Angles in parallel lines

Worked solutions

KS3 Maths topic practice

This topic online

1 The diagram shows triangle ABC.

a. Use three letters to name the marked angle.

b. Write down the side opposite the vertex A.

c. Use three letters to name the angle between the sides AC and BC.

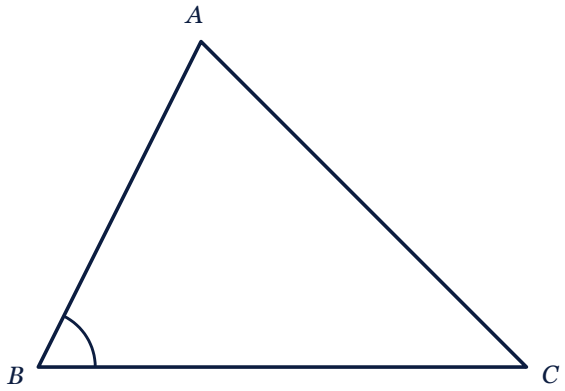

Diagram NOT accurately drawn

(3 marks)

The middle letter is where the angle is

a)

Angle at B, between A and C

Angle ABC

b) Side that does not touch A

BC

c) AC and BC meet at C

Angle ACB

2 Two angles fit together on a straight line. One of the angles is 64° and the other angle is y°.

a. Work out the value of y.

b. Give a reason for your answer.

(2 marks)

Angles on a straight line add up to 180°

$y = 180 - 64 = 116$

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3 Three angles meet at a point. Two of the angles are 145° and 118°. The third angle is x°.

Work out the value of x. Give a reason for your answer.

(2 marks)

Angles around a point add up to 360°

$145 + 118 = 263$

$x = 360 - 263 = 97$

4 The diagram shows two straight lines crossing.

Work out the sizes of the angles a, b and c. Give a reason for each answer.

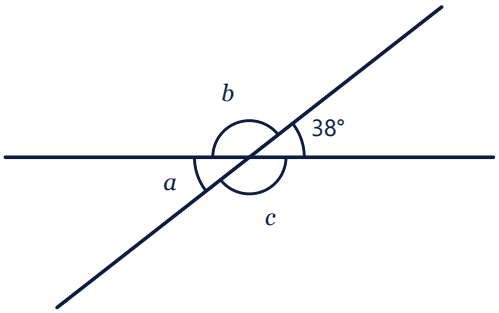

Diagram NOT accurately drawn

(3 marks)

$a = 38°$

Vertically opposite angles are equal

$b = 180 - 38 = 142°$

Angles on a straight line add up to 180°

$c = 142°$

Vertically opposite to b

$a = 38°$, $b = 142°$, $c = 142°$

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5 The line AB is perpendicular to the line CD. They cross at O. The straight line EF also passes through O.

Angle BOE = 27°.

a. Work out the size of angle x. Give a reason.

b. Work out the size of angle y. Give a reason.

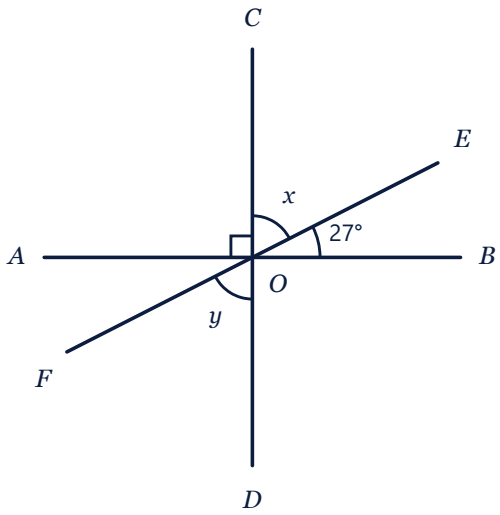

Diagram NOT accurately drawn

(3 marks)

a) Perpendicular, so angle BOC = 90°

$x = 90 - 27 = 63°$

$x = 63°$

b) Vertically opposite angles are equal

$y = x$

$y = 63°$

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

Work out the sizes of the angles a, b and c. For each one, give a reason.

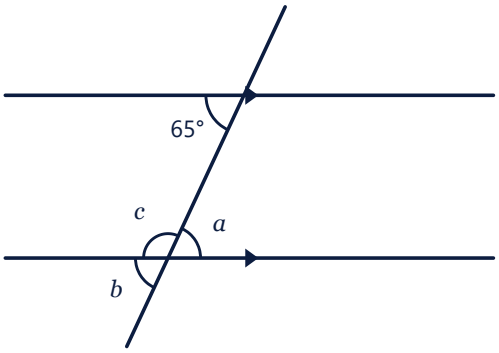

Diagram NOT accurately drawn

(4 marks)

$a = 65^\circ$

Alternate angles are equal (Z)

$b = 65^\circ$

Corresponding angles are equal (F)

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

Co-interior angles add up to 180° (C)

$a = 65^\circ$, $b = 65^\circ$, $c = 115^\circ$

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

One of the marked angles is 71°. The angle marked $x°$ is the co-interior angle between the parallel lines on the same side of the crossing line.

Work out the value of x. Give a reason for your answer.

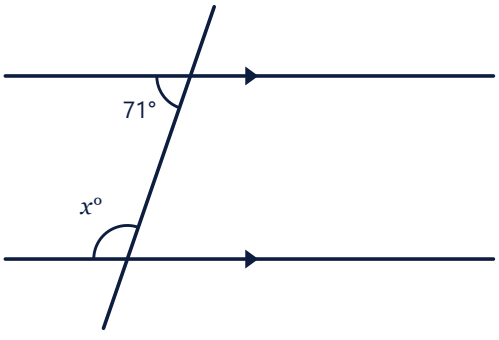

Diagram NOT accurately drawn

(3 marks)

Co-interior (allied) angles between parallel lines add up to 180°

$x = 180 - 71 = 109$

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8 The diagram shows two parallel lines crossed by a straight line. Two of the angles are marked.

a. Write down why $(3x - 10)° = (2x + 25)°$.

b. Work out the size of each marked angle.

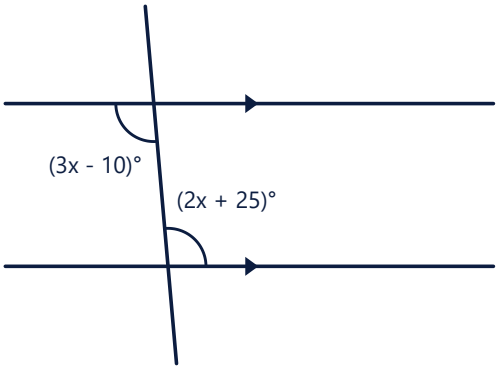

Diagram NOT accurately drawn

(3 marks)

a) Alternate angles are equal

b)

$3x - 10 = 2x + 25$

$x - 10 = 25$ (+10 to both sides)

$x = 35$

$3 \times 35 - 10 = 95$

Check: $2 \times 35 + 25 = 95$

Each angle is $95°$

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9 AB and CD are parallel straight lines.

A straight line crosses AB at E and crosses CD at F. On line AB, A is to the left of E and B is to the right of E. On line CD, C is to the left of F and D is to the right of F.

Angle AEF = 62°.

Work out the size of angle CFE.

Give a reason for each stage of your working.

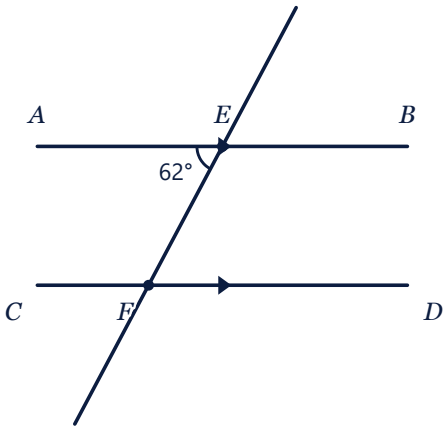

Diagram NOT accurately drawn

(4 marks)

Alternate angles lie between parallel lines on opposite sides of the crossing line. Co-interior angles lie between the parallel lines on the same side of the crossing line

Angle EFD = 62° because angle AEF and angle EFD are alternate angles, and alternate angles are equal

Angle CFE = 180° − 62° = 118° because angles on a straight line add up to 180°

(Alternatively

angle AEF and angle CFE are co-interior angles, so angle CFE = 180° − 62° = 118°)

118°

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10 DE and FG are parallel straight lines.

Triangle ABC is drawn so that A lies on DE, and B and C both lie on FG.

D is to the left of A and E is to the right of A.

Angle DAB = 48° and angle ACB = 63°.

Work out the size of angle BAC.

Give a reason for each stage of your working.

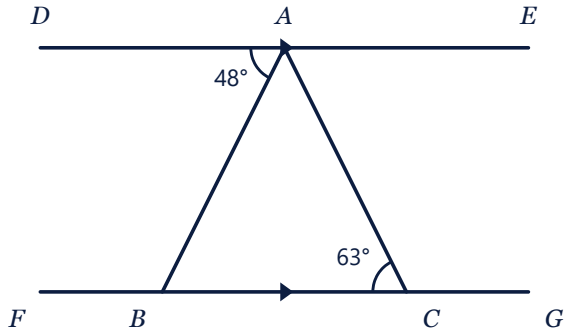

Diagram NOT accurately drawn

(4 marks)

Angle ABC = 48° because angle DAB and angle ABC are alternate angles (DE is parallel to FG), and alternate angles are equal

Angle BAC = 180° − 48° − 63° = 69° because angles in a triangle add up to 180°

69°

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11 A straight line crosses line AB at the point P and crosses line CD at the point Q, where P is above Q. On line AB, B is to the right of P. On line CD, D is to the right of Q.

Angle QPB, between PQ and PB and inside the region between the two lines, is 104°.

Angle PQD, between QP and QD and inside the region between the two lines, is 76°.

Show that AB is parallel to CD.

Give reasons for your answer.

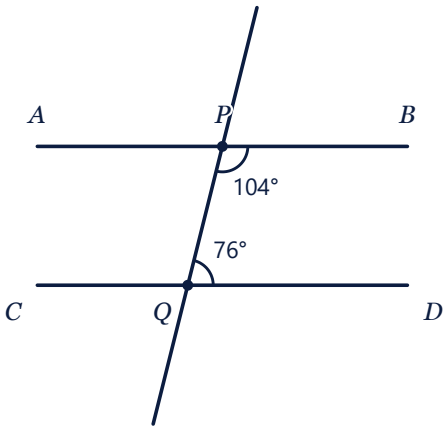

Diagram NOT accurately drawn

(4 marks)

Angle QPB and angle PQD are co-interior (allied) angles between the lines AB and CD

$104^\circ + 76^\circ = 180^\circ$

Co-interior angles add up to 180° only when the two lines are parallel, so AB is parallel to CD

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12 The diagram shows triangle ABC. The line DAE is drawn through A, parallel to BC.

The angles of the triangle are p, q and r.

Show that $p + q + r = 180°$. Give a reason for each step.

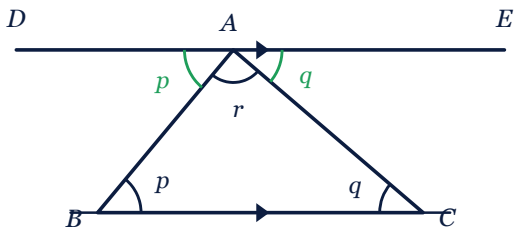

Diagram NOT accurately drawn

(3 marks)

Angle DAB = p

Alternate angles are equal (DE parallel to BC)

Angle EAC = q

Alternate angles are equal

p + r + q = 180°

Angles on a straight line DAE add up to 180°

p + q + r = 180°

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