

Angles in Parallel Lines

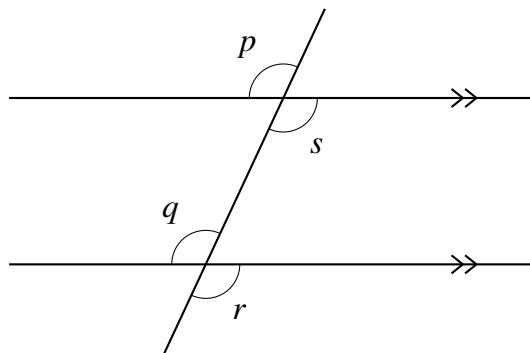
Solutions

For AQA GCSE Mathematics (8300) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (1 mark)

The diagram shows two parallel lines crossed by a straight line.



Not drawn accurately

Which statement is true?

Tick one box.

Corresponding angles are in the same position at each crossing (an F shape).

p is above the top parallel line, to the left of the crossing line.

q is above the bottom parallel line, to the left of the crossing line.

So p and q are corresponding angles.

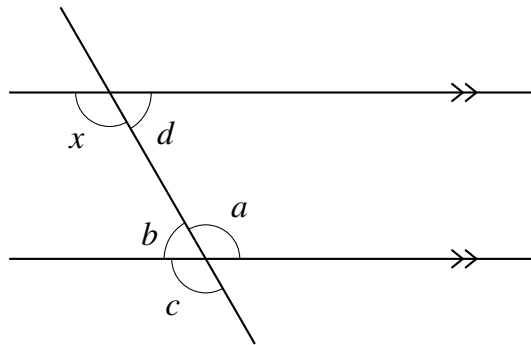
(p and s are vertically opposite. q and s are alternate. q and r are vertically opposite.)

Answer: p and q are corresponding angles

Tip: Corresponding angles are at **different** crossings. Two angles at the same crossing can never be corresponding or alternate.

2 (1 mark)

The diagram shows two parallel lines.



Not drawn accurately

Write down the letter of the angle that is alternate to angle x .

Alternate angles are between the parallel lines, on opposite sides of the crossing line (a Z shape).

Angle x is between the parallel lines, to the left of the crossing line.

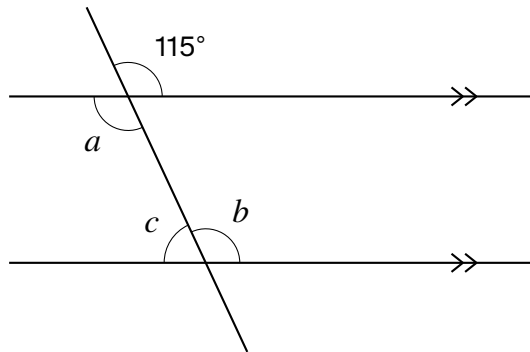
The angle between the parallel lines on the right of the crossing line, at the other crossing, is a .

Answer: a

Tip: Draw the Z shape on the diagram. Alternate angles sit inside the two corners of the Z.

3 (3 marks)

The diagram shows two parallel lines.



Not drawn accurately

- (a) Write down the size of angle a .

Angle a is opposite the 115° angle, where two lines cross.

Vertically opposite angles are equal.

Answer: 115°

- (b) Write down the size of angle b .

Angle b is in the same position at the other crossing as the 115° angle.

Corresponding angles are equal.

Answer: 115°

- (c) Work out the size of angle c .

Angles a and c are between the parallel lines, on the same side of the crossing line (a C shape).

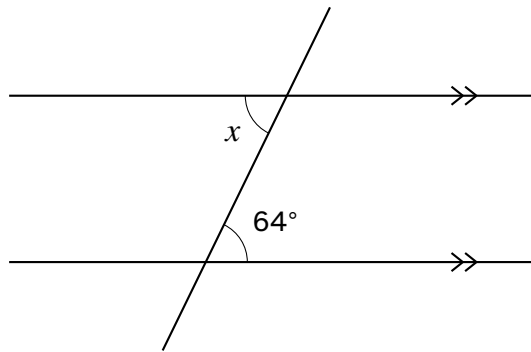
Co-interior angles add up to 180° .

$$c = 180 - 115 = 65^\circ$$

Answer: 65°

4 (2 marks)

The diagram shows two parallel lines.



Not drawn accurately

- (a) Write down the size of angle x .

Angle x and the 64° angle are between the parallel lines, on opposite sides of the crossing line (a Z shape).

So they are equal.

Answer: 64°

- (b) Give a reason for your answer.

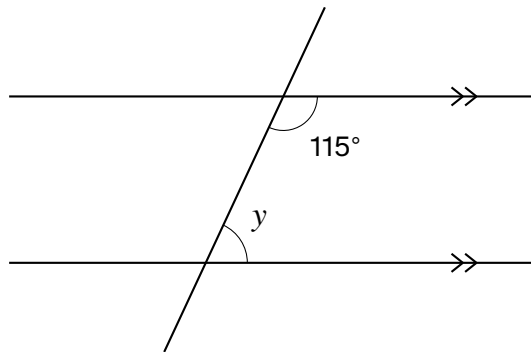
Name the angle fact in full.

Answer: Alternate angles are equal

Tip: “Parallel lines” or “Z angles” alone is not enough. Write “alternate angles are equal”.

5 (2 marks)

The diagram shows two parallel lines.



Not drawn accurately

Work out the size of angle y .

Give a reason for your answer.

Angle y and the 115° angle are between the parallel lines, on the same side of the crossing line (a C shape).

Co-interior angles add up to 180° .

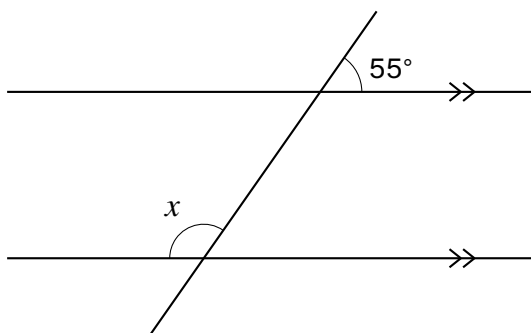
$$y = 180 - 115 = 65^\circ$$

Answer: 65° , co-interior angles add up to 180°

Marks: 1 mark for 65. 1 mark for the reason: co-interior angles add up to 180° .

6 (3 marks)

The diagram shows two parallel lines.



Not drawn accurately

Work out the size of angle x .

Give reasons for your answer.

At the lower crossing, the angle in the same position as the 55° is also 55° .

Reason: corresponding angles are equal.

Angle x is next to this 55° angle on a straight line.

$$x = 180 - 55 = 125^\circ$$

Reason: angles on a straight line add up to 180° .

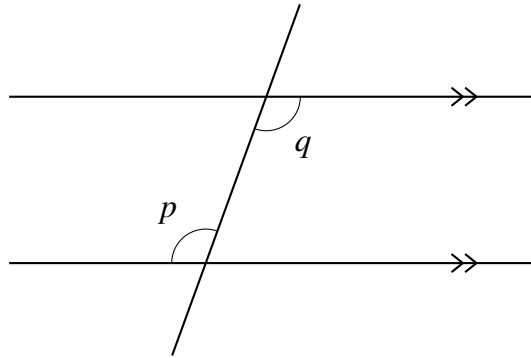
Answer: 125°

Tip: Give a reason for **each** step. Mark each angle you find on the diagram.

Marks: 1 mark for finding the 55° angle at the lower crossing. 1 mark for 125. 1 mark for both reasons.

7 (1 mark)

The diagram shows two parallel lines.



Not drawn accurately

Circle the word that describes angles p and q .

Options: corresponding, alternate, co-interior, vertically opposite

Angles p and q are both between the parallel lines.

They are on opposite sides of the crossing line.

They make a Z shape, so they are alternate angles.

Answer: alternate

8 (2 marks)

$ABCD$ is a parallelogram.

Angle $DAB = 58^\circ$

Work out the size of angle ABC .

In a parallelogram, opposite sides are parallel.

AD is parallel to BC .

So angles DAB and ABC are co-interior angles.

Co-interior angles add up to 180° .

Angle $ABC = 180 - 58 = 122^\circ$

Answer: 122°

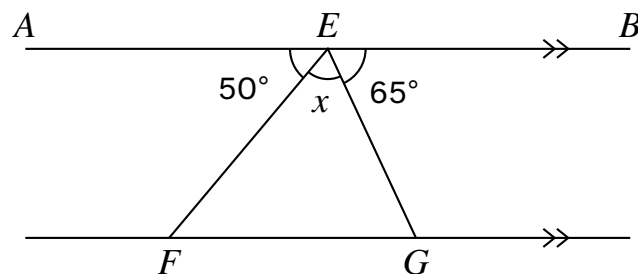
Tip: Sketch the parallelogram and label A, B, C, D in order round the shape. Next-door angles add up to 180° and opposite angles are equal.

Marks: 1 mark for $180 - 58$. 1 mark for 122.

9 (3 marks)

AEB is a straight line.

AEB is parallel to FG .



Not drawn accurately

(a) Work out the size of angle x .

The angles 50° , x and 65° lie on the straight line AEB .

Angles on a straight line add up to 180° .

$$x = 180 - 50 - 65 = 65^\circ$$

Answer: 65°

(b) Work out the size of angle EGF .

Give a reason for your answer.

AEB is parallel to FG .

Angle BEG (65°) and angle EGF make a Z shape.

Alternate angles are equal.

So angle $EGF = 65^\circ$

Answer: 65° , alternate angles are equal

Tip: Angle EGF is the angle at G (the middle letter).

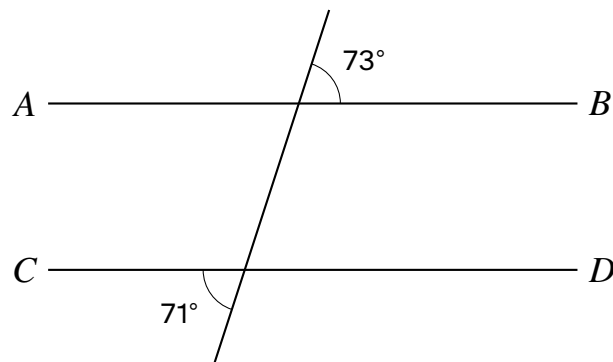
Marks: 1 mark for 65. 1 mark for the reason: alternate angles are equal.

10 (2 marks)

A straight line crosses the lines AB and CD .

Kai says,

' AB and CD are parallel.'



Not drawn accurately

Is Kai correct?

Tick a box.

Give a reason for your answer.

At the crossing with CD , the angle above CD and to the right of the crossing line is vertically opposite the 71° angle.

So it is also 71° (vertically opposite angles are equal).

If AB and CD were parallel, this angle and the 73° angle would be corresponding angles.

Corresponding angles are equal, but $71 \neq 73$.

So the lines are **not** parallel. Kai is not correct.

Answer: No, the corresponding angles would be 71° and 73° , which are not equal

Tip: Don't assume lines are parallel just because they look it. Lines are only parallel if the angle facts work exactly.

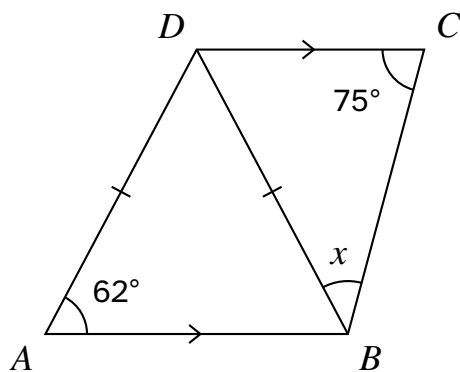
Marks: 1 mark for the 71° vertically opposite angle, or for comparing 71 with 73 as corresponding angles. 1 mark for "No" with a correct reason.

11 (4 marks)

$ABCD$ is a trapezium.

AB is parallel to DC .

$AD = BD$



Not drawn accurately

Work out the size of angle x .

$AD = BD$, so triangle ABD is isosceles.

So angle $ABD = \text{angle } DAB = 62^\circ$

AB is parallel to DC .

Angles ABD and BDC make a Z shape, so they are alternate angles.

Angle $BDC = 62^\circ$

Angles in triangle BCD add up to 180° .

$$x = 180 - 62 - 75 = 43^\circ$$

Answer: 43°

Tip: $AD = BD$ tells you triangle ABD is isosceles. The equal angles are opposite the equal sides, so they are at A and B (not at D).

Marks: 1 mark for angle $ABD = 62$. 1 mark for angle $BDC = 62$. 1 mark for $180 - 62 - 75$. 1 mark for 43.
