Three forms of a line

The same line can be written in point–slope, slope–intercept or general form.

Write the line through (2, 5) with slope 3 in all three forms.

$y-5=3(x-2)$	Substitute into $y - y_1 = m(x - x_1)$.
$y-5=3x-6$	Expand the bracket.
$y=3x-1$	Add 5 to write slope–intercept form.

$3x-y-1=0$

Remember

General form is $ax + by + c = 0$. For the coordinate geometry formulas, see the Formulae and Tables reference in the coordinate chapters.

Ordered stem-and-leaf plots

Put the leaves in order, repeat duplicate values, and include a key.

A leaves	Stem	B leaves
7 4 2	1	3 5 5
4 1	2	2 6

Compare A: 12, 14, 17, 21, 24 and B: 13, 15, 15, 22, 26.

$\text{Median A} = 17$	The third of the five ordered values.
$\text{Median B} = 15$	The repeated 15 must appear twice.
$\text{Range A} = 24 - 12 = 12$	Subtract the smallest value from the largest.

$$\text{Range B} = 26 - 13 = 13$$

Remember

In a back-to-back plot, read the left leaves from the stem outwards. Key: stem 1 and leaf 7 mean 17.

Counting choices and independent events

Multiply the number of choices at each stage when every choice in the first stage can pair with every choice in the next.

A fair coin and a fair six-sided die are used. Find the probability of tails and a die score above 4.

$2\times6=12$	There are 12 equally likely outcomes.
$\{(T,5),(T,6)\}$	These are the two successful outcomes.

$$\frac{2}{12}=\frac{1}{6}$$

Remember

A two-way table can show independent events; use a tree when later probabilities depend on earlier outcomes.

Parallel cuts and areas

A line parallel to one triangle side creates a similar smaller triangle.

D is on AB and E is on AC. DE is parallel to BC. AD = 4, DB = 2 and AE = 6. Find EC.

$\frac{AD}{DB}=\frac{AE}{EC}$	The parallel cut divides the two sides in the same ratio.
$\frac{4}{2}=\frac{6}{EC}$	Substitute the known lengths.
$EC=3$	

Remember

Parallelogram area is base × perpendicular height. A triangle with that same base and height has half the area.

Symmetry and central symmetry

Axial symmetry is a reflection in a line. Central symmetry is a half-turn about a point.

Find the image of A(4, 0) under central symmetry about C(1, 2).

$A - C = (4-1, 0-2) = (3, -2)$	Find the move from the centre to A.
$A' = C - (3, -2) = (-2, 4)$	Go equally far in the opposite direction.

$A' = (-2, 4)$

Remember

The centre is the midpoint of A and its image. A non-square rectangle has two reflection axes and half-turn symmetry.

Comparing changes in context

An absolute comparison uses subtraction; a relative comparison compares to a starting value.

Class A goes from 10 to 15. Class B goes from 20 to 26. Which increases more?

$15-10=5, \quad 26-20=6$	B has the larger absolute increase.
$\frac{5}{10}\times 100=50, \quad \frac{6}{20}\times 100=30$	A has the larger percentage increase.

Absolute: B. Relative: A.

Remember

State which comparison you mean. If two graphs use different scales, compare their values rather than their visual steepness.

Line plots and misleading displays

A line plot shows frequency using marks over a number line. A time-series graph has time on the horizontal axis.

The values are 1, 2, 2, 4, 4, 4. Find the mode and range.

$f(1)=1,\quad f(2)=2,\quad f(4)=3$	Count how many times each value appears.
$4-1=3$	Range is the largest value minus the smallest.

Mode 4, range 3

Remember

An axis starting above zero can exaggerate differences on a bar chart. Check scale, labels and sample size before interpreting a display.

Make a conjecture, then test it

Examples can suggest a rule. An argument explains why it always works. A counterexample can show a rule is false.

Is the sum of two consecutive odd whole numbers always a multiple of 4?

$3+5=8, \quad 5+7=12$	Two examples suggest that it is.
$(2n+1)+(2n+3)=4n+4$	Write two consecutive odd numbers in general form.
$4n+4=4(n+1)$	Factor out 4.

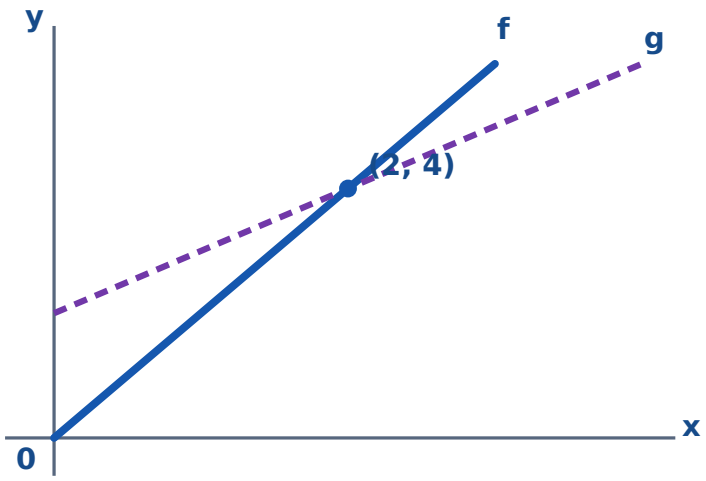
Yes, the sum is a multiple of 4.

Remember

A single counterexample disproves an “always” claim. For instance, 3 + 7 = 10 shows that two odd numbers need not sum to a multiple of 4 if they are not consecutive.

Read an inequality from two graphs

Compare the heights of the two graphs at the same x.



Blue: f(x) = 2x. Purple: g(x) = x + 2. The blue graph is lower to the left of the crossing.

For f(x) = 2x and g(x) = x + 2, use the graph to find where f(x) is below g(x).

$2x = x + 2 \Rightarrow x = 2$	The graphs meet at (2, 4).
$f(0) = 0, \quad g(0) = 2$	On the left of the crossing, the blue graph is lower.

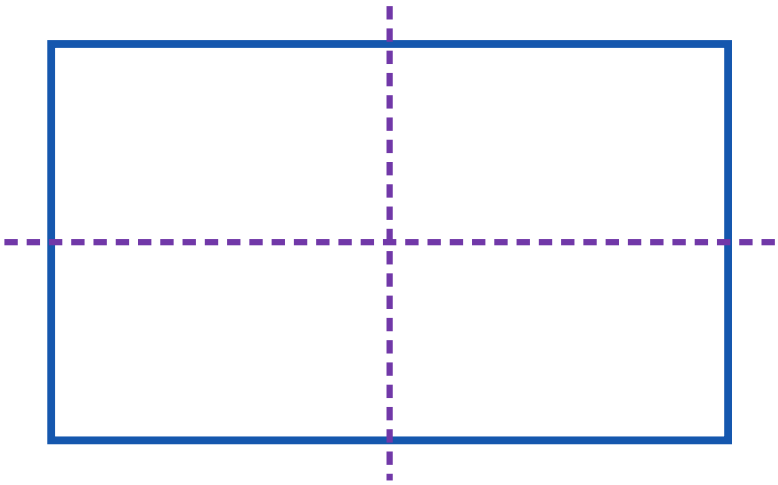
$x < 2$

Remember

Do not include x = 2 for a strict inequality. The answer is a set of x-values, not a shaded region in the coordinate plane.

Draw axes of symmetry

An axis is a line you can fold along so that the two halves match exactly.



The dashed horizontal and vertical lines pass through the centre.

Draw every axis of symmetry of a rectangle that is not a square.	
Left half matches right half.	Draw one line vertically through the centre.
Top half matches bottom half.	Draw one line horizontally through the centre.
Two axes of symmetry.	

Remember

A diagonal of a non-square rectangle does not fold one half onto the other.

Course Review

Try the questions before opening the separate answer key. Show one step per line.

28.1 · Fluency

Plan A rises from €35 to €42. Plan B rises from €80 to €92. Compare absolute and relative rises.

28.2 · Variation

Prove that two consecutive even integers add to a number two more than a multiple of four.

28.3 · Choose a method

A 1 : 25,000 map shows 9 cm between two places. A walker covers that distance in 45 minutes. Estimate the average speed and state an assumption.

Check your work: are the sign, units and level of accuracy appropriate?