

GCSE MATHS • GRADE 4

MATHS



MODEL ANSWERS

ANGLES IN PARALLEL LINES

SCORE

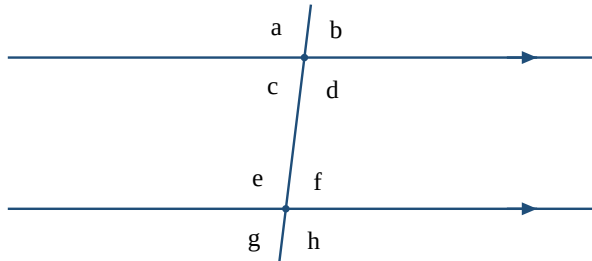
/92

PERCENTAGE

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STEMUP

- 1 AB and CD are parallel lines. Angle $g = 83^\circ$.
 (a) Write down the letter of one other angle of size 83° .
 (b) Give a reason for your answer.

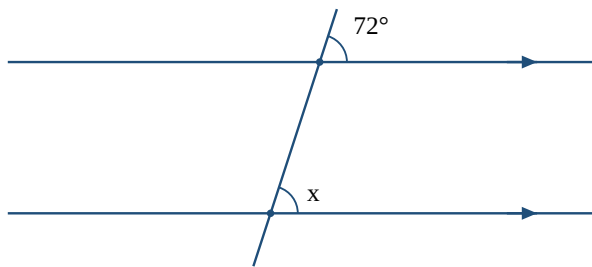


Angles of size 83° : b, c, f, g. b: equal to a corresponding or alternate angle
 c: corresponding angles are equal
 f: vertically opposite angles are equal

b (any of b, c, f); b: equal to a corresponding or alternate angle

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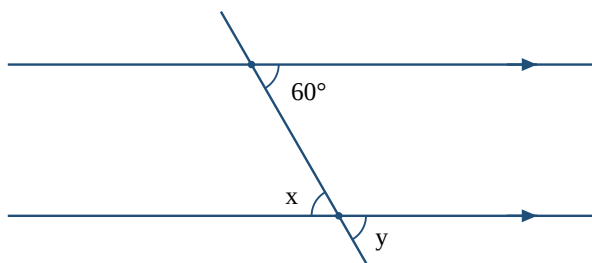
- 2 The two lines are parallel.
 Work out the size of the angle marked x. Give a reason for your answer. Diagram NOT accurately drawn.



$x = 72^\circ$ (Corresponding angles are equal)

/ 1

- 3 The two lines are parallel.
 Work out the size of angle x and the size of angle y. Give a reason for each answer. Diagram NOT accurately drawn.

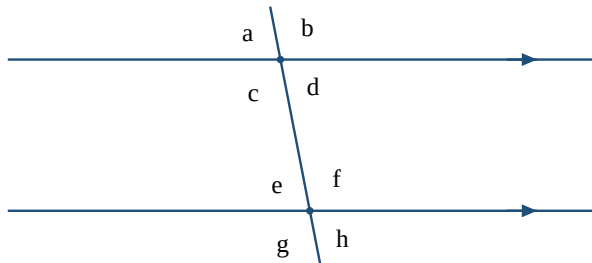


x: Alternate angles are equal.
 y: Vertically opposite angles are equal

$x = 60^\circ$ (Alternate angles are equal); $y = 60^\circ$ (Vertically opposite angles are equal)

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- 4 AB and CD are parallel lines. Angle $f = 101^\circ$.
 (a) Write down the letter of one other angle of size 101° .
 (b) Give a reason for your answer.

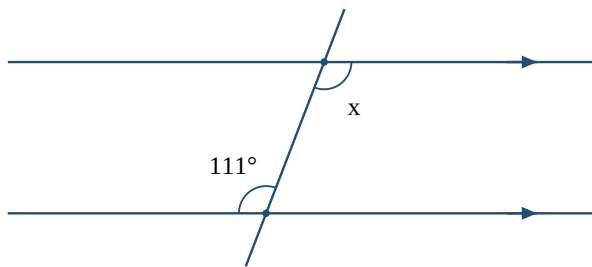


Angles of size 101° : b, c, g, f.
 b: corresponding angles are equal
 c: alternate angles are equal
 g: vertically opposite angles are equal

b (any of b, c, g); b:
 corresponding angles are equal

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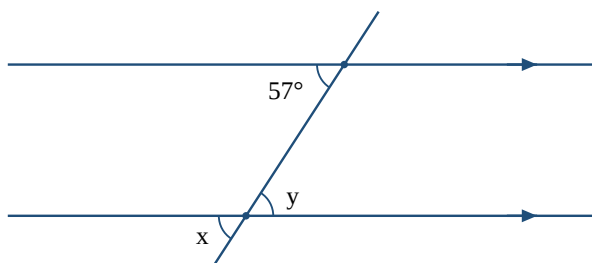
- 5 The two lines are parallel.
 Work out the size of the angle marked x. Give a reason for your answer. Diagram NOT accurately drawn.



$x = 111^\circ$ (Alternate angles are equal)

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- 6 The two lines are parallel.
 Work out the size of angle x and the size of angle y. Give a reason for each answer. Diagram NOT accurately drawn.

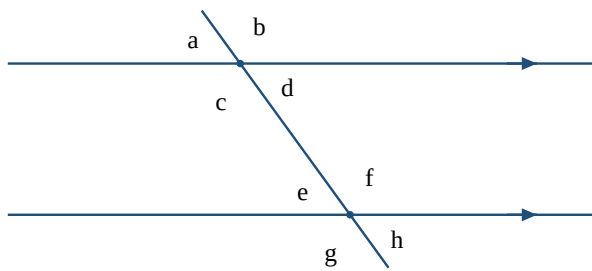


x: Corresponding angles are equal. y: Vertically opposite angles are equal

$x = 57^\circ$ (Corresponding angles are equal); $y = 57^\circ$ (Vertically opposite angles are equal)

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- 7 AB and CD are parallel lines. Angle $f = 126^\circ$.
Write down the letter of the co-interior angle to angle f and work out its size.

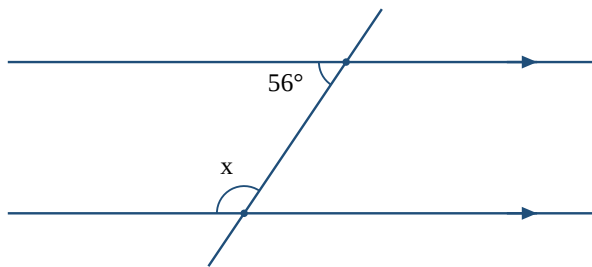


Co-interior angles add up to 180° ($180 - 126 = 54$)

$$d = 54^\circ$$

/ 1

- 8 The two lines are parallel.
Work out the size of the angle marked x . Give a reason for your answer. Diagram NOT accurately drawn.

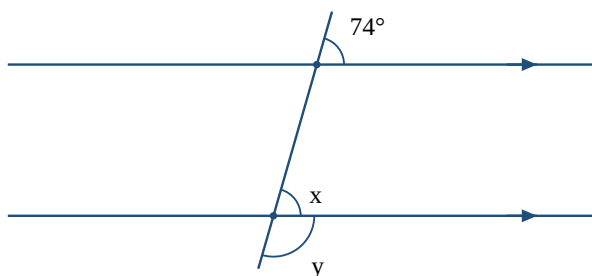


Co-interior angles add up to 180° : $180 - 56 = 124$

$$x = 124^\circ \text{ (Co-interior angles add up to } 180^\circ\text{)}$$

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- 9 The two lines are parallel.
Work out the size of angle x and the size of angle y . Give a reason for each answer. Diagram NOT accurately drawn.

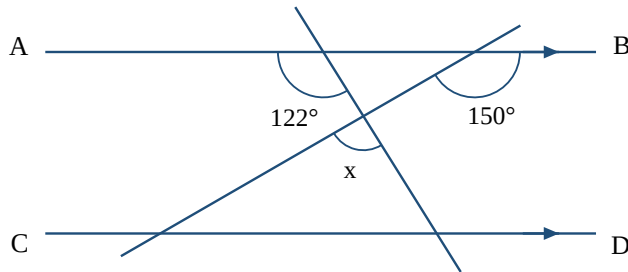


x : Corresponding angles are equal. y : Angles on a straight line add up to 180° : $180 - 74 = 106$

$x = 74^\circ$ (Corresponding angles are equal); $y = 106^\circ$ (Angles on a straight line add up to 180°)

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- 10** AB and CD are parallel lines.
 (a) Find the size of angle x.
 (b) Give reasons for your answer. Diagram NOT accurately drawn.

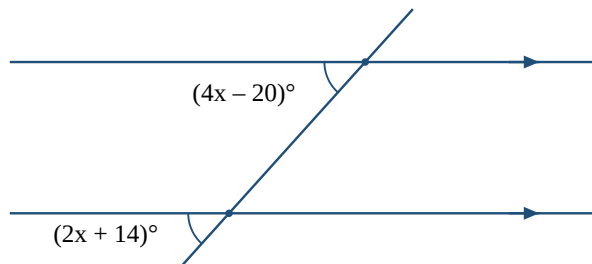


Angles on a straight line add up to 180° : $180 - 122 = 58$ and $180 - 150 = 30$ (angles of the small triangle at the top)
 Angles in a triangle add up to 180° : $180 - 58 - 30 = 92$
 Vertically opposite angles are equal, so $x = 92$

92° (angles on a straight line; angles in a triangle; vertically opposite angles)

1 / 1

- 11** The two lines are parallel.
 Work out the value of x. Diagram NOT accurately drawn.

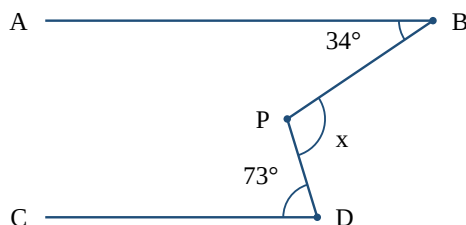


$2x + 14 = 4x - 20$
 (corresponding angles are equal). $-2x = -34$, so $x = 17$

$x = 17$

1 / 1

- 12** AB and CD are parallel lines.
 Work out the size of angle BPD. Give a reason for your answer. Diagram NOT accurately drawn.



Reason: draw a line through P parallel to AB
 Alternate angles are equal, so $BPD = ABP + CDP$: $34 + 73 = 107$

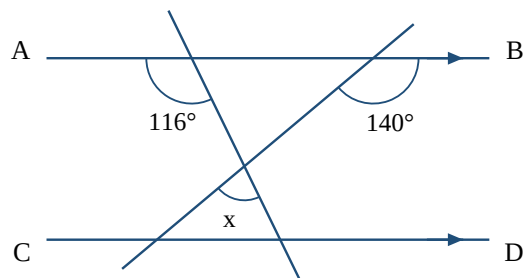
107° (alternate angles are equal, split at P)

1 / 1

13 AB and CD are parallel lines.

(a) Find the size of angle x.

(b) Give reasons for your answer. Diagram NOT accurately drawn.



Angles on a straight line add up to 180° : $180 - 116 = 64$ and $180 - 140 = 40$ (angles of the small triangle at the top)

Angles in a triangle add up to 180° : $180 - 64 - 40 = 76$

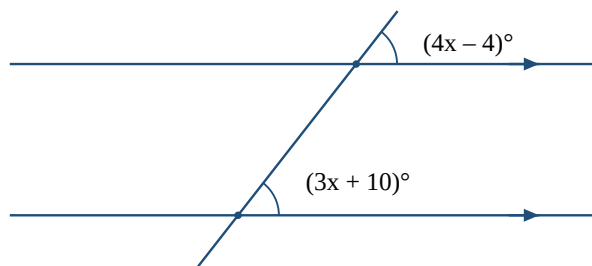
Vertically opposite angles are equal, so $x = 76$

76° (angles on a straight line; angles in a triangle; vertically opposite angles)

1 / 1

14 The two lines are parallel.

Work out the value of x. Diagram NOT accurately drawn.



$$3x + 10 = 4x - 4$$

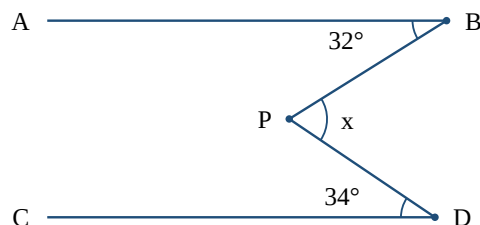
(corresponding angles are equal). $-1x = -14$, so $x = 14$

$$x = 14$$

1 / 1

15 AB and CD are parallel lines.

Work out the size of angle BPD. Give a reason for your answer. Diagram NOT accurately drawn.



Reason: draw a line through P parallel to AB

Alternate angles are equal, so $BPD = ABP + CDP$: $32 + 34 = 66$

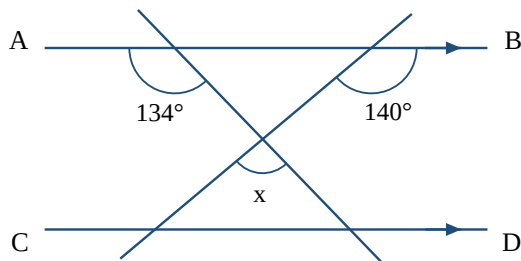
66° (alternate angles are equal, split at P)

1 / 1

16 AB and CD are parallel lines.

(a) Find the size of angle x.

(b) Give reasons for your answer. Diagram NOT accurately drawn.



Angles on a straight line add up to 180° : $180 - 134 = 46$ and $180 - 140 = 40$ (angles of the small triangle at the top)

Angles in a triangle add up to 180° : $180 - 46 - 40 = 94$

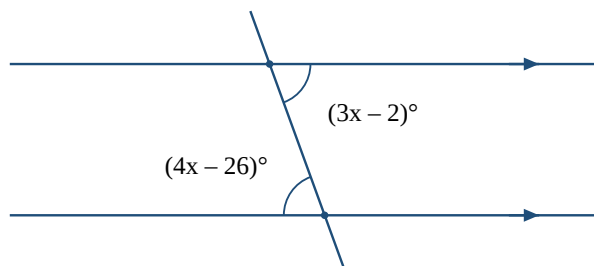
Vertically opposite angles are equal, so $x = 94$

94° (angles on a straight line; angles in a triangle; vertically opposite angles)

/ 1

17 The two lines are parallel.

Work out the value of x. Diagram NOT accurately drawn.



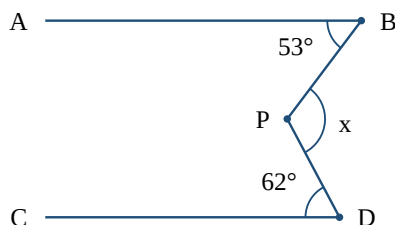
$3x - 2 = 4x - 26$ (alternate angles are equal). $-1x = -24$, so $x = 24$

$x = 24$

/ 1

18 AB and CD are parallel lines.

Work out the size of angle BPD. Give a reason for your answer. Diagram NOT accurately drawn.



Reason: draw a line through P parallel to AB
Alternate angles are equal, so $BPD = ABP + CDP$: $53 + 62 = 115$

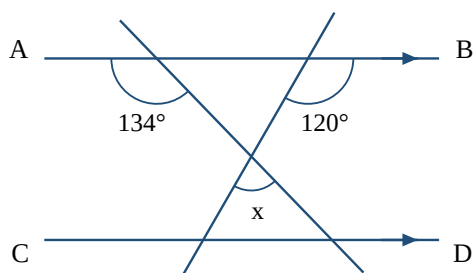
115° (alternate angles are equal, split at P)

/ 1

19 AB and CD are parallel lines.

(a) Find the size of angle x.

(b) Give reasons for your answer. Diagram NOT accurately drawn.



Angles on a straight line add up to 180° : $180 - 134 = 46$ and $180 - 120 = 60$ (angles of the small triangle at the top)

Angles in a triangle add up to 180° : $180 - 46 - 60 = 74$

Vertically opposite angles are equal, so $x = 74$

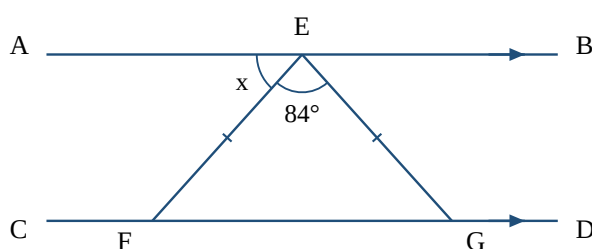
74° (angles on a straight line; angles in a triangle; vertically opposite angles)

1 / 1

20 AB and CD are parallel lines. EF = EG.

Work out the size of angle AEF.

Give reasons for your answer. Diagram NOT accurately drawn.



Angle EFG = $EGF = (180 - 84) \div 2 = 48$ (angles in a triangle add up to 180)

base angles of an isosceles triangle are equal)

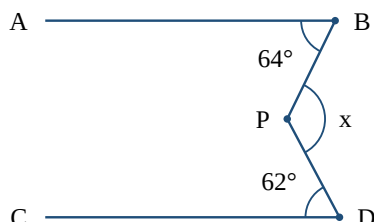
Angle AEF = angle EFG = 48 (alternate angles are equal)

48°

1 / 1

21 AB and CD are parallel lines.

Work out the size of angle BPD. Give a reason for your answer. Diagram NOT accurately drawn.

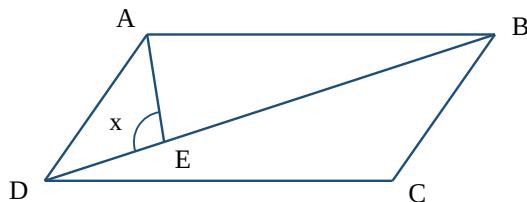


Reason: draw a line through P parallel to AB
Alternate angles are equal, so $BPD = ABP + CDP$: $64 + 62 = 126$

126° (alternate angles are equal, split at P)

2 / 2

- 22 ABCD is a parallelogram. E is a point on the diagonal BD.
 Angle DAE = 44° and angle CBD = 37° .
 Work out the size of angle AED.
 Give reasons for your answer. Diagram NOT accurately drawn.

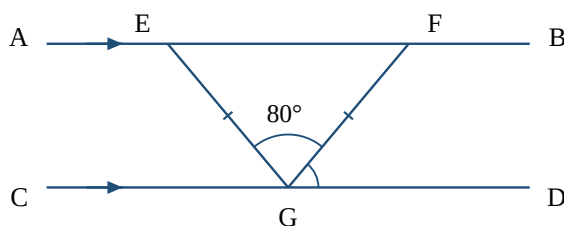


Angle ADE = angle CBD = 37°
 (alternate angles are equal, AD is parallel to BC)
 Angle AED = $180 - 44 - 37 = 99$
 (angles in a triangle add up to 180)

99°

2 / 2

- 23 AB and CD are parallel lines. EFG is an isosceles triangle with GE = GF.
 Angle EGF = 80°
 Find the size of angle FGD. Give a reason for each stage of your working. Diagram NOT accurately drawn.

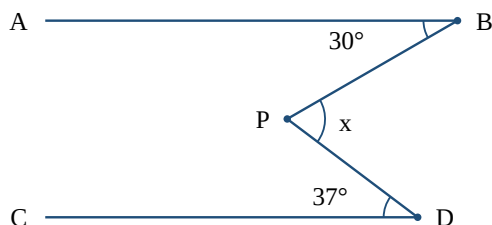


Angle GFE = $(180 - 80) \div 2 = 50$
 (angles in a triangle add up to 180
 base angles of an isosceles triangle are equal)
 Angle FGD = angle GFE = 50
 (alternate angles are equal)

50°

2 / 2

- 24 AB and CD are parallel lines.
 Work out the size of angle BPD. Give a reason for your answer. Diagram NOT accurately drawn.

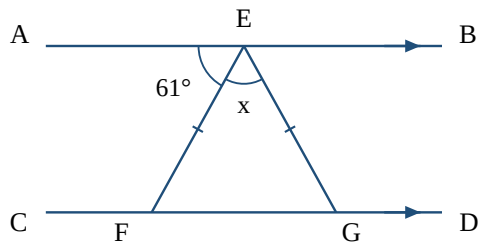


Reason: draw a line through P parallel to AB
 Alternate angles are equal, so BPD = ABP + CDP: $30 + 37 = 67$

67° (alternate angles are equal,
 split at P)

2 / 2

- 25 AB and CD are parallel lines. $EF = EG$.
Work out the size of angle FEG.
Give reasons for your answer. Diagram NOT accurately drawn.

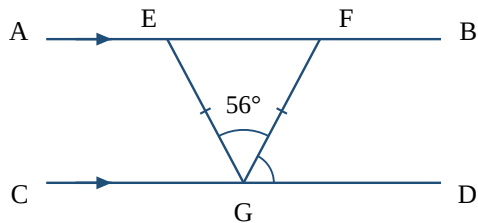


Angle $EFG = 61$ (alternate angles are equal, AB and CD are parallel)
Triangle EFG is isosceles with $EF = EG$, so angle $EGF = 61$ (base angles of an isosceles triangle are equal)
Angle $FEG = 180 - 61 - 61 = 58$
(angles in a triangle add up to 180)

58°

2 / 2

- 26 AB and CD are parallel lines. EFG is an isosceles triangle with $GE = GF$.
Angle $EGF = 56^\circ$
Find the size of angle FGD. Give a reason for each stage of your working. Diagram NOT accurately drawn.

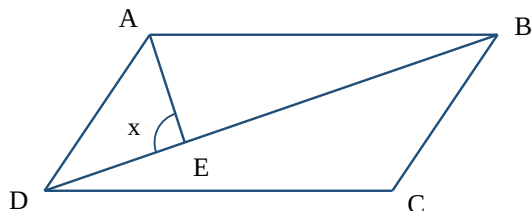


Angle $GFE = (180 - 56) \div 2 = 62$
(angles in a triangle add up to 180
base angles of an isosceles triangle are equal)
Angle $FGD = \text{angle } GFE = 62$
(alternate angles are equal)

62°

2 / 2

- 27 ABCD is a parallelogram. E is a point on the diagonal BD.
Angle $DAE = 52^\circ$ and angle $CBD = 37^\circ$.
Work out the size of angle AED.
Give reasons for your answer. Diagram NOT accurately drawn.



Angle $ADE = \text{angle } CBD = 37$
(alternate angles are equal, AD is parallel to BC)
Angle $AED = 180 - 52 - 37 = 91$
(angles in a triangle add up to 180)

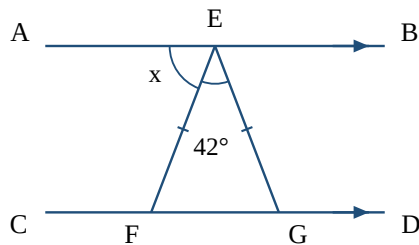
91°

2 / 2

- 28 AB and CD are parallel lines. $EF = EG$.

Work out the size of angle AEF.

Give reasons for your answer. Diagram NOT accurately drawn.



Angle $EFG = EGF = (180 - 42) \div 2 = 69$
 (angles in a triangle add up to 180
 base angles of an isosceles triangle are equal)
 Angle $AEF = \text{angle } EFG = 69$ (alternate
 angles are equal)

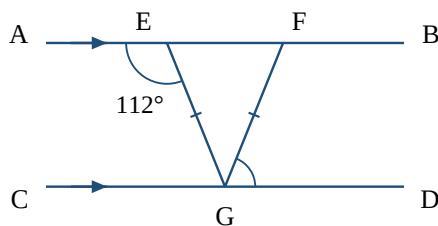
69°

2 / 2

- 29 AB and CD are parallel lines. EFG is an isosceles triangle with $GE = GF$.

Angle $AEG = 112^\circ$

Find the size of angle FGD. Give a reason for each stage of your working. Diagram NOT accurately drawn.



Angle $GEF = 180 - 112 = 68$ (angles on a
 straight line add up to 180)
 Angle $GFE = 68$ (base angles of an
 isosceles triangle are equal)
 Angle $FGD = \text{angle } GFE = 68$ (alternate
 angles are equal)

68°

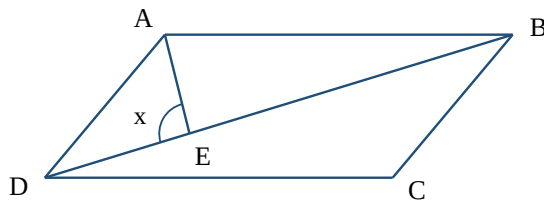
2 / 2

- 30 ABCD is a parallelogram. E is a point on the diagonal BD.

Angle $DAE = 54^\circ$ and angle $CBD = 33^\circ$.

Work out the size of angle AED.

Give reasons for your answer. Diagram NOT accurately drawn.



Angle $ADE = \text{angle } CBD = 33$
 (alternate angles are equal, AD is
 parallel to BC)
 Angle $AED = 180 - 54 - 33 = 93$
 (angles in a triangle add up to
 180)

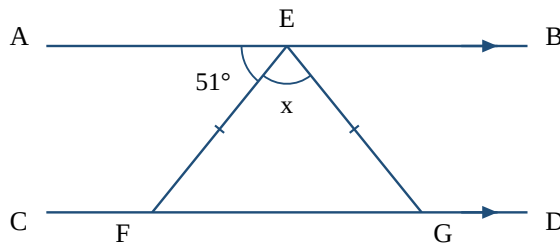
93°

2 / 2

- 31 AB and CD are parallel lines. $EF = EG$.

Work out the size of angle FEG.

Give reasons for your answer. Diagram NOT accurately drawn.



Angle $EFG = 51$ (alternate angles are equal, AB and CD are parallel)
 Triangle EFG is isosceles with $EF = EG$, so angle $EGF = 51$ (base angles of an isosceles triangle are equal)
 Angle $FEG = 180 - 51 - 51 = 78$
 (angles in a triangle add up to 180)

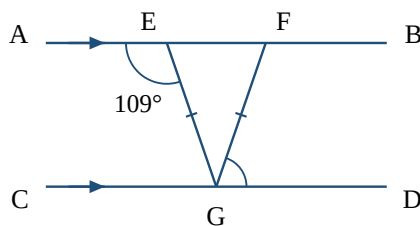
78°

2 / 2

- 32 AB and CD are parallel lines. EFG is an isosceles triangle with $GE = GF$.

Angle $AEG = 109^\circ$

Find the size of angle FGD. Give a reason for each stage of your working. Diagram NOT accurately drawn.



Angle $GEF = 180 - 109 = 71$ (angles on a straight line add up to 180)
 Angle $GFE = 71$ (base angles of an isosceles triangle are equal)
 Angle $FGD = \text{angle } GFE = 71$ (alternate angles are equal)

71°

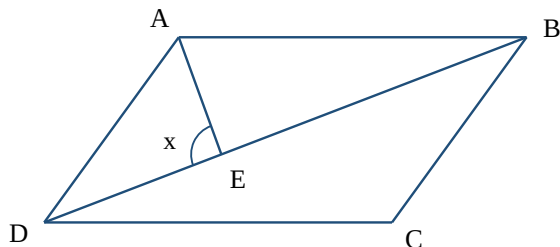
2 / 2

- 33 ABCD is a parallelogram. E is a point on the diagonal BD.

Angle $DAE = 56^\circ$ and angle $CBD = 33^\circ$.

Work out the size of angle AED.

Give reasons for your answer. Diagram NOT accurately drawn.

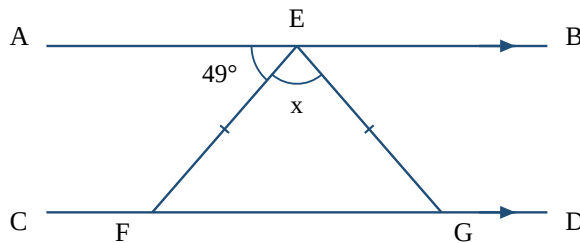


Angle $ADE = \text{angle } CBD = 33$
 (alternate angles are equal, AD is parallel to BC)
 Angle $AED = 180 - 56 - 33 = 91$
 (angles in a triangle add up to 180)

91°

2 / 2

- 34 AB and CD are parallel lines. $EF = EG$.
Work out the size of angle FEG.
Give reasons for your answer. Diagram NOT accurately drawn.

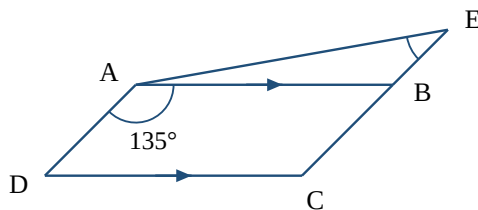


Angle $EFG = 49$ (alternate angles are equal, AB and CD are parallel)
Triangle EFG is isosceles with $EF = EG$, so angle $EGF = 49$ (base angles of an isosceles triangle are equal)
Angle $FEG = 180 - 49 - 49 = 82$
(angles in a triangle add up to 180)

82°

2 / 2

- 35 ABCD is a parallelogram.
CBE is a straight line. Angle $BAD = 135^\circ$. Angle $AEB = 35^\circ$.
Find the size of angle BAE.
Give a reason for each stage of your working. Diagram NOT accurately drawn.

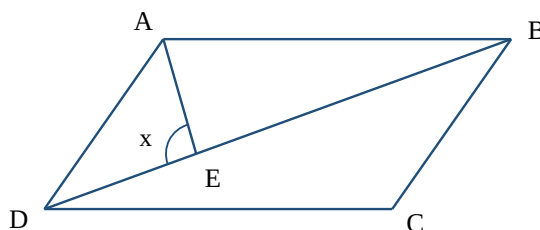


Angle $ABC = 180 - 135 = 45$
(co-interior angles)
Angle $ABE = 180 - 45 = 135$ (angles on a straight line)
Angle $BAE = 180 - 135 - 35 = 10$
(angles in a triangle)

10°

2 / 2

- 36 ABCD is a parallelogram. E is a point on the diagonal BD.
Angle $DAE = 51^\circ$ and angle $CBD = 35^\circ$.
Work out the size of angle AED.
Give reasons for your answer. Diagram NOT accurately drawn.



Angle $ADE = \text{angle } CBD = 35$
(alternate angles are equal, AD is parallel to BC)
Angle $AED = 180 - 51 - 35 = 94$
(angles in a triangle add up to 180)

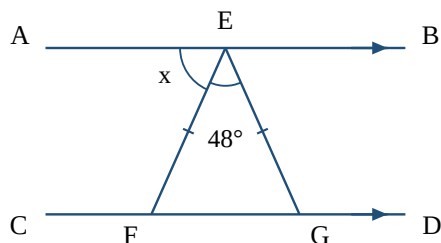
94°

2 / 2

- 37 AB and CD are parallel lines. $EF = EG$.

Work out the size of angle AEF.

Give reasons for your answer. Diagram NOT accurately drawn.



$\text{Angle } EFG = EGF = (180 - 48) \div 2 = 66$ (angles in a triangle add up to 180 base angles of an isosceles triangle are equal)

$\text{Angle } AEF = \text{angle } EFG = 66$ (alternate angles are equal)

66°

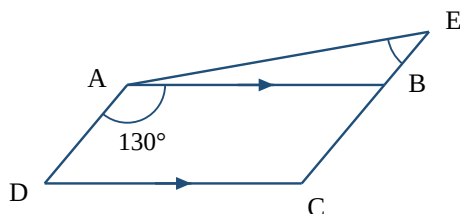
2 / 2

- 38 ABCD is a parallelogram.

CBE is a straight line. Angle BAD = 130° . Angle AEB = 40° .

Find the size of angle BAE.

Give a reason for each stage of your working. Diagram NOT accurately drawn.



$\text{Angle } ABC = 180 - 130 = 50$
(co-interior angles)

$\text{Angle } ABE = 180 - 50 = 130$ (angles on a straight line)

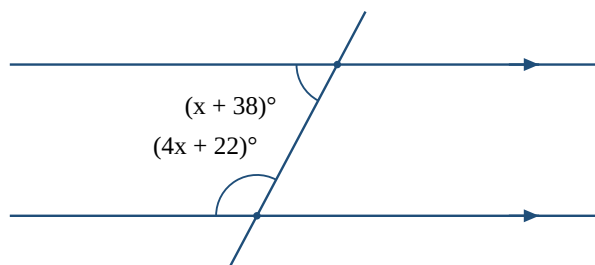
$\text{Angle } BAE = 180 - 130 - 40 = 10$
(angles in a triangle)

10°

2 / 2

- 39 The two lines are parallel.

Work out the value of x. Diagram NOT accurately drawn.

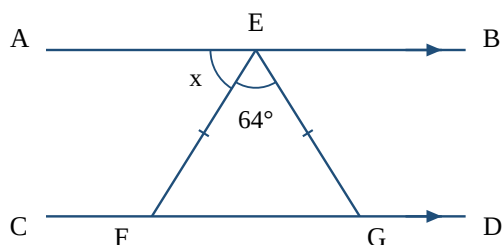


$4x + 22 + x + 38 = 180$
(co-interior angles add up to 180°). $5x + 60 = 180$, so $x = 24$

$x = 24$

3 / 3

- 40 AB and CD are parallel lines. $EF = EG$.
Work out the size of angle AEF.
Give reasons for your answer. Diagram NOT accurately drawn.

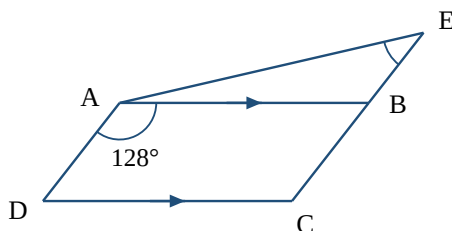


Angle $EFG = EGF = (180 - 64) \div 2$
 $= 58$ (angles in a triangle add up to 180
 base angles of an isosceles triangle
 are equal)
 Angle $AEF = \text{angle } EFG = 58$
 (alternate angles are equal)

58°

3 / 3

- 41 ABCD is a parallelogram.
CBE is a straight line. Angle $BAD = 128^\circ$. Angle $AEB = 39^\circ$.
Find the size of angle BAE.
Give a reason for each stage of your working. Diagram NOT accurately drawn.

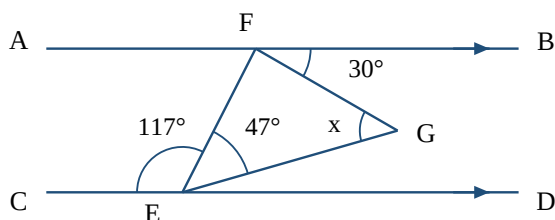


Angle $ABC = 180 - 128 = 52$
 (co-interior angles)
 Angle $ABE = 180 - 52 = 128$ (angles
 on a straight line)
 Angle $BAE = 180 - 128 - 39 = 13$
 (angles in a triangle)

13°

3 / 3

- 42 AB and CD are parallel. Angle $CEF = 117^\circ$, angle $FEG = 47^\circ$ and angle $BFG = 30^\circ$.
Find the size of angle x.
Give a reason for each stage of your working. Diagram NOT accurately drawn.



Angle $AFE = 180 - 117 = 63$
 (co-interior angles add up to 180)
 Angle $EFG = 180 - 63 - 30 = 87$
 (angles on a straight line add up
 to 180). $x = 180 - 47 - 87 = 46$
 (angles in a triangle add up to
 180)

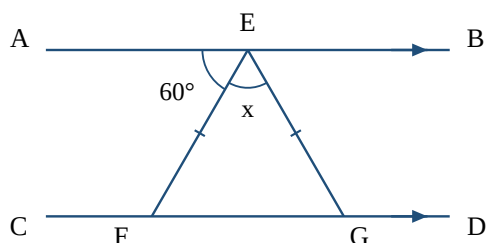
46°

3 / 3

- 43 AB and CD are parallel lines. $EF = EG$.

Work out the size of angle FEG.

Give reasons for your answer. Diagram NOT accurately drawn.



Angle $EFG = 60$ (alternate angles are equal, AB and CD are parallel)
 Triangle EFG is isosceles with $EF = EG$, so angle $EGF = 60$ (base angles of an isosceles triangle are equal)
 Angle $FEG = 180 - 60 - 60 = 60$ (angles in a triangle add up to 180)

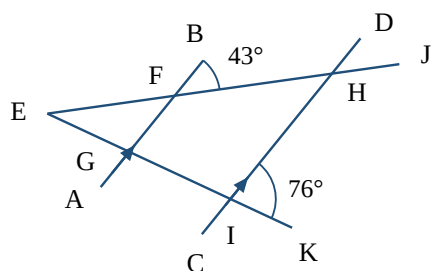
60°

3 / 3

- 44 AB and CD are parallel. Angle $HIK = 76^\circ$ and angle $BFH = 43^\circ$.

Find the size of angle FEG.

You must show how you got your answer. Diagram NOT accurately drawn.



Angle $EFG = \text{angle } BFH = 43$ (vertically opposite angles are equal)
 Angle $BGK = \text{angle } HIK = 76$ (corresponding angles are equal, AB is parallel to CD)
 Angle $FGE = 180 - 76 = 104$ (angles on a straight line add up to 180)
 Angle $FEG = 180 - 43 - 104 = 33$ (angles in a triangle add up to 180)

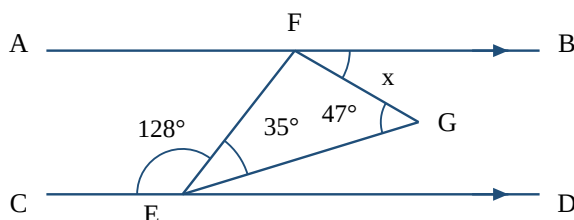
33°

3 / 3

- 45 AB and CD are parallel. Angle $CEF = 128^\circ$, angle $FEG = 35^\circ$ and angle $EGF = 47^\circ$.

Find the size of angle x.

Give a reason for each stage of your working. Diagram NOT accurately drawn.



Angle $AFE = 180 - 128 = 52$ (co-interior angles add up to 180)
 Angle $EFG = 180 - 35 - 47 = 98$ (angles in a triangle add up to 180). $x = 180 - 52 - 98 = 30$ (angles on a straight line add up to 180)

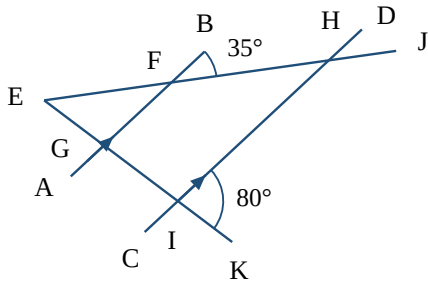
30°

3 / 3

- 46 AB and CD are parallel. Angle HIK = 80° and angle BFH = 35° .

Find the size of angle FEG.

You must show how you got your answer. Diagram NOT accurately drawn.



Angle EFG = angle BFH = 35 (vertically opposite angles are equal)
 Angle BGK = angle HIK = 80 (corresponding angles are equal, AB is parallel to CD)
 Angle FGE = $180 - 80 = 100$ (angles on a straight line add up to 180)
 Angle FEG = $180 - 35 - 100 = 45$ (angles in a triangle add up to 180)

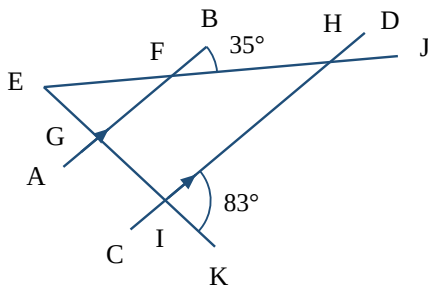
45°

3 / 3

- 47 AB and CD are parallel. Angle HIK = 83° and angle BFH = 35° .

Find the size of angle FEG.

You must show how you got your answer. Diagram NOT accurately drawn.



Angle EFG = angle BFH = 35 (vertically opposite angles are equal)
 Angle BGK = angle HIK = 83 (corresponding angles are equal, AB is parallel to CD)
 Angle FGE = $180 - 83 = 97$ (angles on a straight line add up to 180)
 Angle FEG = $180 - 35 - 97 = 48$ (angles in a triangle add up to 180)

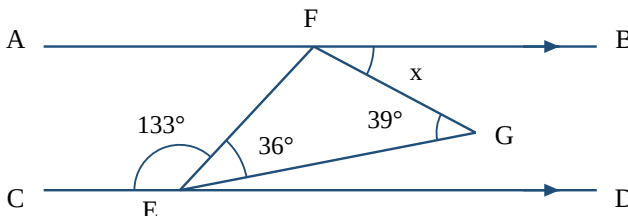
48°

3 / 3

- 48 AB and CD are parallel. Angle CEF = 133° , angle FEG = 36° and angle EGF = 39° .

Find the size of angle x.

Give a reason for each stage of your working. Diagram NOT accurately drawn.



Angle AFE = $180 - 133 = 47$ (co-interior angles add up to 180)
 Angle EFG = $180 - 36 - 39 = 105$ (angles in a triangle add up to 180). $x = 180 - 47 - 105 = 28$ (angles on a straight line add up to 180)

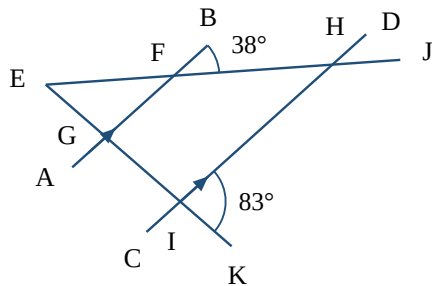
28°

3 / 3

- 49 AB and CD are parallel. Angle $HIK = 83^\circ$ and angle $BFH = 38^\circ$.

Find the size of angle FEG.

You must show how you got your answer. Diagram NOT accurately drawn.



Angle $EFG = \text{angle } BFH = 38$ (vertically opposite angles are equal)
 Angle $BGK = \text{angle } HIK = 83$ (corresponding angles are equal, AB is parallel to CD)
 Angle $FGE = 180 - 83 = 97$ (angles on a straight line add up to 180)
 Angle $FEG = 180 - 38 - 97 = 45$ (angles in a triangle add up to 180)

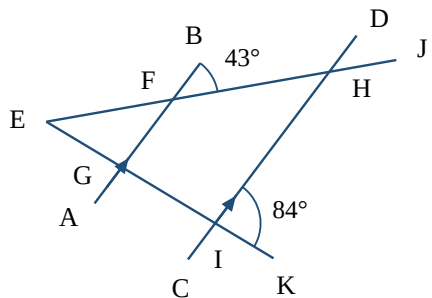
45°

3 / 3

- 50 AB and CD are parallel. Angle $HIK = 84^\circ$ and angle $BFH = 43^\circ$.

Find the size of angle FEG.

You must show how you got your answer. Diagram NOT accurately drawn.



Angle $EFG = \text{angle } BFH = 43$ (vertically opposite angles are equal)
 Angle $BGK = \text{angle } HIK = 84$ (corresponding angles are equal, AB is parallel to CD)
 Angle $FGE = 180 - 84 = 96$ (angles on a straight line add up to 180)
 Angle $FEG = 180 - 43 - 96 = 41$ (angles in a triangle add up to 180)

41°

3 / 3