JUNIOR CYCLE MATHS · FREE REVISION SHEET

Lines, angles & triangles

↗ Léim

Learning outcomes (2018 specification): GT.3b, GT.3c. Play the game: **leim.ie/angle-chase.html**

1. Angle words

Acute < 90° · **right angle** = 90° (little square) · **obtuse** between 90° and 180° · **straight angle** = 180° · **reflex** between 180° and 360°.

∠ABC is the angle at **B**: the middle letter is the **vertex**.

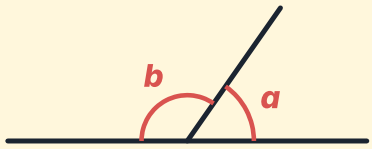
Parallel lines never meet (arrows) · **perpendicular** lines meet at 90° · a **transversal** cuts across other lines · a **line segment** has two end points; a **ray** goes on forever one way.

2. Triangles

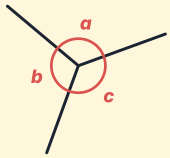
By sides: scalene (all different) · isosceles (two equal, marked with dashes) · equilateral (all equal, every angle 60°).

By angles (look at the biggest): acute-angled (all < 90°) · right-angled (one = 90°) · obtuse-angled (one > 90°).

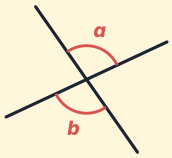
3. The angle facts (learn the names: they are your reasons)



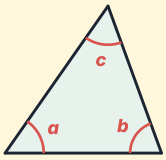
Angles on a straight line add to 180°
a + b = 180°



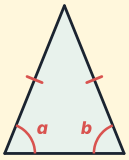
Angles at a point add to 360°
a + b + c = 360°



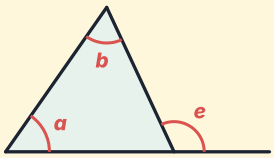
Vertically opposite angles are equal (Theorem 1)
a = b



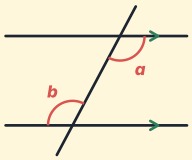
Angles in a triangle add to 180° (Theorem 4)
a + b + c = 180°



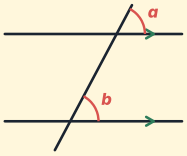
Isosceles triangle: base angles are equal (Theorem 2)
a = b



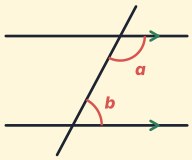
Exterior angle = sum of the two interior opposite angles (Theorem 6)
e = a + b



Alternate angles are equal (Theorem 3)
a = b



Corresponding angles are equal (Theorem 5)
a = b



Co-interior angles add to 180°
a + b = 180°

4. How to chase an angle

Mark what you know. Find a fact that joins a known angle to an unknown one. Write each step on its own line **with the reason**: *y = 180° − 72° = 108° (straight line)*. Keep going until you reach the angle you want. Check that each triangle adds to 180°.

Exam tip: the reason earns marks. Write **alternate** and **corresponding**, never "Z" or "F". Exam diagrams usually aren't drawn to scale, so don't measure: use the facts.

PRACTICE · 34 QUESTIONS

Have a go

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A. Angle words

1. What type of angle is 35°? _____
2. What type of angle is 147°? _____
3. What type of angle is 215°? _____
4. A triangle has angles of 90°, 36° and 54°. Is it acute-angled, right-angled or obtuse-angled? _____
5. A triangle has sides of 7 cm, 7 cm and 4 cm. Is it scalene, isosceles or equilateral? _____
6. In ∠KLM, which point is the vertex? _____

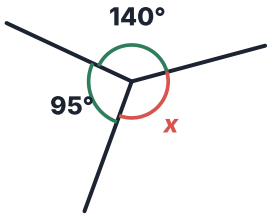
B. Find x and give the reason

7.



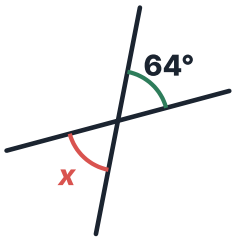
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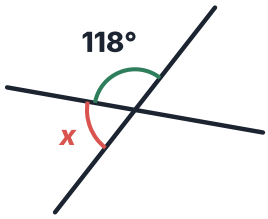
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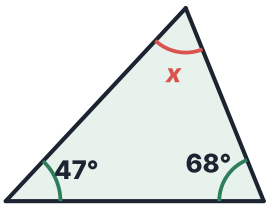
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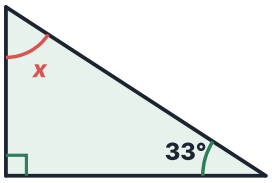
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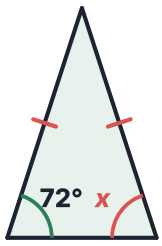
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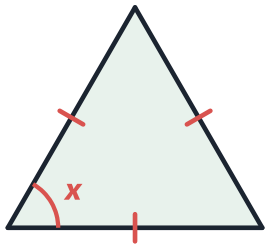
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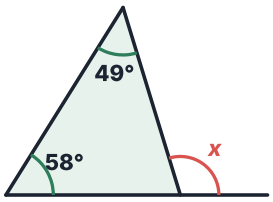
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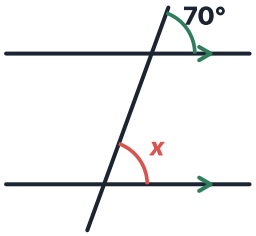
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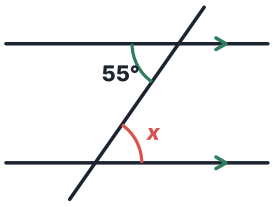
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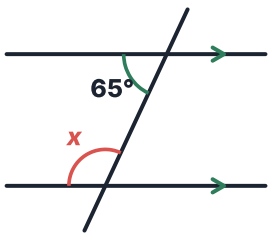
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17.



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18.



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C. Triangles and angles

19. Could a triangle have angles of 100° and 85°? Explain. _____
20. Two angles of a triangle are 42° and 75°. Find the third angle. _____
21. An isosceles triangle has an apex angle of 38°. Find each base angle. _____
22. An isosceles triangle has base angles of 66°. Find the apex angle. _____
23. Three angles at a point are 150°, 85° and x. Find x. _____
24. How many degrees are in each angle of an equilateral triangle? Why? _____

Questions 25–34 are on the next page.

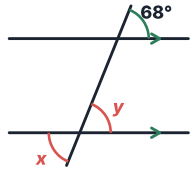
TWO-STEP CHASES · EXAM-STYLE · ANSWERS

Chase it, then check

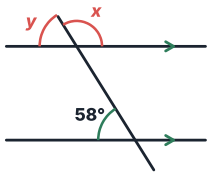
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D. Two-step chases: find y (and z) first, then x. Give a reason for each step.

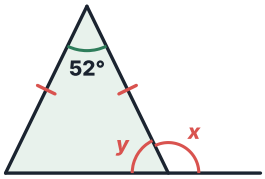
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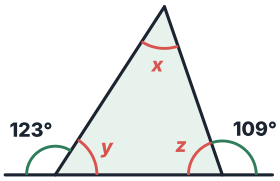
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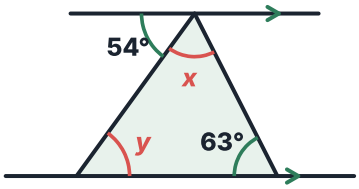
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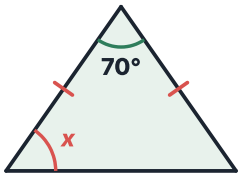
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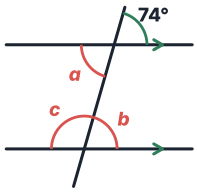


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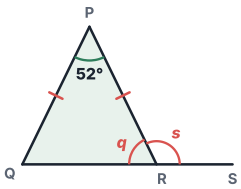


E. Exam-style questions (show your work)

31. The two lines with arrows are parallel. Find the angles a, b and c, giving a reason for each.



32. In the triangle PQR, |PQ| = |PR| and ∠QPR = 52°. QR is extended to S. (a) Find q, the size of ∠PRQ. (b) Find s, the size of ∠PRS. Give a reason for each step.



33. A triangle has angles of 35°, 75° and y. (a) Find y. (b) Is the triangle acute-angled, right-angled or obtuse-angled? (c) Could a triangle have angles of 95° and 90°? Explain.

34. Explain why a triangle can never have two obtuse angles.

Answers

A	1. acute · 2. obtuse · 3. reflex · 4. right-angled · 5. isosceles · 6. L
B	7. 52° (straight line) · 8. 125° (angles at a point) · 9. 64° (vertically opposite) · 10. 62° (straight line) · 11. 65° (angles in a triangle) · 12. 57° (angles in a triangle) · 13. 72° (isosceles: base angles equal) · 14. 60° (equilateral: 180 ÷ 3) · 15. 107° (exterior angle = 58 + 49) · 16. 70° (corresponding angles) · 17. 55° (alternate angles) · 18. 115° (co-interior angles)
C	19. No: 100 + 85 = 185, more than 180° · 20. 63° · 21. 71° · 22. 48° · 23. 125° · 24. 60°: the three equal angles share 180°
D	25. 68°: y = 68 (corr.), x = y (vert. opp.) · 26. 122°: y = 58 (corr.), x = 180 − 58 (str. line) · 27. 116°: y = 128 ÷ 2 = 64 (isosceles), x = 180 − 64 (str. line) · 28. 52°: y = 57, z = 71 (str. lines), x = 180 − 128 (triangle) · 29. 63°: y = 54 (alternate), x = 180 − 117 (triangle) · 30. 55°: (180 − 70) ÷ 2 (isosceles, triangle)
E	31. a = **74°** (vertically opposite) · b = **74°** (corresponding) · c = 180 − 74 = **106°** (straight line with b; or co-interior) · 32. (a) q = (180 − 52) ÷ 2 = **64°** (isosceles: equal base angles; angles in a triangle add to 180°) (b) s = 180 − 64 = **116°** (straight line), or 52 + 64 = 116 (exterior angle) · 33. (a) y = 180 − 110 = **70°** (b) **acute-angled** (all less than 90°) (c) **No**: 95 + 90 = 185, more than 180°, before the third angle · 34. Two obtuse angles are each more than 90°, so together they are more than 180°. But all **three** angles of a triangle add to exactly 180°, so it's impossible.

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