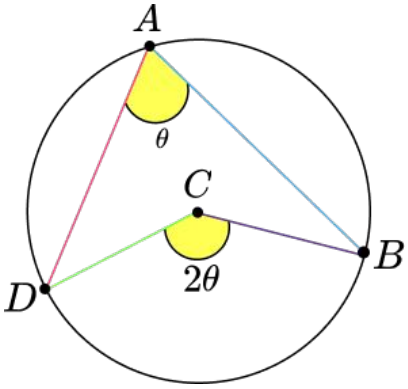
THIRD SPACE LEARNING

GCSE Exam Questions

Circle Theorems | Geometry & Measure

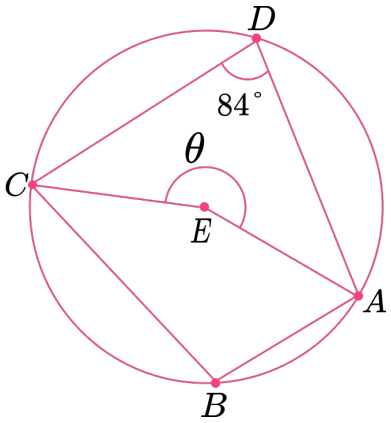
GCSE Exam Questions: Circle Theorems

1) (a) Prove that the angle at the centre is twice the angle at the circumference.



(5)

(b) Use this theorem to calculate the missing angle in the diagram:

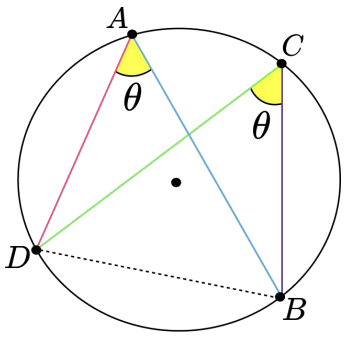


(3)

(8 marks)

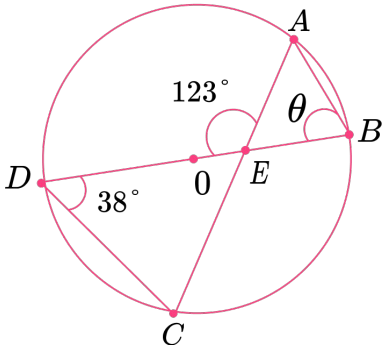
GCSE Exam Questions: Circle Theorems

2) **(a)** Prove that angles in the same segment are equal.



(3)

(b) Use this theorem to calculate the missing angle in the diagram:

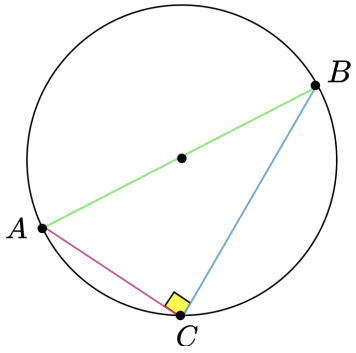


(5)

(8 marks)

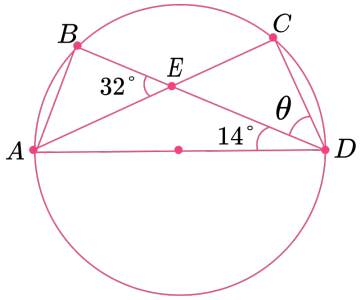
GCSE Exam Questions: Circle Theorems

3) **(a)** Prove that the angle in a semicircle is 90 degrees.



(4)

(b) Use this theorem to calculate the missing angle in the diagram:

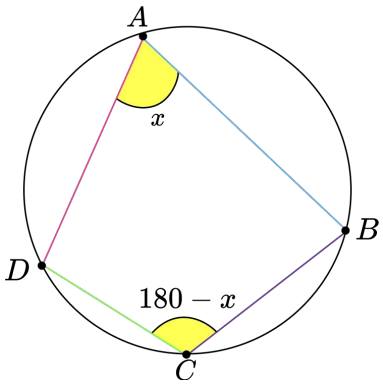


(4)

(8 marks)

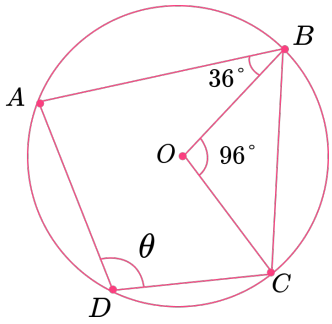
GCSE Exam Questions: Circle Theorems

4) **(a)** Prove that opposite angles in a cyclic quadrilateral total 180 degrees.



(4)

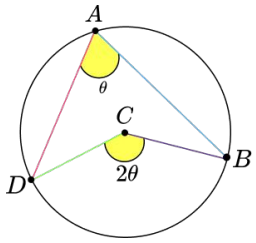
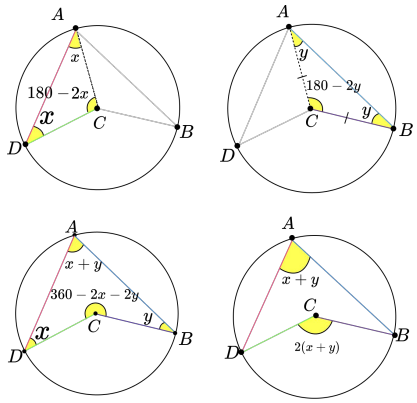
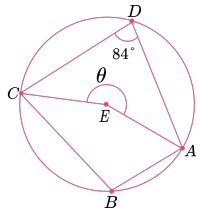
(b) Use this theorem to calculate the missing angle in the diagram:



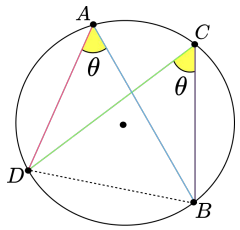
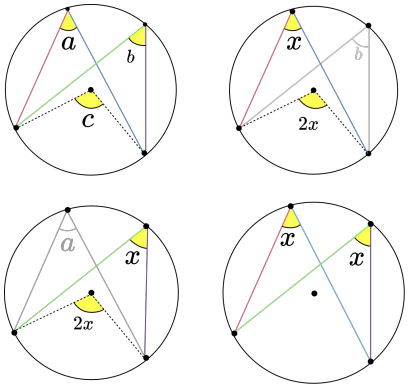
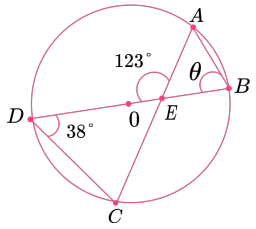
(3)

(4 marks)

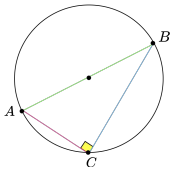
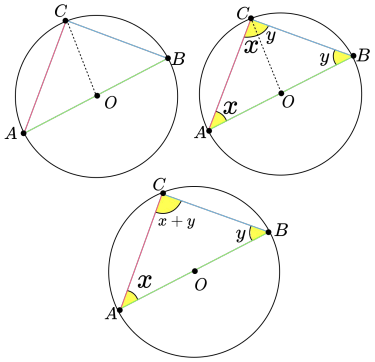
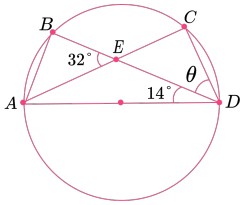
GCSE Exam Questions: Circle Theorems Answers

	Question	Answer	Marks
1) (a)	Prove that the angle at the centre is twice the angle at the circumference. 	Answer in full  *ACD* is an isosceles triangle so *CAD* = *ADC* = *x*. Angle *ACD* = 180 - 2*x* as **angles in a triangle total** 180°. This is the same for triangle *ABC* using *y* instead of *x*. Adding the two angles at the centre, we get the reflex angle at *BCD* = 360 - 2*x* - 2*y*. As angles at a point total 180°, the other angle at *BCD* = 2*x* + 2*y* or 2(*x* + *y*). As the angle at the circumference is equal to *x* + *y* and the angle at the centre is equal to 2(*x* + *y*), we can state that **The angle at the centre is twice the angle at the circumference.**	**(1)** **(1)** **(1)** **(1)** **(1)**
(b)	Use this theorem to calculate the missing angle in the diagram: 	*CED* = 84 × 2 =168 *θ* = 360 - 168 = 192° Angles around a point total 360°	**(1)** **(1)** **(1)**

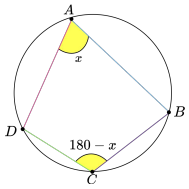
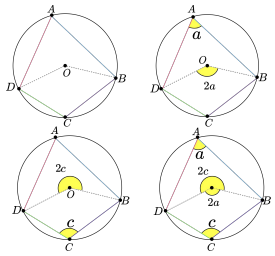
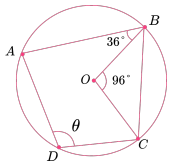
GCSE Exam Questions: Circle Theorems Answers

	Question	Answer	Marks
2) (a)	Prove that angles in the same segment are equal. 	Answer in full  As **the angle at the centre is twice the angle at the circumference**, angle c is twice the size of angle a. For the same reason, angle c is double the size of angle b. This means that $a = b$.	**(1)** **(1)** **(1)**
(b)	Use this theorem to calculate the missing angle in the diagram: 	$CAB = 38°$ $AEB = 180 - 123 = 57°$ Reason: Angles on a straight line total 180° $\theta = 180 - (38 + 57) = 85°$ Reason: Angles in a triangle total 180°	**(1)** **(1)** **(1)** **(1)** **(1)**

GCSE Exam Questions: Circle Theorems Answers

	Question	Answer	Marks
3) (a)	Prove that the angle in a semicircle is 90 degrees. 	 Splitting the triangle ABC into two **isosceles triangles**, we can state that angle $OAC = OCA = x$, and $OBC = OCB = y$. This means that angle $ACB = x + y$. As **angles in a triangle total** 180° $x + y + x + y = 180$ $2x + 2y = 180$ $x + y = 90°$	**(1)** **(1)** **(1)** **(1)**
(b)	Use this theorem to calculate the missing angle in the diagram: 	$ACD = 90°$ $CED = 32°$ $CDE = 180 - (90 + 32)$ $\theta = 58°$	**(1)** **(1)** **(1)** **(1)**

GCSE Exam Questions: Circle Theorems Answers

	Question	Answer	Marks
4) (a)	Prove that opposite angles in a cyclic quadrilateral total 180 degrees. 	 As the **angle at the centre is twice the angle at the circumference** and $BAD = a$, angle $BOD = 2a$. For the same reason, The reflex angle at $BOD = 2c$. As **angles at a point total** 360° $2a + 2c = 360$ $a + c = 180°$	**(1)** **(1)** **(1)** **(1)**
(b)	Use this theorem to calculate the missing angle in the diagram: 	OBC is an isosceles triangle so $OBC = OCB = (180 - 96) \div 2 = 42°$ $ABC = 42 + 36 = 78°$ $ADC = 180 - 78 = 102°$	**(1)** **(1)** **(1)** **(1)**

Where to go next?

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