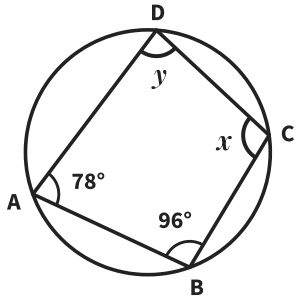
Circle theorems: cyclic quadrilaterals

ANSWERS

1

ABCD is a cyclic quadrilateral.
Find x and y. Give a reason.



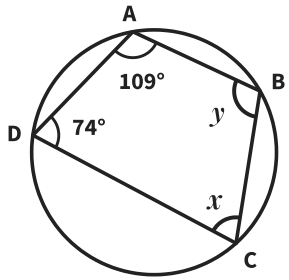
$x = 180° - 78° =$ 102°

$y = 180° - 96° =$ 84°

Reason: opposite angles in a cyclic quadrilateral add to 180°

2

ABCD is a cyclic quadrilateral.
Find x and y. Give a reason.



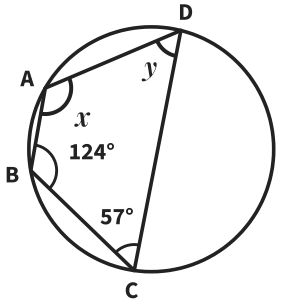
$x = 180° -$ 109° = 71°

$y = 180° -$ 74° = 106°

Reason: opposite angles add to 180°

3

ABCD is a cyclic quadrilateral.
Find x and y. Give a reason.



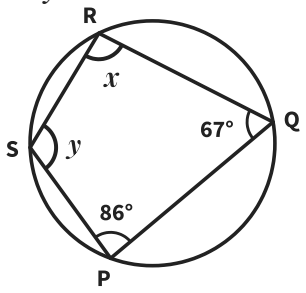
$x =$ 180° − 57° = 123°

$y =$ 180° − 124° = 56°

Reason: opposite angles add to 180°

4

PQRS is a cyclic quadrilateral.
Find x and y. Give a reason.

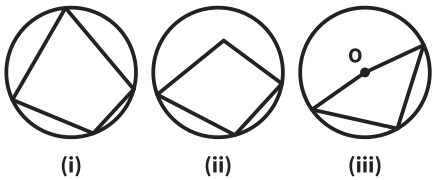


$x =$ 94°

$y =$ 113°

5 *Notice the change!*

Which of these is a cyclic quadrilateral?
Explain why each of the others is not.



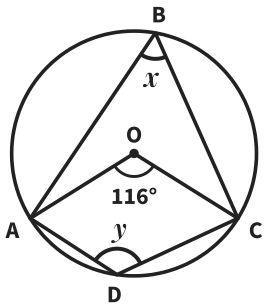
(ii): a corner is inside the circle

(iii): O is the centre, not on the circle

Cyclic: (i)

6

O is the centre of the circle. Find x and y.
Give a reason for each.



$x =$ 116° ÷ 2 = 58°

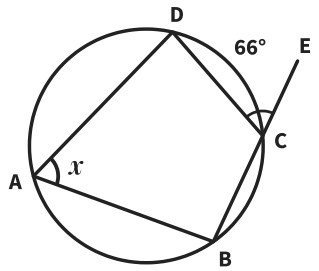
Reason: centre = 2 × circumference

$y =$ 180° − 58° = 122°

Reason: opposite angles add to 180°

7

ABCD is a cyclic quadrilateral.
BC is extended to E. Find angle BAD,
marked x. Give a reason for each step.



Angle BCD = 180° − 66° = 114°

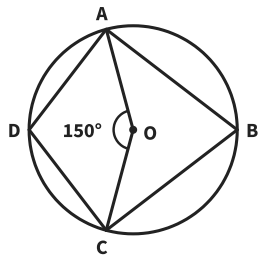
Reason: angles on a line add to 180°

$x =$ 180° − 114° = 66°

Reason: opposite angles add to 180°

8

O is the centre. Amara says angle
ADC = 180° − 150° = 30° (opposite angles).
Explain her mistake. Find angle ADC.



O is not on the circle: OADC is not cyclic

ABC = 75°, so ADC = 180° − 75°

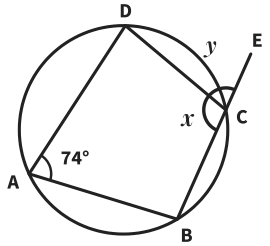
Angle ADC = 105°

Circle theorems: cyclic quadrilaterals *further practice*

ANSWERS

9

ABCD is a cyclic quadrilateral and BC is extended to E. Find x and y.
Give a reason for each.



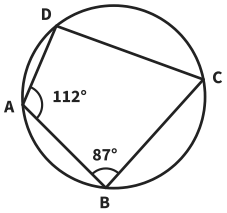
$x = 180° - 74° = 106°$ (opposite angles)

$y = 180° - 106° = 74°$ (straight line)

Answer $x = 106°, y = 74°$

10

A garden bed has four straight edges. Its corners A, B, C and D are on a circular path. Angle A is 112° and angle B is 87°. Find angles C and D.



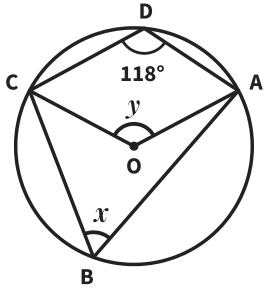
$C = 180° - 112° = 68°$ (opposite angles)

$D = 180° - 87° = 93°$ (opposite angles)

Answer $C = 68°, D = 93°$

11

O is the centre of the circle.
Find x and y. Give a reason for each.



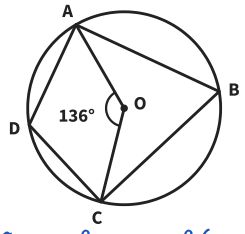
$x = 180° - 118° = 62°$ (opposite angles)

$y = 2 \times 62° = 124°$ (angle at the centre)

Answer $x = 62°, y = 124°$

12

Four lamps A, B, C and D stand on the edge of a round fountain with centre O.
Angle AOC = 136°. Find angle ADC.



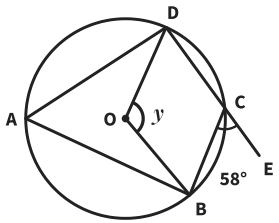
$ABC = 136° \div 2 = 68°$ (angle at the centre)

$ADC = 180° - 68° = 112°$ (opposite angles)

Angle ADC = 112°

13

ABCD is cyclic, with centre O.
DC is extended to E. Find angle BOD, marked y, with reasons.



$BAD = 58°$ (exterior angle = interior opposite angle)

$y = 2 \times 58° = 116°$ (angle at the centre)

y = 116°

14

ABCD is a cyclic quadrilateral.
Angle BAD is twice the size of angle BCD. Find angle BCD.

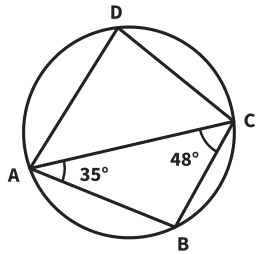
angle BAD + angle BCD = 180° (opposite angles)

3 parts = 180°, so 1 part = 60°

Angle BCD = 60°

15

ABCD is a cyclic quadrilateral.
Find angle ADC. Give a reason for each step.



$ABC = 180° - 35° - 48° = 97°$ (triangle)

$ADC = 180° - 97° = 83°$ (opposite angles)

Angle ADC = 83°

16

Lena says, "If one angle of a cyclic quadrilateral is obtuse, the angle opposite it must be acute."
Is she right? Explain.

opposite angles add to 180°

more than 90° leaves less than 90° for the other

Answer Yes