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FUNCTIONAL SKILLS LEVEL 1 MATHS

MASTER COMPLETE COURSE GUIDE

The complete common Level 1 course in 31 teaching units, with examples, answers and diagrams

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Edition 1 | Checked 13 November 2026 | Volume 1 of 7

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Scope, result and study route

Functional Skills Maths Level 1 is an England qualification assessing practical number, measures/shape/space and information/data. It has a Pass/Fail outcome. National rules allocate 25% of marks to non-calculator work and 75% to calculator-permitted work. [MDFE, MOFQ]

One combined assessment result

The Pass boundary applies to the overall assessment version or permitted pair. There are no independent calculator and non-calculator pass marks. The separate underpinning-skills/problem-solving allocation is also 25:75; it is a different classification from calculator access. [MOFQ]

Level 1 demand

Choose and carry out methods for straightforward practical problems, including connected steps. Some problems connect two of the three content areas. Show working, choose sensible accuracy and explain the result in context. [MDFE]

How the units map

M01-M31 are this publication’s teaching IDs. They divide the full national content into practical lessons. Some online versions of the DfE text display several number topics as unnumbered bullets; the named-topic map below avoids confusing those display numbers with our lesson IDs.

A useful route

Study a lesson, try its self-check, then use the method clinics in Volume 3. Repair repeated mistakes with Volume 4. Work through the linked contexts in Volume 5 before sitting the Volume 6 practice papers and an official sample for your actual awarding organisation.

Complete content map: M01-M16

Teaching ID	National topic taught
M01	Large numbers and place value
M02	Positive and negative numbers
M03	Multiplying and dividing by 10, 100 and 1000
M04	Multiplication facts and division links
M05	Simple formulae in words
M06	Squares of numbers
M07	Order of operations
M08	Common fractions and mixed numbers
M09	Fractions of quantities
M10	Decimals to three places
M11	Decimal arithmetic
M12	Rounding and sensible accuracy
M13	Understanding whole-number percentages
M14	Percentages and simple percentage changes
M15	Estimation as a check
M16	Equivalent fractions, decimals and percentages

M01-M17: number and the number system. M18-M26: common measures, shape and space. M27-M31: information and data. All units also practise interpretation and checking. [MDFE]

Complete content map: M17-M31

Teaching ID	National topic taught
M17	Simple ratio and direct proportion
M18	Simple interest
M19	Discounts and final prices
M20	Metric units, money and time
M21	Simple scales on maps and drawings
M22	Area and perimeter of rectangles and composites
M23	Volume of cubes and cuboids
M24	Drawing shapes, symmetry and angle size
M25	Plans, elevations and nets
M26	Measuring angles and describing direction
M27	Discrete data in tables and charts
M28	Grouping discrete data
M29	Mean and range
M30	Probability scale and likelihood
M31	Simple equally likely outcomes

M01-M17: number and the number system. M18-M26: common measures, shape and space. M27-M31: information and data. All units also practise interpretation and checking. [MDFE]

M01. Large numbers and place value

Read numbers in groups of thousands. A digit’s position gives its value. Compare numbers by the largest differing place, adding leading zeros mentally if helpful. Level 1 includes positive whole numbers up to one million. Use a place-value grid when a number contains zeros.

Worked example

In 604,080 the 6 means 600,000 and the 4 means 4,000. Order 64,800, 604,080 and 640,008: 64,800 < 604,080 < 640,008.

Your turn

Write 305,016 in words. What is the value of 5? Order 90,099, 99,009 and 90,909.

Worked self-check

Three hundred and five thousand and sixteen; 5,000. Order: 90,099, 90,909, 99,009.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M01 in Volume 4.

M02. Positive and negative numbers

Numbers to the right on a number line are greater. Negative numbers describe values below a reference point, such as temperature below zero or an overdrawn balance. A rise across zero includes the distance up to zero and then the distance above it.

Worked example

A temperature rises from -5°C to 3°C: increase 8°C. -2 is greater than -7 because it lies farther right.

Your turn

Order -9, 4, -1, 0. Find the increase from -8°C to 6°C.

Worked self-check

-9, -1, 0, 4; increase 14°C.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M02 in Volume 4.

M03. Multiplying and dividing by 10, 100 and 1000

Multiplying by a power of ten changes each digit’s place value. Dividing reverses that change. Zeros may be needed as placeholders. The value changes even if the decimal point is not written. Use estimates to check the direction and size.

Worked example

4.37 × 100 = 437. 52 ÷ 1,000 = 0.052. Multiplication makes a positive number larger; division makes it smaller.

Your turn

Calculate 0.86 × 1,000; 73.5 ÷ 100; 4,200 ÷ 10.

Worked self-check

860; 0.735; 420.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M03 in Volume 4.

M04. Multiplication facts and division links

Use times-table facts to derive related calculations. Multiplication and division are inverse operations. Partition a large number into convenient parts and keep track of remainders in practical division. Check a division by multiplying quotient by divisor and adding any remainder.

Worked example

7 × 8 = 56, so 560 ÷ 7 = 80. For 24 × 15, calculate 24 × 10 + 24 × 5 = 240 + 120 = 360.

Your turn

Calculate 36 × 14; 648 ÷ 8; 95 ÷ 6 with a remainder.

Worked self-check

504; 81; 15 remainder 5. Check: 6 × 15 + 5 = 95.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M04 in Volume 4.

M05. Simple formulae in words

A formula is a rule connecting quantities. Identify what each phrase means and the units needed. Follow the stated order for a one- or two-step rule. Write the numerical substitution before calculating so the method is clear.

Worked example

Hire charge = £12 booking fee + £4 × hours. For 7 hours: 12 + 4 × 7 = £40. The booking fee is charged once.

Your turn

Pay = hours worked × hourly rate. Find pay for 6 hours at £11.50. Hire = £8 + £3 × hours; find cost for 5 hours.

Worked self-check

£69; £23.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M05 in Volume 4.

M06. Squares of numbers

A square is a number multiplied by itself. The notation 12^2 means 12×12, not 12×2. Squares arise in square areas and numerical patterns. Learn common squares and use partitioning for less familiar two-digit values.

Worked example

$13^2 = 13 \times 13 = 169$. A square with side 9 cm has area $9^2 = 81$ cm^2.

Your turn

Find 7^2, 15^2 and 24^2.

Worked self-check

49, 225 and 576.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M06 in Volume 4.

M07. Order of operations

Work out brackets before multiplication and division, then addition and subtraction. Multiplication and division have equal priority and are done left to right. Addition and subtraction also have equal priority. A written line for each stage prevents accidental changes to the expression.

Worked example

$6 + 4 \times 3 = 6 + 12 = 18$. $(6 + 4) \times 3 = 30$. $20 \div 5 \times 2 = 4 \times 2 = 8$.

Your turn

Evaluate $18 - 3 \times 4$ and $(18 - 3) \times 4$.

Worked self-check

6 and 60.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M07 in Volume 4.

M08. Common fractions and mixed numbers

A fraction describes equal parts. The denominator names how many equal pieces form the whole; the numerator counts them. Compare fractions by using equivalent fractions or familiar benchmarks such as one half. A mixed number includes whole units and a fraction.

Worked example

3/4 = 6/8, so 3/4 is greater than 5/8. 1 1/2 is between 1 and 2. To order 1/2, 3/4 and 2/3, use twelfths: 6/12, 9/12, 8/12.

Your turn

Order 1/4, 2/3 and 1/2. Which is greater: 1 1/4 or 1 3/4?

Worked self-check

1/4, 1/2, 2/3; 1 3/4 is greater.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M08 in Volume 4.

M09. Fractions of quantities

To find a fraction of a whole-number quantity, divide by the denominator and multiply by the numerator. Keep the unit. Check whether the fraction is less than one whole, so the answer should be smaller than the original amount.

Worked example

Find 3/8 of 64 kg: one eighth = 64 ÷ 8 = 8 kg; three eighths = 8 × 3 = 24 kg.

Your turn

Find 2/5 of £90 and 3/4 of 48 minutes.

Worked self-check

£36; 36 minutes.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M09 in Volume 4.

M10. Decimals to three places

Read decimals through tenths, hundredths and thousandths. Append zeros to make comparisons easier: 0.7 = 0.700. Compare from the leftmost differing place. Three decimal places describe thousandths; the number of digits alone does not determine size.

Worked example

Order 0.65, 0.605, 0.56: 0.560, 0.605, 0.650. In 3.047 the 4 represents four hundredths.

Your turn

Order 2.09, 2.009 and 2.9. Give the value of 7 in 0.372.

Worked self-check

2.009, 2.090, 2.900; seven hundredths = 0.07.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M10 in Volume 4.

M11. Decimal arithmetic

Align decimal points when adding or subtracting. For multiplication, use a whole-number method then restore place value. For division, multiply both numbers by the same power of ten to make the divisor whole. Level 1 calculation inputs include decimals up to two places.

Worked example

4.75 + 0.8 = 5.55. 3.6 ÷ 0.12 = 360 ÷ 12 = 30. 2.4 × 0.5 = 1.2.

Your turn

Calculate 7.2 - 3.85; 1.25 × 8; 6.4 ÷ 0.8.

Worked self-check

3.35; 10; 8.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M11 in Volume 4.

M12. Rounding and sensible accuracy

Identify the last place to keep and inspect the next digit: 5 or more rounds up, less than 5 stays. Use the requested whole number, one decimal place or two decimal places. Practical rounding may instead require enough whole packs or the number of full groups that fit.

Worked example

8.746 rounds to 9 as a whole number, 8.7 to 1 decimal place and 8.75 to 2 decimal places. A requirement of 3.2 tins means buying 4 tins.

Your turn

Round 12.968 to a whole number, 1 decimal place and 2 decimal places.

Worked self-check

13; 13.0; 12.97.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M12 in Volume 4.

M13. Understanding whole-number percentages

Percent means out of 100. Compare percentages using the same whole. A larger percentage can still represent a smaller amount when the totals differ. Whole-number percentage order is numerical order, but always identify what the percentage refers to.

Worked example

18% = 18 out of 100. 60% is more than half and 25% is a quarter. Order 5%, 45%, 9%: 5%, 9%, 45%.

Your turn

Order 70%, 7%, 17%. Which is greater than one half: 45% or 55%?

Worked self-check

7%, 17%, 70%; 55%.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M13 in Volume 4.

M14. Percentages and simple percentage changes

Build percentages from 10%, 5% and familiar fractions. Level 1 includes simple increases and decreases in multiples of 5%. An increase adds the percentage amount; a decrease subtracts it. State whether you found the change or the final amount.

Worked example

15% of £240 = £24 + £12 = £36. A 15% increase gives £276; a 15% reduction gives £204.

Your turn

Find 35% of £80. Increase £160 by 10%.

Worked self-check

£28; £176.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M14 in Volume 4.

M15. Estimation as a check

Round inputs to convenient nearby values and use them to predict the answer's size. An estimate checks reasonableness; it is not the exact result unless an estimate is requested. Fractions and decimals can be replaced by nearby easy benchmarks.

Worked example

Estimate 19.8 × 5.1 as 20 × 5 = 100. The exact answer is 100.98, so an answer such as 10.098 would be suspicious.

Your turn

Estimate 48.6 × 3.9 and 201 ÷ 4.9.

Worked self-check

About 50 × 4 = 200; about 200 ÷ 5 = 40. Other sensible estimates are acceptable.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M15 in Volume 4.

M16. Equivalent fractions, decimals and percentages

Learn common equivalents and use division for a new fraction. To write a decimal as a percentage, multiply by 100. To write a percentage as a fraction, place it over 100 and simplify. Use a common form when comparing amounts.

Worked example

1/2 = 0.5 = 50%; 1/4 = 0.25 = 25%; 3/4 = 0.75 = 75%; 1/5 = 0.2 = 20%.

Your turn

Convert 2/5 to a decimal and percentage. Write 0.6 as a fraction.

Worked self-check

0.4 and 40%; 6/10 = 3/5.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M16 in Volume 4.

M17. Simple ratio and direct proportion

A ratio compares quantities in equal-sized parts. Simplify by dividing each term by the same number. To share a total, divide it by the sum of the ratio parts. Direct proportion uses the same scale factor for both quantities. Level 1 does not require inverse-proportion methods as core content.

Worked example

Share £120 in ratio 2:3. Five parts; each £24. Shares £48 and £72. A recipe for 4 uses 300 g; for 10 it uses 300 ÷ 4 × 10 = 750 g.

Your turn

Share 84 in ratio 3:4. Five notebooks cost £7.50; find cost of 8 at the same rate.

Worked self-check

36 and 48; £12.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M17 in Volume 4.

M18. Simple interest

Simple interest is calculated on the original amount every year. Interest = starting amount × annual rate × number of years. For Level 1, rates include multiples of 5%. Distinguish the interest earned from the final balance. Teaching rates are supplied assumptions, not product recommendations.

Worked example

£600 at a stated simple rate of 5% per year for 3 years earns £30 each year, so interest = £90 and final balance = £690.

Your turn

Find simple interest and final balance for £800 at 10% per year for 2 years.

Worked self-check

£80 per year; £160 interest; £960 final balance.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M18 in Volume 4.

M19. Discounts and final prices

Calculate the discount as a percentage of the stated original price, then subtract it. Rates at Level 1 include multiples of 5%. Read whether the reduction applies to every item or only selected products. Do not subtract a percentage number as though it were pounds.

Worked example

A £72 jacket has 25% off. Discount = 72 ÷ 4 = £18. Sale price = £54. Two identical jackets at that price cost £108.

Your turn

Find the sale price of a £140 item after 15% off.

Worked self-check

10% = £14 and 5% = £7; discount £21; sale price £119.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M19 in Volume 4.

M20. Metric units, money and time

Use conversions within the same system: 1 km = 1,000 m; 1 m = 100 cm; 1 kg = 1,000 g; 1 litre = 1,000 ml; £1 = 100p. An hour has 60 minutes, not 100. Choose consistent units before calculating.

Worked example

2.4 kg = 2,400 g; 750 ml = 0.75 litres. From 09:45 to 12:10 is 2 h 25 min. 1 h 30 min = 1.5 h.

Your turn

Convert 3.6 m to cm; 1,250 ml to litres; £4.08 to pence. Find time from 22:50 to 01:15 next day.

Worked self-check

360 cm; 1.25 litres; 408p; 2 h 25 min.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M20 in Volume 4.

M21. Simple scales on maps and drawings

A scale relates a drawing length to an actual distance. Keep the stated drawing and real units clear. If 1 cm represents 2 m, multiply centimetres by 2 to obtain metres. To draw from actual measurements, reverse the calculation. Check printing size before measuring any supplied diagram.

Worked example

At 1 cm : 5 m, a 7 cm path represents 35 m. A 20 m wall should be drawn as 4 cm at this scale.

Your turn

At 1 cm : 2 m, a room is 6 cm by 4 cm on a plan. Find actual dimensions.

Worked self-check

12 m by 8 m.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M21 in Volume 4.

M22. Area and perimeter of rectangles and composites

Perimeter is the total outside length. Area measures the surface inside a shape. Rectangle area = length × width; perimeter = 2(length + width). For a composite made from rectangles, split into non-overlapping pieces or subtract a missing rectangle. Include every outside edge for perimeter.

Worked example

An 8 m by 5 m rectangle has area 40 m² and perimeter 26 m. Remove a 3 m by 2 m corner: remaining area = 40 - 6 = 34 m².

Your turn

Find area and perimeter of a 7 m by 4 m rectangle. A 10 m by 6 m floor has a 2 m by 3 m corner removed; find remaining area.

Worked self-check

28 m² and 22 m; remaining area 60 - 6 = 54 m².

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M22 in Volume 4.

M23. Volume of cubes and cuboids

Volume measures three-dimensional space. Cuboid volume = length × width × height; cube volume = side × side × side. Use one unit for all dimensions and express volume in cubic units. Count complete boxes that fit using their dimensions when a packing problem supplies them; volume alone may not prove a layout works.

Worked example

A box 8 cm by 5 cm by 4 cm has volume 160 cm^3. A cube of side 3 cm has volume 27 cm^3.

Your turn

Find volume of a 6 × 4 × 2 cm cuboid and a cube of side 5 m.

Worked self-check

48 cm^3; 125 m^3.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M23 in Volume 4.

M24. Drawing shapes, symmetry and angle size

Draw shapes with the stated dimensions, using a ruler and protractor where needed. A line of symmetry divides a shape into matching mirror halves. Acute angles are below 90°, a right angle is 90°, obtuse angles lie between 90° and 180°, and a straight angle is 180°.

Worked example

A non-square rectangle has two lines of symmetry through the midpoints of opposite sides. A square has four. An angle of 120° is obtuse.

Your turn

Draw a 6 cm by 3 cm rectangle and mark its symmetry lines. Classify 35°, 90° and 145°.

Worked self-check

Two symmetry lines through the centre, parallel to its sides. Acute, right and obtuse respectively.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M24 in Volume 4.

M25. Plans, elevations and nets

A plan looks from above. Front and side elevations look straight at a solid from stated directions. A net folds into the solid without overlapping faces. Match face sizes and count faces. Do not add perspective diagonals to a straight-on front view.

Worked example

For a cuboid 6 cm wide, 4 cm deep and 3 cm high: plan 6 × 4, front 6 × 3, side 4 × 3. A closed cube needs six equal square faces in its net.

Your turn

Give plan, front and side dimensions for a cuboid 5 wide, 2 deep and 4 high.

Worked self-check

Plan 5 × 2; front 5 × 4; side 2 × 4.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M25 in Volume 4.

M26. Measuring angles and describing direction

Put the protractor centre on the angle vertex and align its baseline with one arm. Read the scale that starts at zero on that arm. Estimate the angle type first to select the correct scale. Direction can be described through turns: quarter turn 90°, half turn 180°, full turn 360°.

Worked example

An angle looks obtuse, so a protractor reading of 125° is plausible; 55° on the opposite scale is not. Facing north, a clockwise quarter turn faces east.

Your turn

How many degrees are in three quarter turns? Starting east, which direction follows a clockwise half turn?

Worked self-check

270°; west.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M26 in Volume 4.

M27. Discrete data in tables and charts

Discrete data are counts or separate values. Use a table to organise them, a bar chart for categories, a line graph for changes over ordered time, or a pie chart for parts of a whole. Label the title, axes, units and scale. For a pie chart, angle = frequency ÷ total × 360°.

Worked example

Out of 40 journeys, 10 are by car. Car share = 1/4 and pie angle = 90°. A bar chart can compare walk, bus and car counts without converting to angles.

Your turn

A survey records walk 8, bus 12 and car 20. Find pie angles and name a suitable chart for counts.

Worked self-check

72°, 108°, 180°; a bar chart.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M27 in Volume 4.

M28. Grouping discrete data

Choose non-overlapping classes that cover every value. Tally each observation once, check the total frequency and draw equal-width bars for equal-width groups. Keep the interval labels precise: for whole-number counts, 0-4 and 5-9 do not overlap. Do not calculate an estimated grouped mean as a Level 1 core requirement.

Worked example

Data 0,2,4,5,6,8,9,11 grouped 0-4,5-9,10-14 give frequencies 3,4,1. Total frequency 8 matches the data count.

Your turn

Group 1,3,4,6,6,7,10,12,14 into 0-4, 5-9 and 10-14.

Worked self-check

Frequencies 3,3,3; total 9.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M28 in Volume 4.

M29. Mean and range

The mean is the total divided by the number of observations. The range is the maximum minus minimum and describes spread. Do not divide by the largest value. Explain the units and what a lower or higher result means in context. Mean and range describe different aspects of a data set.

Worked example

Times 4,6,7,7,11 minutes have total 35, count 5, mean 7 minutes and range 7 minutes. Equal numerical values here do not mean the statistics represent the same thing.

Your turn

Find mean and range of 3,5,8,8.

Worked self-check

Total 24; mean 6; range 8 - 3 = 5.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M29 in Volume 4.

M30. Probability scale and likelihood

Probability runs from 0 for impossible to 1 for certain. An even chance is 1/2. Compare probabilities on the same scale. A larger probability means more likely, not guaranteed. An experimental result describes what happened and does not force the next outcome.

Worked example

A fair coin has probability 1/2 of heads. A probability of 3/4 is more likely than 1/4. A chance of 0 means an event cannot occur under the stated model.

Your turn

Order 0, 1/2, 1/4, 1 from least to most likely. Which represents certainty?

Worked self-check

0, 1/4, 1/2, 1; certainty is 1.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M30 in Volume 4.

M31. Simple equally likely outcomes

For equally likely outcomes, probability = number of favourable outcomes divided by total outcomes. Count every outcome once and simplify the fraction if possible. Check that the favourable count is included in the total. Do not use this rule without considering whether outcomes really are equally likely.

Worked example

A fair die has six equally likely faces. The chance of an even number is 3/6 = 1/2. A bag with 3 red and 5 blue counters has P(red) = 3/8 for one random draw.

Your turn

A bag contains 4 green, 2 yellow and 6 white counters. Find P(yellow) and P(not white).

Worked self-check

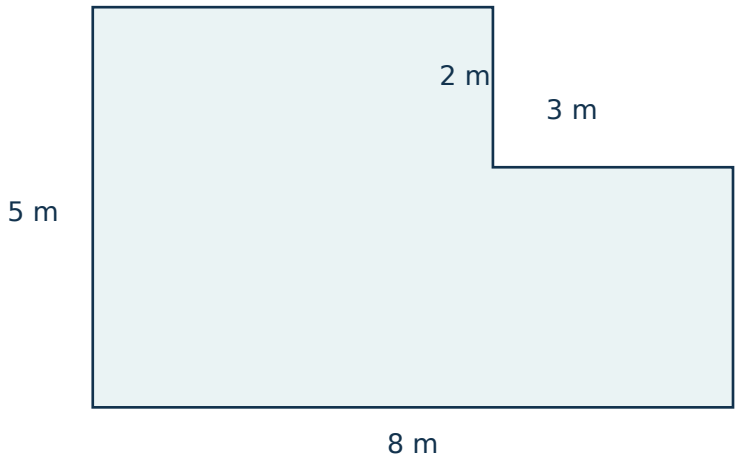
2/12 = 1/6; 6/12 = 1/2.

Explain and check

State the unit where one is needed. Explain why the chosen operation fits the question, then check with an estimate, an inverse calculation, a diagram or the original constraint.

For a targeted fresh retest, use Diagnostic M31 in Volume 4.

Visual atlas: composite area



Outer rectangle

8 m × 5 m

Removed corner

3 m × 2 m

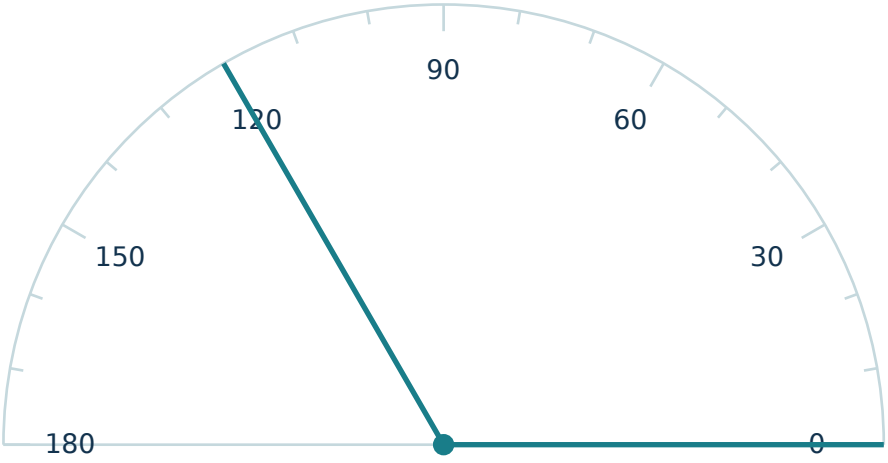
Split the shape into non-overlapping rectangles or subtract the removed corner. Area = 8 × 5 - 3 × 2 = 34 m². For perimeter, trace the outside only: 8 + 3 + 3 + 2 + 5 + 5 = 26 m. The diagram is labelled for calculation, not scale measurement.

Practice

Covering this floor with packs of 2 m² needs 17 packs before any waste allowance. At £14 per pack, cost = £238. If a question gives a waste allowance, include it before selecting a sufficient pack count.

Visual atlas: measuring angles

Align zero on the right-hand arm. The other arm reaches 120°.



The baseline is aligned with the right-pointing arm. Read from its zero to the second arm. The result is obtuse, so 120° fits the visual estimate; 60° on the opposite scale would not.

Direction check

Quarter turn = 90°; half turn = 180°; three-quarter turn = 270°; full turn = 360°. Starting north, a clockwise quarter turn faces east. Starting west, a clockwise half turn faces east.

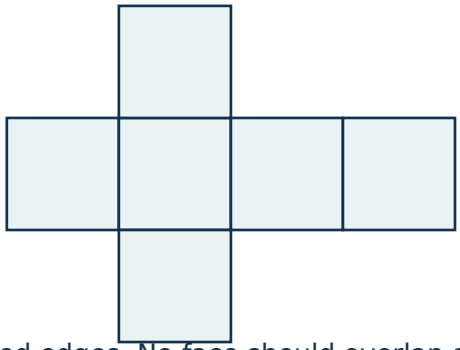
Independent task

Draw angles of 40°, 90° and 130° using a ruler and protractor. Label the vertex and angle size. Check that your first is acute, second right and third obtuse.

Visual atlas: cube net and solid views

A valid cube net: six equal squares

Four in a row, with one above and one below the second square.



Fold along shared edges. No face should overlap another.

The net has six equal square faces and folds to make a closed cube. A plan and elevation are different: they show views rather than a fold-out pattern.

Worked views

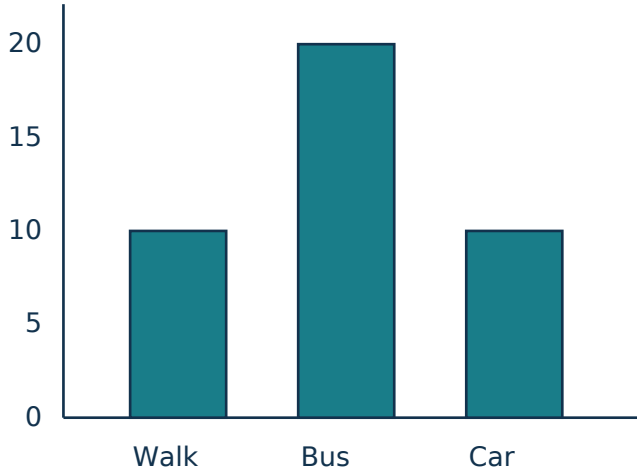
A cuboid 6 units wide, 4 deep and 3 high has plan 6 × 4, front elevation 6 × 3 and side elevation 4 × 3. Front means the stated viewing direction. Do not include depth diagonals in a straight-on front view.

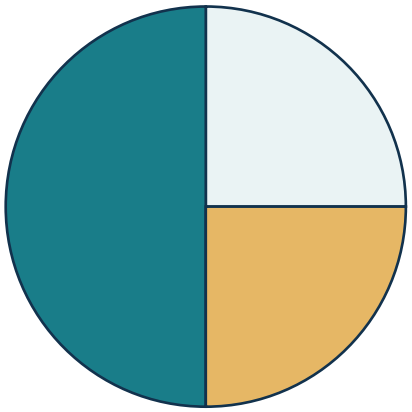
Practice

Sketch a cuboid and label width, depth and height. Then draw its three straight-on views. A plan on its own does not give the height.

Visual atlas: bar charts and pie charts

Travel survey: walk 10, bus 20, car 10





Pie angles: 90°, 180°, 90°

The bus count is half the total: 20/40, so its pie angle is 180°. Walk and car are each 10/40, so each has 90°. The bars show the same category comparison using counts. Neither chart shows how travel changed over time.

Line graphs

Use a line graph for an ordered time series, for example daily attendance of 12, 15, 14, 18 and 16 from Monday to Friday. Put time on the horizontal axis and number attending on the vertical axis; plot the five values accurately.

Check the display

Label both axes, use a consistent scale and explain what each bar, point or sector represents. Look for an axis starting above zero or missing categories before drawing a conclusion.

Straightforward problems and revision

Stage	What to record
Read	Requested quantity, useful data and constraints
Choose	The operation or relationship needed
Calculate	Labelled working, with consistent units
Check	Estimate, inverse or direct check against the requirement
Explain	A sentence answering the practical question

Worked example

A group of 15 pays £8 each for admission and £95 for travel. Total = 15 × 8 + 95 = £215. With a £230 budget, the trip is affordable and £15 remains. The answer includes the cost and the decision.

Revision sequence

Practise number and written methods first, followed by fractions/decimals/percentages and ratio. Then measures, time, shape and scale. Finish with data and probability, keeping linked problem practice throughout. Retest a repaired weakness after two days and again a week later.

Bridge to Level 2

Reverse percentages, compound interest, inverse proportion, circle/cylinder formulae, grouped-mean estimation, combined-event probability and scatter correlation belong to the Level 2 content expansion. Secure this Level 1 course before moving on.

Sources and edition notes

Sources checked on 13 November 2026. Use the current official specification and booking instructions for your qualification and assessment mode. Dates and formats below are an evidence snapshot.

[MDFE] DfE: mathematics subject content, updated November 2024

Open source document

[MOFQ] Ofqual: mathematics conditions and requirements, May 2024

Open source document

[MP] Pearson: Level 1/2 mathematics specification; Level 1 structure p7

Open source document

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