find 186 ÷ 30.

÷ 3	186 ÷ 3 = 62
÷ 10	62 ÷ 10 = **6.2**

EXAM TIP

Check your answer is sensible by estimating: 4.36 × 7 is about 4 × 7 = 28, so 30.52 is about right. An answer of 305.2 would be clearly wrong.

1.1 Numbers, notation and rounding

Rounding to decimal places and significant figures

To round to **3 decimal places**, look at the 4th decimal place. To round to **significant figures**, count from the **first non-zero digit**. Zeros at the start do not count; zeros needed to keep the size of the number must stay.

Number	Rounded to	Answer
7.389 6	3 decimal places	7.390
48 615	2 significant figures	49 000
0.004 783	2 significant figures	0.0048
2.049	3 significant figures	2.05

> **EXAM TIP**
> 7.3896 to 3 decimal places is 7.390, not 7.39. The final 0 shows the answer is accurate to 3 decimal places, so keep it.

Notation and units

Measure	Units	Links
Money	£, p	£1 = 100p
Time	s, min, h	1 h = 60 min
Length	mm, cm, m, km	1 km = 1000 m, 1 m = 100 cm
Weight	g, kg	1 kg = 1000 g
Volume	ml, l	1 l = 1000 ml
Temperature	°C	can be below 0, e.g. −4 °C

KEY POINTS

- < less than, > greater than, ≤ less than or equal to, ≥ greater than or equal to.
- Brackets first, then × and ÷, then + and −.
- A ratio uses a colon, e.g. 2 : 3.
- Always write the unit with your final answer.

Quick check

1 Find 12.6 + 3.48.

2 Find 20 − 7.35.

3 Find 6.47 × 8.

4 Find 31.5 ÷ 7.

5 Find 0.38 × 300.

6 Find 2.4 ÷ 60.

7 Round 3.141 59 to 3 decimal places.

8 Round 0.060 49 to 2 significant figures.

1.1 Numbers, notation and rounding

Exam-style questions (15 marks)

1 Leo buys 3 sandwiches at £3.45 each and 2 drinks at £1.85 each. He pays with a £20 note. How much change should he get? **(non-calculator)**

(3)

2 A café in Glen Arrin uses 0.45 kg of coffee beans each day. **(non-calculator)**

(a) How much coffee does it use in 30 days? **(1)**

(b) Coffee comes in 2 kg bags costing £18.60 each. How many bags must the café buy for 30 days, and how much will they cost? **(3)**

3 In a sprint final, the winning time shown on the electronic timer is 12.4687 seconds.

(a) Round this time to 3 decimal places. **(1)**

(b) Round this time to 3 significant figures. **(1)**

4 Zara and five friends share the cost of a £74.40 taxi equally. How much does each person pay? **(non-calculator)**

(2)

5 Kai says that 0.0705 rounded to 2 significant figures is 0.07. Is he correct? Give a reason for your answer.

(2)

6 A plumber charges a call-out fee of £42.50 plus £28 for each hour of work. How much does a 3-hour job cost? **(non-calculator)**

(2)

> **EXAM TIP**
> With money, write every answer with £ and two decimal places. Show the working for each step: in Paper 1 the marks are for the process, not just the final answer.

1.2 Fractions, decimals and percentages

Fractions of quantities and shapes

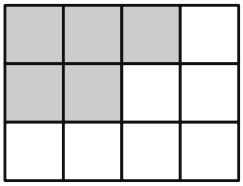
To find a fraction of an amount, **divide by the bottom number and multiply by the top**. To give a fraction of a shape, count the equal parts.

WORKED EXAMPLE

Find $\frac{3}{5}$ of £45.

÷ 5 $45 \div 5 = 9$

× 3 $9 \times 3 =$ **£27**



$\frac{5}{12}$ of the rectangle is shaded.

Adding and subtracting fractions and mixed numbers

KEY POINTS

- Change to a **common denominator** first: $\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$.
- With mixed numbers, add or subtract the whole numbers, then the fractions. If the fraction part goes negative, borrow 1 from the whole number.
- To find a fraction of a mixed number, change it to a top-heavy fraction: $4\frac{1}{2} = \frac{9}{2}$.

WORKED EXAMPLE

Find $2\frac{1}{3} + 1\frac{3}{4}$.

Wholes $2 + 1 = 3$

Fractions $\frac{4}{12} + \frac{9}{12} = \frac{13}{12} = 1\frac{1}{12}$

Answer $\mathbf{4\frac{1}{12}}$

WORKED EXAMPLE

Find $3\frac{1}{2} - 1\frac{2}{3}$.

Common $3\frac{3}{6} - 1\frac{4}{6}$

Borrow $2\frac{9}{6} - 1\frac{4}{6}$

Answer $\mathbf{1\frac{5}{6}}$

WORKED EXAMPLE

A recipe uses $4\frac{1}{2}$ cups of oats. Isla makes $\frac{2}{3}$ of the recipe. How many cups does she need?

Top-heavy $4\frac{1}{2} = \frac{9}{2}$

Multiply $\frac{2}{3} \times \frac{9}{2} = \frac{18}{6}$

Answer **3 cups**

WORKED EXAMPLE

A hall is booked in quarter-hour slots. How many slots are there in $2\frac{3}{4}$ hours?

Quarters each hour has 4 quarters, so 2 hours = $\frac{8}{4}$

Top-heavy $2\frac{3}{4} = \frac{8}{4} + \frac{3}{4} = \frac{11}{4}$

Answer **11 slots**

FREE SAMPLE

National 5 Applications of Mathematics Revision Guide

This sample shows a few pages. The full printed workbook is available from Amazon.

blewislearning.co.uk

Blewis
LEARNING