

The geometric properties of quadrilaterals

Year 7 About 70 minutes No calculator 45 marks



Hints online, answers free with an account:
mathswariz.uk/worksheets/ks3-year-7-the-geometric-properties-of-quadrilaterals/

Date _____

A Do Now

Quick questions to start.

A1 Needed today [1 mark] **A2** Needed today [1 mark]

Two angles of a triangle are 48° and 75° . Work out the third angle.

Answer

Three angles of a quadrilateral are 90° , 85° and 110° . Work out the fourth angle.

Answer

A3 Last lesson [1 mark] **A4** From chapter 1 [1 mark]

Two co-interior angles between parallel lines are 107° and x .
Work out x .

Answer

Find the HCF of 48 and 80.

Answer

B Example, then your turn

Year 7

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

A quadrilateral has four equal sides. It has no right angles. Name the quadrilateral.

Hint Which quadrilaterals have four equal sides?
Which of those has right angles?

B1 Name each quadrilateral. [2 marks]

(a) It has exactly one pair of parallel sides.

(b) It has two pairs of equal sides next to each other, and every angle is less than 180° .

Answer (a) (b)

EXAMPLE 2

Write down the number of lines of symmetry and the order of rotational symmetry of a rhombus.

Hint Fold it along each diagonal. Then turn it round its centre and count how many times it fits on itself.

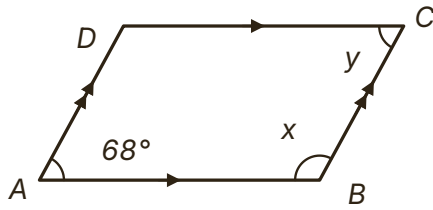
B2 Write down the number of lines of symmetry and the order of rotational symmetry of a parallelogram. [2 marks]

Write down the number of lines of symmetry and the order of rotational symmetry of a parallelogram.

Answer lines ... order ...

EXAMPLE 3

$ABCD$ is a parallelogram. Work out the sizes of the angles marked x and y .

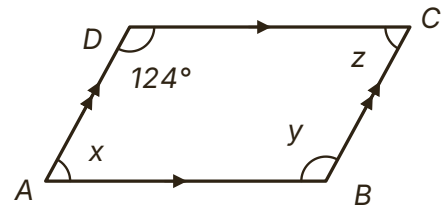


Not drawn accurately

Hint Opposite angles of a parallelogram are equal. Angles next to each other add up to 180° .

B3 $ABCD$ is a parallelogram. [3 marks]

Work out the sizes of the angles marked x , y and z .

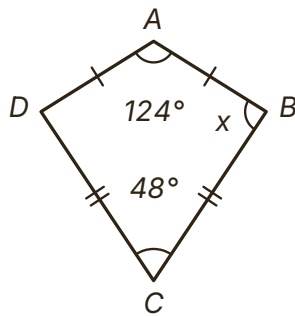


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Answer $x = \dots$ $y = \dots$ $z = \dots$

EXAMPLE 4

$ABCD$ is a kite. Work out the size of the angle marked x .

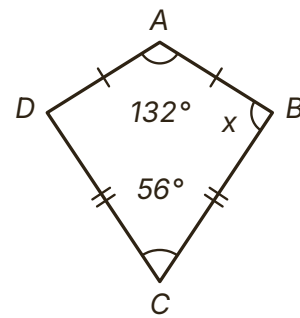


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Hint A kite has one pair of equal angles, between the sides of different lengths. The four angles add up to 360° .

B4 $ABCD$ is a kite. Work out the [2 marks]

size of the angle marked x .

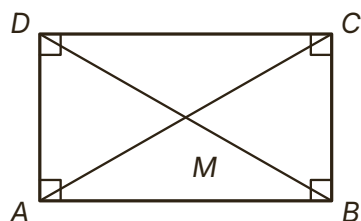


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Answer

- C1** $ABCD$ is a rectangle. Its diagonals cross at M . The diagonal AC is 13 cm long. Work out the length of BM .

[2 marks]

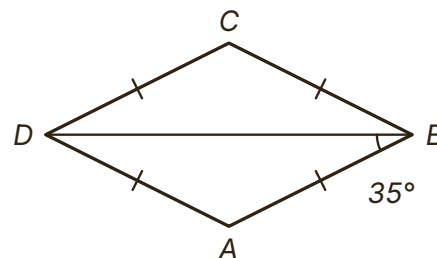


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Answer

- C2** $ABCD$ is a rhombus. Angle $ABD = 35^\circ$. Work out angle BAD .

[2 marks]

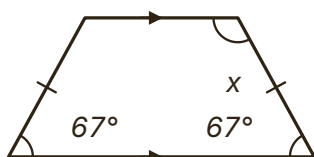


Not drawn accurately

Answer

- C3** This trapezium has a line of symmetry. Work out the size of the angle marked x .

[2 marks]



Not drawn accurately

Answer

- C4** A quadrilateral has exactly one line of symmetry. One of its angles is more than 180° . Name the quadrilateral.

[1 mark]

Answer

- C5** A rhombus has a perimeter of 38 cm. Work out the length of one of its sides.

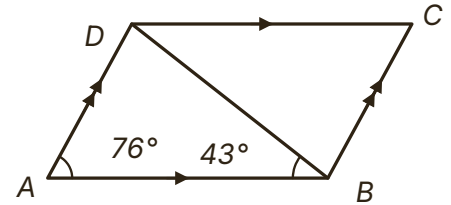
[2 marks]

Answer

D Exam-style questions

D1 $ABCD$ is a parallelogram. BD is a diagonal. Angle $DAB = 76^\circ$ and angle $ABD = 43^\circ$.

- (a) Work out the size of angle ADB . Give a reason for your answer. [2 marks]



Answer

Not drawn accurately

- (b) Work out the size of angle ABC . [1 mark]

Answer

- (c) Work out the size of angle DBC . [2 marks]

Answer

Total for D1: 5 marks

D2 Sam says, "A square is not a rhombus, because a rhombus has no right angles." [2 marks]

Sam is wrong. Explain why.

D3 A , B and C are three corners of a kite $ABCD$. The line AC is a line of symmetry of the kite.

- (a) Write down the coordinates of D . [2 marks]

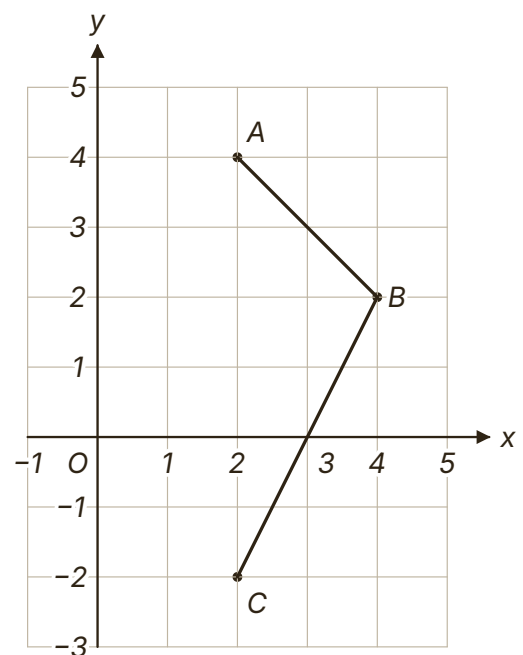
Answer

- (b) Work out the length of the diagonal BD . [1 mark]

Answer

- (c) Work out the length of the diagonal AC . [1 mark]

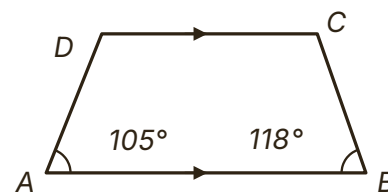
Answer



Total for D3: 4 marks

D4 $ABCD$ is a trapezium. AB is parallel to DC . Angle $DAB = 105^\circ$ and angle $ABC = 118^\circ$.

- (a) Work out the size of angle ADC . Give a reason for your answer. [2 marks]



Answer

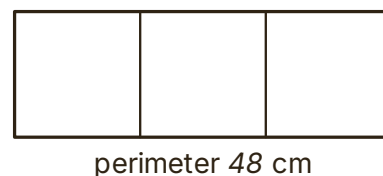
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- (b) Work out the size of angle BCD . [2 marks]

Answer

Total for D4: 4 marks

D5 This rectangle is made from three identical squares in a row. The perimeter of the rectangle is 48 cm. Work out the area of the rectangle. [4 marks]



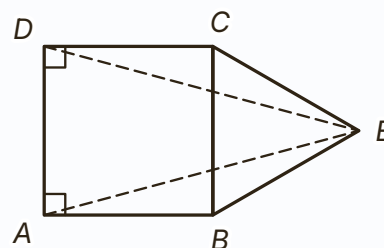
Answer

E Extension

Stretch

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1** $ABCD$ is a square. BCE is an equilateral triangle outside the square. Work out the size of angle AED . [4 marks]



Answer

Not drawn accurately

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** $AB = BC = BE$, so triangle ABE is isosceles. Work out angle ABE first.
- Hint 2** Angle $ABE = 90 + 60 = 150^\circ$, so angles BAE and BEA are each $(180 - 150) \div 2 = 15^\circ$.
- Hint 3** In the same way angle $CED = 15^\circ$. So angle $AED = 60 - 15 - 15 = 30^\circ$.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can name a quadrilateral from its properties.



I can use the properties of quadrilaterals to find missing angles and lengths.



I can find a missing corner of a quadrilateral on a grid.

