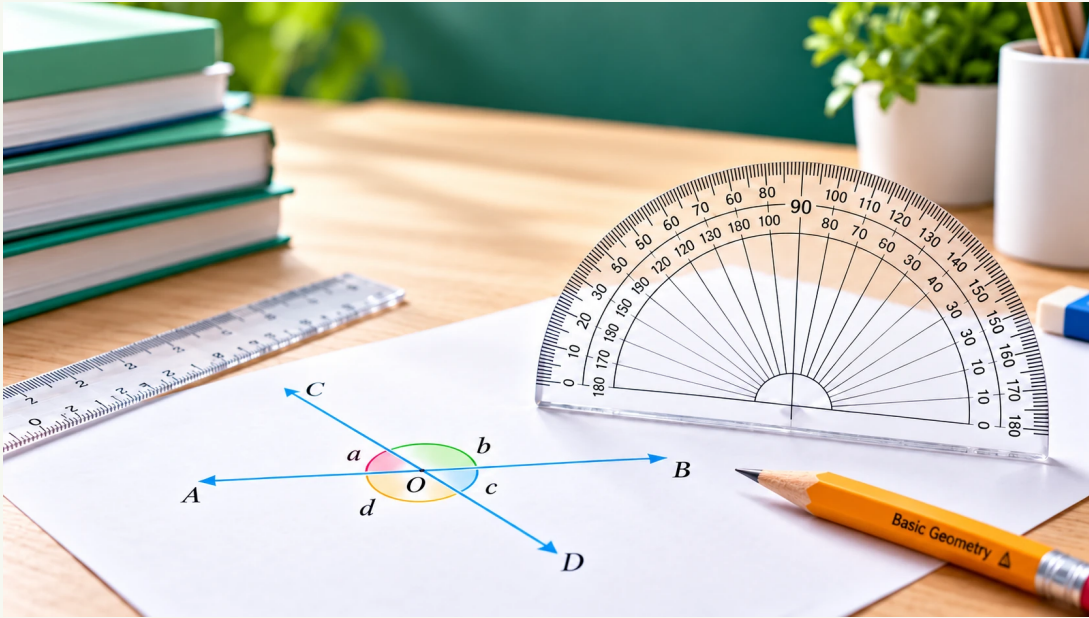


Basic Geometry - Practice Workbook

10.1 Geometrical concepts • 10.2 Intersecting lines • 10.3 Parallel lines



Chapter learning outcomes

- Recognise lines, rays, line segments and angle types.
- Name and measure angles; draw angles using a protractor.
- Apply angle facts at a point, on a line and at intersections.
- Use corresponding, alternate and interior angle properties.
- Explain each answer using a clear mathematical reason.

How to use this workbook

Follow the concept cards and worked examples in lesson order.

Try the exercises before checking the answers in the final workbook.

For geometry, write the angle property beside each calculation.

Lines, rays and naming angles

Mapped to the approved Chapter 10 HTML: "1. Naming an angle"

A Key ideas: line, ray and segment

A line extends in both directions. A ray starts at one endpoint.

A line segment has two endpoints. Two rays meeting form an angle.

Line



Ray



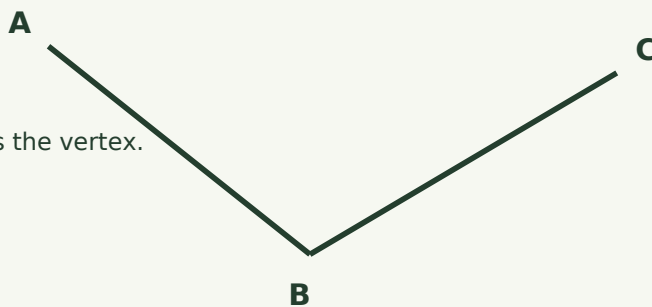
Segment



B How to read an angle

$\angle ABC$ has vertex B.

The middle letter identifies the vertex.
Its arms are BA and BC.



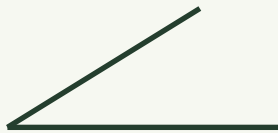
Check your understanding

1. What is the difference between a line and a line segment?
2. In $\angle ABC$, which letter represents the vertex?
3. Draw ray PQ and line segment RS. Label all points.

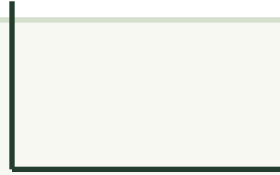
Recognising and measuring angles

Mapped to the HTML cards: angle types and protractor method

C Classifying angles



Acute angle



Right angle



Obtuse angle



Straight angle

Measuring and drawing angles with a protractor

1. Place the protractor centre exactly on the vertex.
2. Align one ray with the 0° baseline of the appropriate scale.
3. Read the scale starting from 0° on that arm.
4. Check whether the result is acute or obtuse.
5. To draw an angle, mark its degree value and draw the second ray.

Worked method: measuring 60°

When one ray aligns with 0° , the second meets 60° on that scale.

Do not read 120° from the opposite scale: the drawn angle is acute.

Check the protractor centre, baseline and chosen scale.

Complementary and supplementary angles

Mapped to the HTML worked examples in “2. Measuring and drawing angles”

D Two essential relationships

Complementary angles add to 90° .

Supplementary angles add to 180° .

Check the total before deciding which relationship applies.

Worked example 1 • Complementary

Given $\angle ABD = 34^\circ$ and $\angle ABC = 90^\circ$, find $\angle DBC$.

$\angle DBC = 90^\circ - 34^\circ = 56^\circ$ (complementary angles).

Worked example 2 • Supplementary

Given $\angle PQR = 117^\circ$ and $\angle RQS$ is its supplement, find $\angle RQS$.

$\angle RQS = 180^\circ - 117^\circ = 63^\circ$.

E Guided practice

4. An angle is 28° . Find its complement.
5. An angle is 143° . Find its supplement.
6. Two angles on a straight line are x° and 68° . Find x .
7. Draw and label a 75° angle using a protractor.
8. Explain why a 110° angle cannot have a complement.

Angles on lines and at a point

Matches the approved HTML teaching card: "3. Straight lines, angles at a point..."

A Three essential angle rules

Angles on a straight line sum to 180° .

Angles around a point sum to 360° .

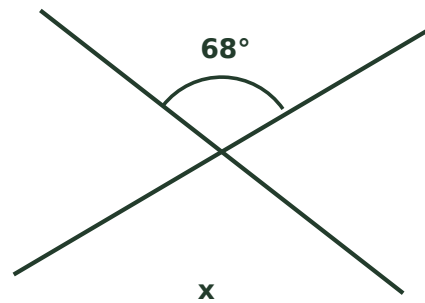
Vertically opposite angles are equal.

B Worked examples: choose the correct property

Example 1 • Vertically opposite angles

If one angle is 68° , the opposite angle $x = 68^\circ$.

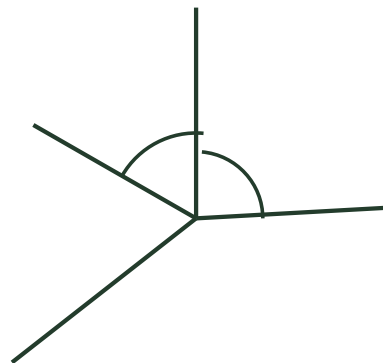
Reason: vertically opposite angles.



Example 2 • Angles around a point

Angles at a point are 95° , 110° , 70° and x .

$x = 360^\circ - (95^\circ + 110^\circ + 70^\circ) = 85^\circ$.



Check your reasoning

Which rule applies? Write it before substituting values.

When an unknown occurs twice, form an equation first.

Intersecting-line practice

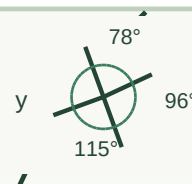
Independent practice • State a reason for each calculation

Practice B / Straight lines, points and intersections

1. Angles on a straight line are 73° and x° . Find x .



2. Angles around a point are 78° , 96° , 115° and y° . Find y .



3. Two straight lines intersect. One angle is 127° . Find the vertically opposite angle.



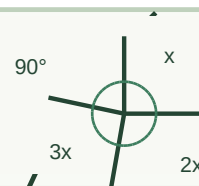
4. At an intersection, one angle is 56° . Find both adjacent angles.



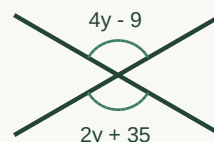
5. Two adjacent angles on a straight line are $(3x + 5)^\circ$ and $(2x + 25)^\circ$. Find x .



6. Angles around a point are x° , $2x^\circ$, $3x^\circ$ and 90° . Find x .



7. A pair of vertically opposite angles are $(4y - 9)^\circ$ and $(2y + 35)^\circ$. Find y .



8. Explain why vertically opposite angles are equal using straight-line angle facts.



Parallel lines and transversals

Corresponding angles • Alternate angles • Interior angles

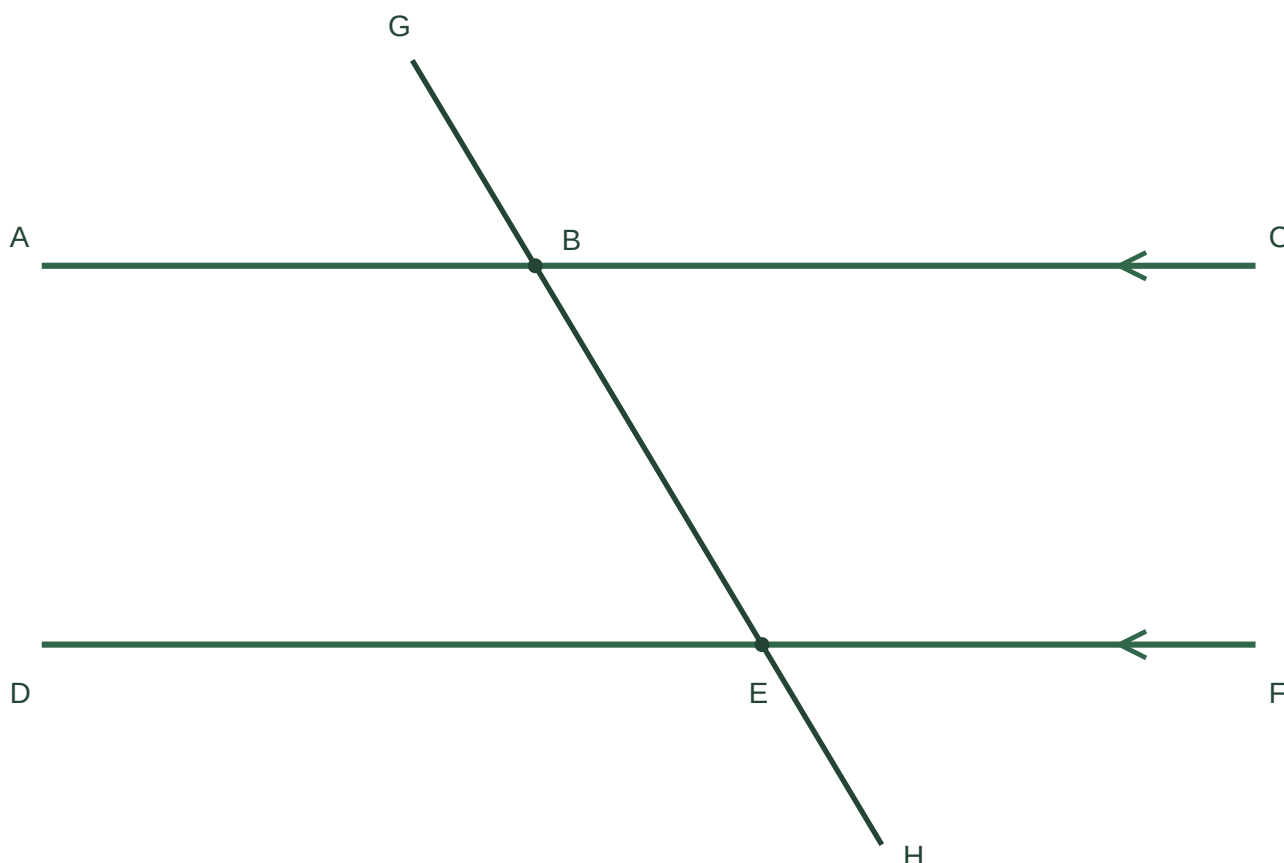
A Three angle properties

Corresponding angles are equal.

Alternate angles are equal.

Interior angles on the same side add up to 180° .

Diagram: AC is parallel to DF; G, B, E and H are collinear.



B Name the angle relationships

Corresponding: $\angle GBC = \angle BEF$

Alternate: $\angle CBE = \angle DEB$

Interior: $\angle ABE + \angle DEB = 180^\circ$

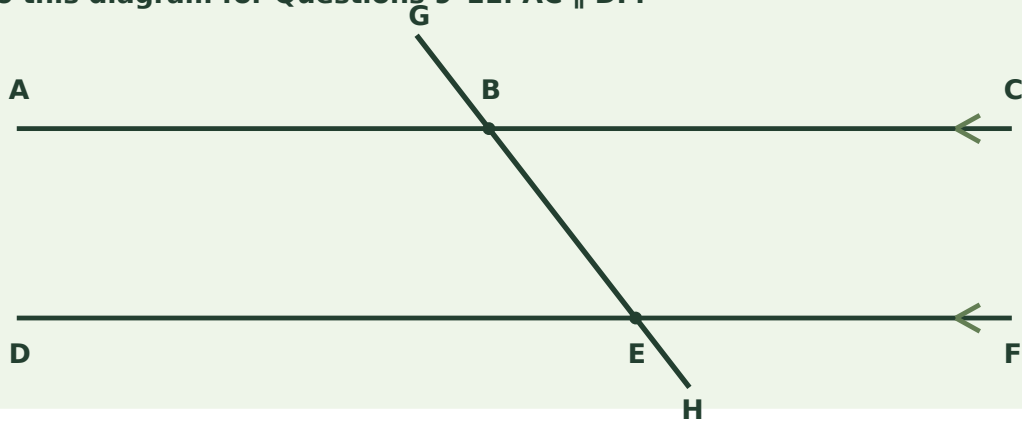
The vertex is always the middle letter of a named angle.

Parallel-line practice

Use proper angle notation and state the geometrical reason.

Practice C • Corresponding, alternate and interior angles

Refer to this diagram for Questions 9–11. $AC \parallel DF$.

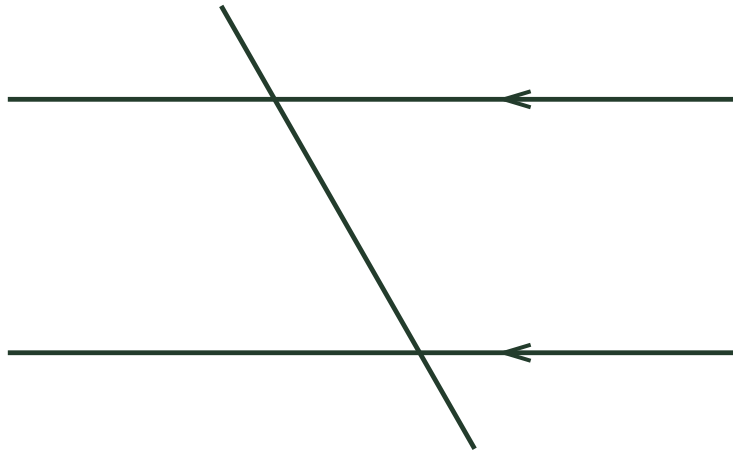


9. If $\angle GBC = 112^\circ$, find $\angle BEF$. Name the angle property.
10. If $\angle CBE = 64^\circ$, find $\angle DEB$. Name the angle property.
11. If $\angle ABE = 118^\circ$, find $\angle DEB$. Give the reason.
12. Corresponding angles are $(2x + 7)^\circ$ and 91° . Find x .
13. Alternate angles are $(5y - 20)^\circ$ and $(3y + 18)^\circ$. Find y .
14. Interior angles are $(3x + 12)^\circ$ and $(2x + 48)^\circ$. Find x .
15. Explain why interior angles on the same side add to 180° .
16. Draw parallel lines and a transversal. Name corresponding and alternate angles.

Multi-step geometry reasoning

Follows HTML card: “5. Multi-step geometry reasoning”

A Worked example: a zigzag between parallel lines



Strategy:

1. Mark the known angles and the parallel lines.
2. Draw a short auxiliary line parallel to the given lines if helpful.
3. Split the unknown angle into angles related to the transversal.
4. Write a reason next to each equality.

B Worked example: combining two properties

At an intersection, angle A is 112° . Its adjacent angle B is

$180^\circ - 112^\circ = 68^\circ$ (angles on a straight line).

Angle C opposite B is 68° (vertically opposite angles).

The answer is not just 68° : each step needs its reason.

Chapter review: explain your steps

Questions 17–24 • Name the angle property used at each step

Independent practice

17. An angle is complementary to 37° . Find the angle.



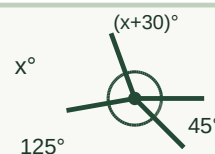
18. An angle is supplementary to 128° . Find the angle.



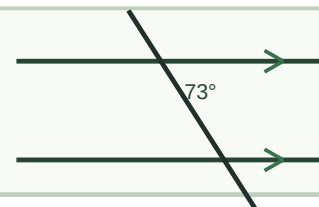
19. Two intersecting lines form one angle of 143° . Find the other three angles.



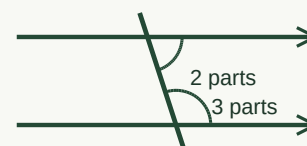
20. Angles around a point are 45° , 125° , x° and $(x + 30)^\circ$. Find x .



21. Parallel lines have a transversal. An alternate angle is 73° . Find its equal partner.



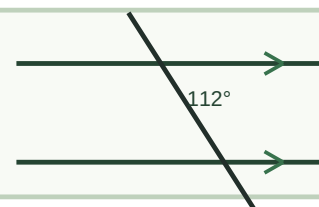
22. Two interior angles on the same side are in the ratio 2 : 3. Find both angles.



23. A straight-line pair has angles $(4x - 10)^\circ$ and $(2x + 22)^\circ$. Find x and both angles.



24. A corresponding angle is 112° . Find its adjacent angle and explain the rules used.



Answer key and short reasons

Check your calculation and geometrical reason.

Section 10.2 • Intersecting lines

1. 107° — angles on a straight line add to 180° .
2. 71° — angles around a point add to 360° .
3. 127° — vertically opposite angles are equal.
4. 124° each — adjacent angles on a straight line.
5. $x = 30$ — $3x + 5 + 2x + 25 = 180$.
6. $x = 45$ — $x + 2x + 3x + 90 = 360$.
7. $y = 22$ — vertically opposite angles are equal.
8. Both angles share the same supplement.

Section 10.3 • Parallel lines

9. 112° — $\angle GBC = \angle BEF$ (corresponding angles).
10. 64° — $\angle CBE = \angle DEB$ (alternate angles).
11. 62° — $\angle ABE + \angle DEB = 180^\circ$ (interior angles).
12. $x = 42$ — $2x + 7 = 91$ (corresponding).
13. $y = 19$ — $5y - 20 = 3y + 18$ (alternate).
14. $x = 24$ — $(3x + 12) + (2x + 48) = 180$ (interior).
15. Use an alternate-angle equality, then angles on a straight line.
16. Accept correctly named angle pairs and parallel-line markings.

Mixed revision answers

Questions 17–24 • State a reason at each step.

Mixed revision answer key

17. 53° — complementary angles total 90° .
18. 52° — supplementary angles total 180° .
19. 143° , 37° , 37° — vertically opposite and straight-line angles.
20. $x = 80 - 45 + 125 + x + (x + 30) = 360$.
21. 73° — alternate angles are equal.
22. 72° and 108° — interior angles total 180° .
23. $x = 28$; the angles are 102° and 78° .
24. 68° — corresponding angles are equal; adjacent angles total 180° .

Final self-check

- Did you name the geometrical angle property?
- Did you check the given parallel-line markings?
- Is the value sensible for the labelled angle?

Section 10.1 — Answers and guidance

Check your understanding and guided practice

1. A line continues endlessly in both directions; a segment has two endpoints.
2. B is the vertex of angle ABC.
3. Check that ray PQ begins at P and passes through Q;

segment RS has endpoints R and S.
4. $62^\circ - 90^\circ$ minus 28° .
5. $37^\circ - 180^\circ$ minus 143° .
6. 112° — angles on a straight line sum to 180° .
7. The drawn angle must measure 75° from the correct protractor scale.
8. Complementary angles total 90° ; 110° already exceeds 90° .