

IEB Euclidean geometry practice — Questions

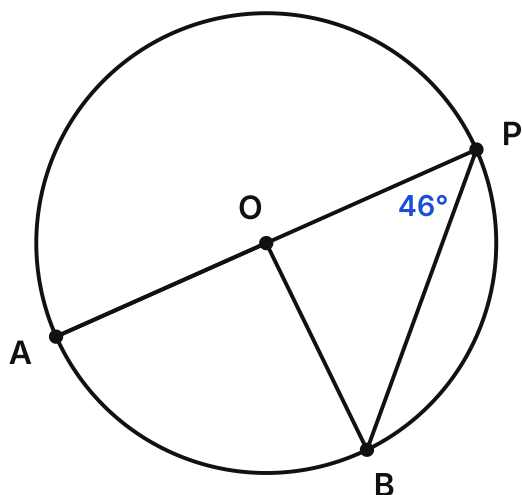
12 newly generated questions across all 14 euclidean geometry topics the IEB examines in Paper II — 137 marks in all. Every answer is worked in the memorandum booklet. Nothing here is taken from a past paper.

The angle at the centre

1

[15]

In the diagram, O is the centre of the circle. $\hat{APB} = 46^\circ$.



- (a) Determine, with reasons, the size of $\hat{AOB}$. (2)

Answer: _____

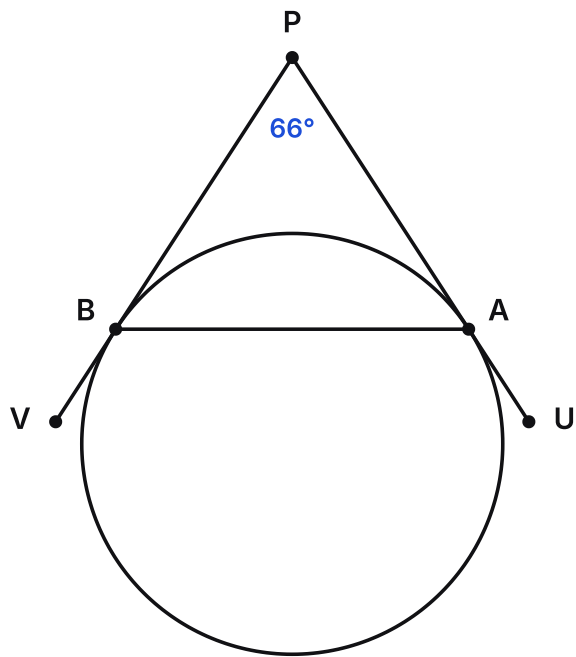
- (b) Determine, with reasons, the size of $\hat{PBO}$. (2)

Answer: _____

- (c) Determine, with reasons, the size of $\hat{POB}$. (2)

Answer: _____

In the diagram below, PA and PB are tangents to the circle from P. $\hat{APB} = 66^\circ$.



- (d) Determine, with reasons, the size of $\hat{PAB}$. (3)

Answer: _____

- (e) Determine, with reasons, the size of $\hat{PBA}$. (2)

Answer: _____

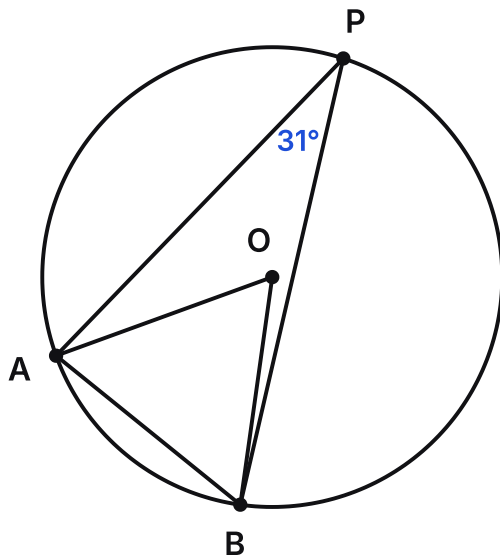
- (f) Determine, with reasons, the size of $\hat{BAU}$. (2)

Answer: _____

- (g) Determine, with reasons, the size of $\hat{VBA}$. (2)

Answer: _____

In the diagram, O is the centre of the circle and AB is joined. $\angle APB = 31^\circ$.



- (a) Determine, with reasons, the size of $\angle AOB$. (2)

Answer: _____

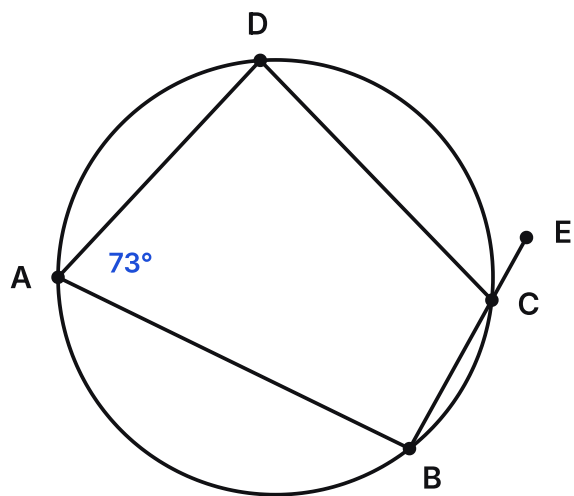
- (b) Determine, with reasons, the size of $\angle OAB$. (3)

Answer: _____

- (c) Determine, with reasons, the size of $\angle OBA$. (2)

Answer: _____

In the diagram below, ABCD is a cyclic quadrilateral and BC is produced to E. $\angle BAD = 73^\circ$.



- (d) Determine, with reasons, the size of $\widehat{DCB}$. (2)

Answer: _____

- (e) Determine, with reasons, the size of $\widehat{ECD}$. (2)

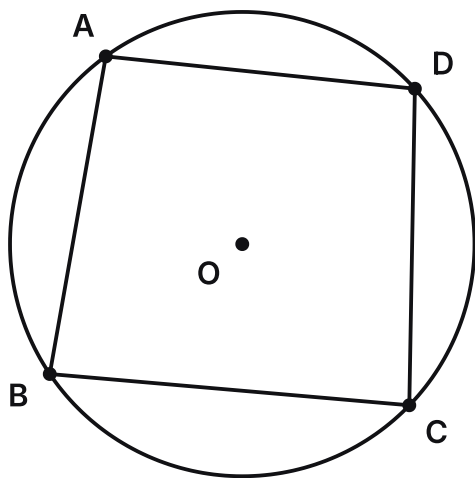
Answer: _____

Proving the theorem itself, not using it

3

[8]

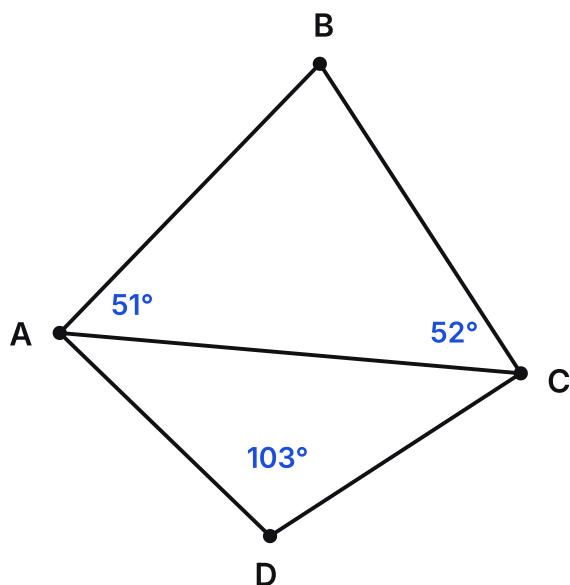
In the diagram, ABCD is a cyclic quadrilateral in a circle with centre O.



- (a) Use the diagram to prove the theorem which states that the opposite angles of a cyclic quadrilateral are supplementary. (4)

Answer: _____

In the diagram below, ABCD is a quadrilateral with the diagonal AC drawn. $\angle BAC = 51^\circ$; $\angle ACB = 52^\circ$; $\angle CDA = 103^\circ$.

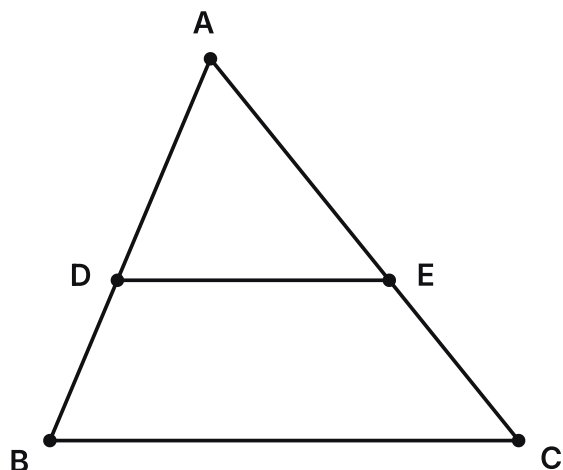


(b) Prove that ABCD is a cyclic quadrilateral.

(4)

Answer: _____

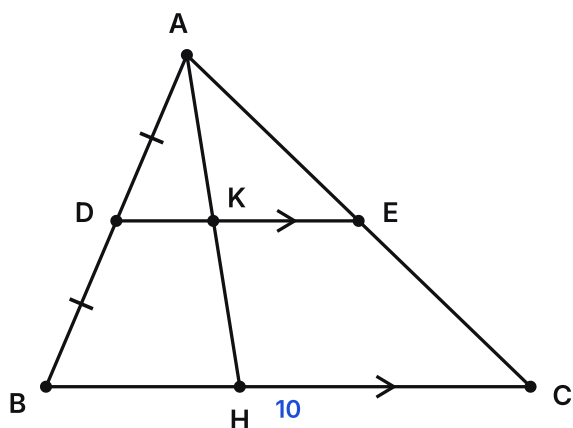
In the diagram, $\triangle ABC$ with D on AB and E on AC, and $DE \parallel BC$.



- (a) Use the diagram to prove the theorem which states that a line parallel to one side of a triangle divides the other two sides proportionally. (4)

Answer: _____

In the diagram below, $\triangle ABC$ is drawn. D is the mid-point of AB. E lies on AC with $DE \parallel BC$. H lies on BC with $BH : HC = 2 : 3$, and AH cuts DE at K. $BC = 10$ units.



- (b) Prove that E is the mid-point of AC. (2)

Answer: _____

- (c) Calculate the length of DE. (2)

Answer: _____

- (d) Calculate the length of DK. (3)

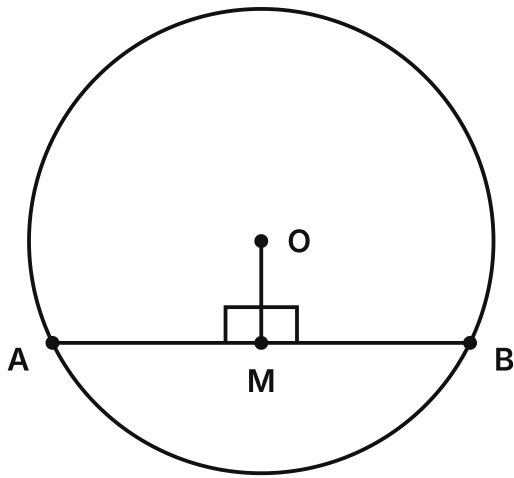
Answer: _____

(e) Determine DK : KE.

(2)

Answer: _____

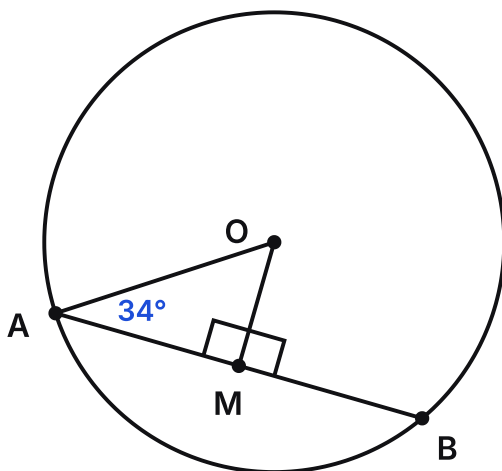
In the diagram, circle with centre O. AB is a chord. $OM \perp AB$.



- (a) Use the diagram to prove the theorem which states that the line from the centre perpendicular to a chord bisects the chord. (6)

Answer: _____

In the diagram below, O is the centre of the circle and $OM \perp AB$, with M on AB. $\angle OAB = 34^\circ$.



- (b) Determine, with reasons, the size of $\angle OMA$. (2)

Answer: _____

(c) Determine, with reasons, the size of $\hat{O}MB$. (2)

Answer: _____

(d) Determine, with reasons, the size of $\hat{A}OM$. (2)

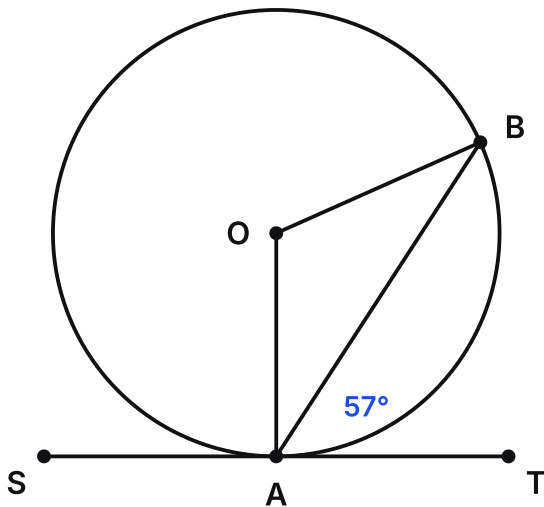
Answer: _____

Tangents, and tangents from a point outside

6

[14]

In the diagram, SAT is a tangent at A to the circle with centre O, and B lies on the circle.
 $\hat{BAT} = 57^\circ$.



- (a) Determine, with reasons, the size of $\hat{BAS}$. (2)

Answer: _____

- (b) Determine, with reasons, the size of $\hat{OAS}$. (2)

Answer: _____

- (c) Determine, with reasons, the size of $\hat{OAT}$. (2)

Answer: _____

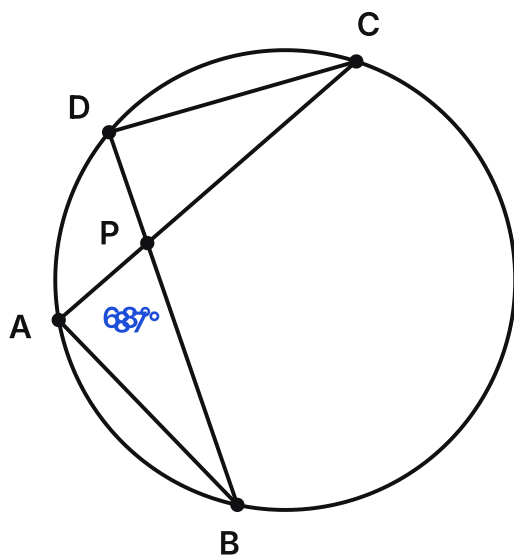
- (d) Determine, with reasons, the size of $\hat{OBA}$. (2)

Answer: _____

- (e) Determine, with reasons, the size of $\hat{BOA}$. (2)

Answer: _____

In the diagram below, the chords AC and BD cut at P inside the circle. $\hat{APB} = 68^\circ$; $\hat{PAB} = 87^\circ$.



- (f) Determine, with reasons, the size of $\hat{PBA}$. (2)

Answer: _____

- (g) Determine, with reasons, the size of $\hat{DPA}$. (2)

Answer: _____

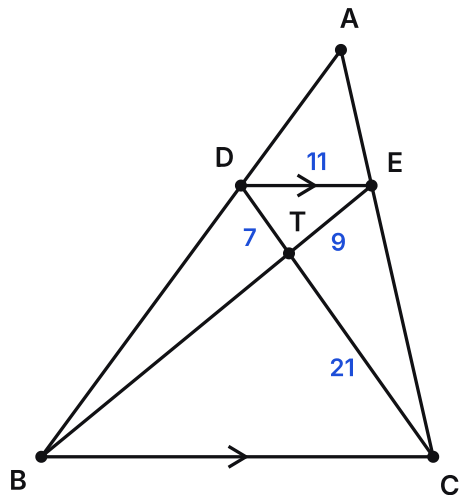
Similar triangles

7

[10]

In the diagram, $\triangle ABC$ is drawn.

- D is a point on AB and E is a point on AC so that $DE \parallel BC$.
- BE and DC intersect at T.
- $DE = 11$ units, $DT = 7$ units, $ET = 9$ units and $TC = 21$ units.



- (a) Prove that $\triangle DET \parallel \triangle CBT$. (3)

Answer: _____

- (b) Determine the length of BC. (2)

Answer: _____

- (c) Determine the length of BT. (2)

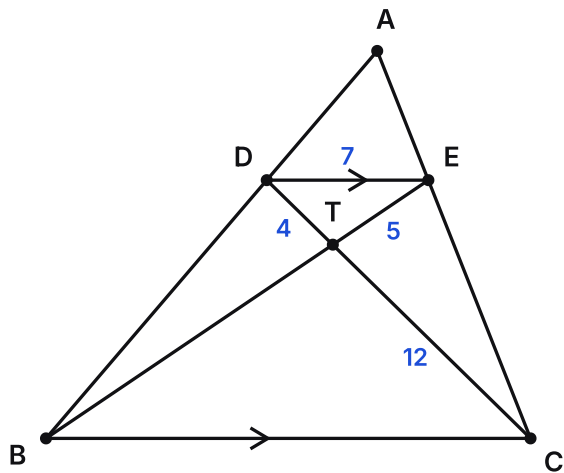
Answer: _____

- (d) Determine $AD : DB$. (3)

Answer: _____

In the diagram, $\triangle ABC$ is drawn.

- D is a point on AB and E is a point on AC so that $DE \parallel BC$.
- BE and DC intersect at T.
- $DE = 7$ units, $DT = 4$ units, $ET = 5$ units and $TC = 12$ units.



- (a) Prove that $\triangle DET \parallel \triangle CBT$. (3)

Answer: _____

- (b) Determine the length of BC . (2)

Answer: _____

- (c) Determine the length of BT . (2)

Answer: _____

- (d) Determine $AD : DB$. (3)

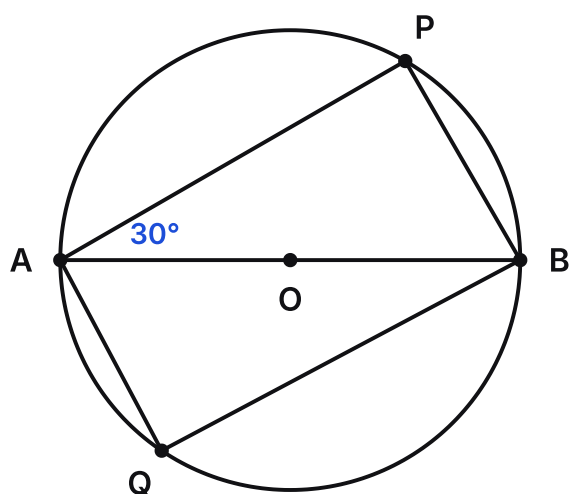
Answer: _____

The angle in a semi-circle

9

[10]

In the diagram, AB is a diameter of the circle with centre O, and P and Q lie on the circle.
 $\angle PAB = 30^\circ$.



- (a) Determine, with reasons, the size of $\angle APB$. (2)

Answer: _____

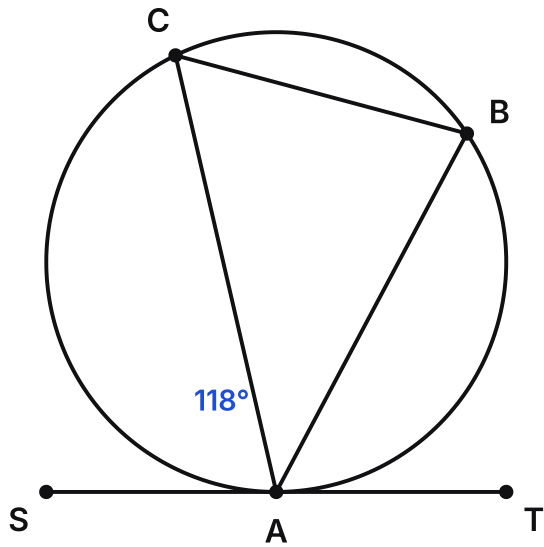
- (b) Determine, with reasons, the size of $\angle BQA$. (2)

Answer: _____

- (c) Determine, with reasons, the size of $\angle PBO$. (2)

Answer: _____

In the diagram below, SAT is a tangent to the circle at A. $\angle SAB = 118^\circ$.



- (d) Determine, with reasons, the size of $\hat{BAT}$. (2)

Answer: _____

- (e) Determine, with reasons, the size of $\hat{ACB}$. (2)

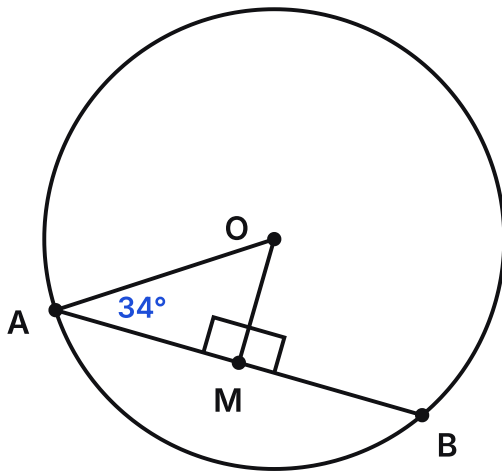
Answer: _____

Chords, and the line from the centre

10

[12]

In the diagram, O is the centre of the circle and $OM \perp AB$, with M on AB . $\angle OAB = 34^\circ$.



- (a) Determine, with reasons, the size of $\angle OMA$. (2)

Answer: _____

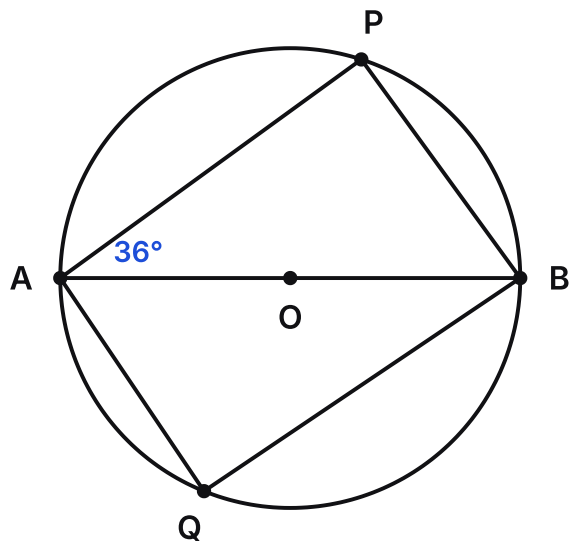
- (b) Determine, with reasons, the size of $\angle OMB$. (2)

Answer: _____

- (c) Determine, with reasons, the size of $\angle OMA$. (2)

Answer: _____

In the diagram below, AB is a diameter of the circle with centre O , and P and Q lie on the circle. $\angle PAB = 36^\circ$.



- (d) Determine, with reasons, the size of $\hat{APB}$. (2)

Answer: _____

- (e) Determine, with reasons, the size of $\hat{BQA}$. (2)

Answer: _____

- (f) Determine, with reasons, the size of $\hat{PBO}$. (2)

Answer: _____

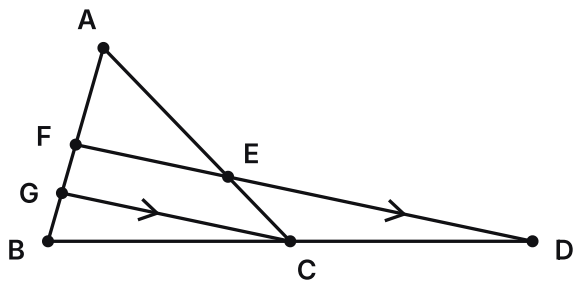
The proportion theorem

11

[8]

In the diagram, $\triangle ABC$ is drawn.

- E and F are points on AC and AB respectively, with $AE : EC = 2 : 1$ and $AF : FB = 1 : 1$.
- BC produced meets FE produced at D.
- G is a point on FB so that $FD \parallel GC$.



(a) Determine $AF : FG$. (2)

Answer: _____

(b) Hence determine $FG : GB$. (3)

Answer: _____

(c) Calculate $BC : CD$. (3)

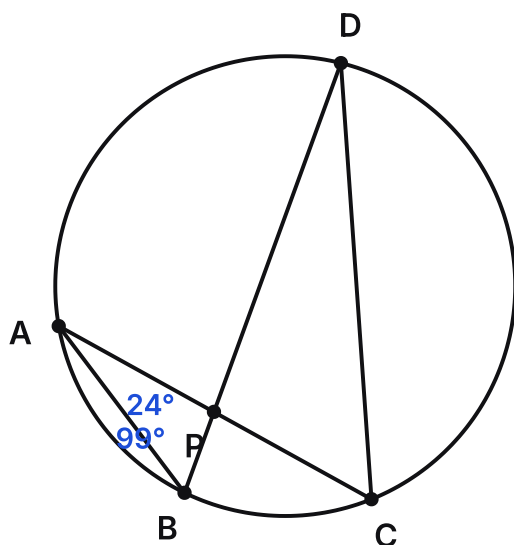
Answer: _____

Angles in the same segment

12

[14]

In the diagram, the chords AC and BD cut at P inside the circle. $\hat{APB} = 99^\circ$; $\hat{PAB} = 24^\circ$.



- (a) Determine, with reasons, the size of $\hat{PBA}$. (2)

Answer: _____

- (b) Determine, with reasons, the size of $\hat{DPA}$. (2)

Answer: _____

- (c) Determine, with reasons, the size of $\hat{BPC}$. (2)

Answer: _____

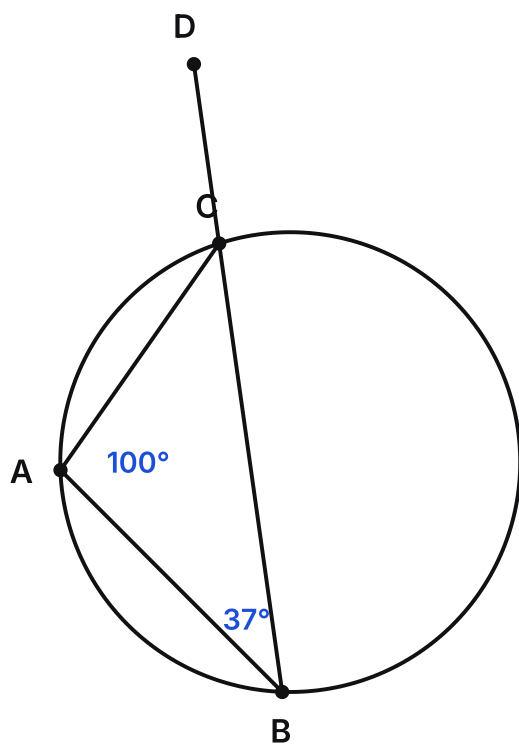
- (d) Determine, with reasons, the size of $\hat{PDC}$. (2)

Answer: _____

- (e) Determine, with reasons, the size of $\hat{DPC}$. (2)

Answer: _____

In the diagram below, ABC is a triangle with BC produced to D. $\hat{BAC} = 100^\circ$; $\hat{ABC} = 37^\circ$.



(f) Determine, with reasons, the size of $\hat{ACB}$. (2)

Answer: _____

(g) Determine, with reasons, the size of $\hat{DCA}$. (2)

Answer: _____