Maths Level 1
Complete Study Guide

Every topic explained with worked examples and practice
10 Topics | Formulas | Step-by-Step Methods

rewired for parents

About the L1 Maths Exam

Total marks: 60 | **Pass mark:** 36 (60%)

Section A: Non-calculator — 20 marks, 10 questions

Section B: Calculator allowed — 40 marks, 15 questions

25 questions total | **2 hours**

Contents

1. Fractions, Decimals & %
2. Percentages of Amounts
3. Ratio & Proportion
4. Mean, Median, Mode & Range
5. Area & Perimeter
6. Best Value & Unit Pricing
7. Probability
8. Charts & Graphs
9. Scale & Conversions
10. Number Skills & Problem Solving

1. Fractions, Decimals & Percentages

The Three Forms

Fraction to Decimal: Divide top by bottom. 3/4 = 0.75. **Decimal to %:** x100. 0.75 = 75%. **% to Fraction:** Over 100, simplify. 75% = 3/4.

Key Equivalents

Fraction	Decimal	%
1/2	0.5	50%
1/4	0.25	25%
3/4	0.75	75%
1/5	0.2	20%
1/3	0.333...	33.3%
1/8	0.125	12.5%
1/10	0.1	10%

Order 2/3, 65%, 0.7 smallest to largest

```
2/3=0.667, 65%=0.65, 0.7
Order: 65%, 2/3, 0.7
```

Tip: Convert everything to decimals first when comparing.

Common Mistake: 1/3 = 0.333..., not 0.3. The recurring decimal matters in ordering.

Practice Questions

1. Convert 7/8 to decimal and %
2. Order: 3/5, 0.58, 62%
3. Write 0.375 as a fraction

Answers: 1) 0.875, 87.5% 2) 0.58, 3/5, 62% 3) 3/8

2. Percentages of Amounts

Finding a Percentage

Building blocks: Find 10%, 5%, 1% and combine. **Calculator:** Amount x % / 100.

Find 15% of £240

```
10% = £24, 5% = £12
15% = £24 + £12 = £36
```

Percentage Increase and Decrease

New amount = Original +/- (% x Original)

Coat was £80, 35% off. Sale price?

```
35% of £80: 10%=8, 30%=24, 5%=4, 35%=28
Sale = £80 - £28 = £52
```

Reverse Percentages

Sale price = remaining %. Divide by that % to find 1%, then x100.

Shirt costs £36 after 10% off. Original?

```
£36 = 90%. 1% = 36/90 = 0.40
100% = 0.40 x 100 = £40
```

Percentage Change

% change = (difference / original) x 100

£80 to £92. % increase?

```
Increase = £12. (12/80) x 100 = 15%
```

Common Mistake: Always divide by the ORIGINAL, not the new amount.

Practice Questions

1. 17.5% of £320
2. Laptop £600, 25% off. Sale price?
3. After 20% increase = £180k. Original?
4. 500 to 400. % decrease?

Answers: 1) £56 2) £450 3) £150,000 4) 20%

3. Ratio & Proportion

Simplifying Ratios

Divide all parts by the HCF. 12:8 / 4 each = 3:2.

Sharing in a Ratio

Share £150 in ratio 2:3:5

```
Total parts = 10. One part = £15.
2x15=£30, 3x15=£45, 5x15=£75
Check: 30+45+75=150
```

Scaling Recipes

Recipe for 4: 300g. For 6?

```
Per person = 300/4 = 75g
For 6 = 75 x 6 = 450g
```

Inverse Proportion

More workers = less time. Multiply values for constant, divide by new.

3 painters: 8 hours. 6 painters?

```
Constant = 3 x 8 = 24
Time = 24 / 6 = 4 hours
```

Tip: Always check ratio shares add up to the total.

Practice Questions

1. Simplify 48:36
2. Share £200 in 3:2
3. Recipe for 8: 500g. For 5?
4. 4 workers: 12 days. 6 workers?

Answers: 1) 4:3 2) £120,£80 3) 312.5g 4) 8 days

4. Mean, Median, Mode & Range

Mean = total / count. **Median** = middle value (ordered). **Mode** = most frequent. **Range** = highest - lowest.

Data: 5, 8, 3, 8, 12, 6

```
Mean = 42/6 = 7
Ordered: 3,5,6,8,8,12
Median = (6+8)/2 = 7
Mode = 8
Range = 12-3 = 9
```

Finding a Missing Value

Mean of 5 numbers = 20. Four values: 15,22,18,25. Find 5th.

```
Total = 20 x 5 = 100
Known = 80. Missing = 20
```

Choosing the Right Average

Mean: evenly spread data. **Median:** data with outliers. **Mode:** non-numerical or 'most popular'.

Common Mistake: With negatives: range of -3 to 8 = 8-(-3) = 11.

Practice Questions

1. Mean, median, mode, range of: 4,7,7,10,12
2. Mean of 6 nums = 15. Five: 12,18,14,10,16. Find 6th.
3. Wages: 250,280,280,310,950. Best average?

Answers: 1) Mean=8,Med=7,Mode=7,Range=8 2) 20 3) Median (280)

5. Area & Perimeter

Key Formulas

Rectangle: A = l x w | P = 2(l+w)

Triangle: A = 1/2 x base x height

Parallelogram: A = base x height

Trapezium: A = 1/2 x (a+b) x h

Circle: A = pi x r^2 | C = pi x d

Circle area, radius 5cm

```
A = 3.14 x 25 = 78.5 cm2
```

Trapezium: sides 8cm,12cm, height 6cm

```
A = 1/2 x (8+12) x 6 = 60 cm2
```

Compound Shapes

Split into rectangles/triangles/semicircles. Calculate each. Add or subtract.

L-shape: 10x6 with 4x3 cut-out

```
60 - 12 = 48 m2
```

Common Mistake: Radius = half diameter. If given diameter, divide by 2 first.

Practice Questions

1. Circle area, diameter 20cm
2. Semicircle perimeter, diameter 14cm
3. Room 6x4.5m, laminate £15/m2
4. Trapezium: 5cm,9cm, h=4cm

Answers: 1) 314cm2 2) 35.98cm 3) £405 4) 28cm2

6. Best Value & Unit Pricing

Comparing Prices

Find price per unit (per g, per ml). Lowest = best value.

Small 200g £1.60 vs Large 500g £3.50

```
Small: 1.60/200 = 0.8p/g
Large: 3.50/500 = 0.7p/g
Large is better value
```

Speed, Distance, Time

Speed = Distance / Time | D = S x T | T = D / S

Train: 180 miles in 2.5 hours

```
Speed = 180 / 2.5 = 72 mph
```

Currency Conversion

To foreign: MULTIPLY. **To pounds:** DIVIDE.

£1=EUR1.15. £200 to euros?

```
200 x 1.15 = EUR230
```

Tip: Watch speed units. If distance is km and time is minutes, convert to hours first.

Practice Questions

1. A: 6 for £4.50. B: 10 for £7. Better?
2. Car 240km in 3hrs. Speed?
3. £1=AUD1.85. £400 to AUD?
4. Petrol 145.9p/L. 50 litres?

Answers: 1) B (70p vs 75p) 2) 80km/h 3) AUD740 4) £72.95

7. Probability

P(event) = favourable outcomes / total outcomes

Always between 0 (impossible) and 1 (certain).

Bag: 3R, 5B, 2G. P(blue)?

```
Total=10. P(blue)=5/10=1/2
```

Complementary Events

P(not A) = 1 - P(A)

Expected Frequency

Expected = Probability x Number of trials

Dice rolled 60 times. Expected 6s?

```
1/6 x 60 = 10
```

Independent Events (AND)

P(A and B) = P(A) x P(B)

Coin twice. P(two heads)?

```
1/2 x 1/2 = 1/4
```

Common Mistake: Without replacement: total changes. 5R 3B, take red. Now P(red) = 4/7.

Practice Questions

1. Cards 1-10. P(even)?
2. P(rain)=0.35. P(dry)?
3. P(win)=0.2. Wins in 150?
4. Spinner: 1/2 green. 200 spins. Green?

Answers: 1) 1/2 2) 0.65 3) 30 4) 100

8. Charts & Graphs

Pie Charts

Full circle = 360 deg. Angle = (freq/total) x 360. Freq = (angle/360) x total.

25% Football. Angle?

```
25% x 360 = 90 degrees
```

Scatter Diagrams

Positive: both increase. **Negative:** one up, one down. **None:** random. Correlation is NOT causation.

Two-Way Tables

Read across rows AND down columns. Use totals to fill in missing values.

Stem-and-Leaf

Stem = leading digit(s), leaf = last digit. Always include a key. Leaves in order.

Tip: Grouped frequency: use midpoints to estimate the mean.

Practice Questions

1. Pie sector 144 deg = what %?
2. Stem 4|1 3 3 8. Mode?
3. Negative correlation: exercise vs body fat?

Answers: 1) 40% 2) 43 3) More exercise = less body fat

9. Scale & Conversions

Map Scales

1:25,000 means 1cm = 25,000cm = 250m. Multiply map distance by scale.

Scale 1:50,000. Map = 3cm. Real?

```
3 x 50,000 = 150,000 cm = 1,500m = 1.5km
```

Metric Conversions

Type	Conversion
Length	10mm=1cm, 100cm=1m, 1000m=1km
Weight	1000g=1kg, 1000kg=1t
Capacity	1000ml=1L
Time	60s=1min, 60min=1hr

Imperial-Metric Approx

Imperial	Metric
1 inch	2.54cm
1 foot	30cm
1 mile	1.6km
1 lb	0.45kg
1 gallon	4.5L

Compound Conversions

90 km/h to m/s

```
90 / 3.6 = 25 m/s
```

Practice Questions

1. Scale 1:200, drawing 6.5cm. Real?
2. 5 miles to km
3. 2hrs 15min to minutes
4. Map 4cm, scale 1:25,000. Real km?

Answers: 1) 13m 2) 8km 3) 135min 4) 1km

10. Number Skills & Problem Solving

Negative Numbers

Add neg: goes down (5+(-3)=2). **Subtract neg:** goes up (5-(-3)=8). **Multiply:** same signs=pos, different=neg.

Squares and Roots

1,4,9,16,25,36,49,64,81,100,121,144,169,225

BIDMAS

Brackets, **I**ndices, **D**ivision/**M**ultiplication, **A**ddition/**S**ubtraction

Simple Interest

Interest = Principal x Rate x Time

£2,000 at 3% for 4 years

```
Interest = 2000 x 0.03 x 4 = £240
Total = £2,240
```

Compound Interest

Interest on the new total each year.

£1,000 at 5% for 2 years

```
Year 1: 1000 x 1.05 = £1,050
Year 2: 1050 x 1.05 = £1,102.50
```

Equations from Words

Double a number, subtract 5, get 31.

```
2x - 5 = 31
2x = 36
x = 18
```

Common Mistake: Compound: multiply by multiplier each year. Don't just add the same amount.

Practice Questions

1. (-8) x (-3)?
2. Simple: £3k, 5%, 2 years?
3. Compound: £500, 10%, 2 years?
4. Triple + 7 = 52. Number?

Answers: 1) 24 2) £300 3) £605 4) 15