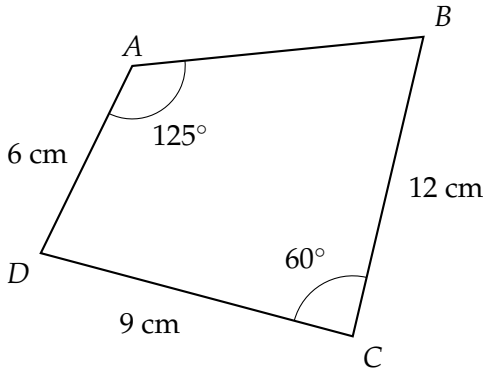
Trigonometry in Quadrilaterals Worksheet

Sine & Cosine Rules in Composite 2D Shapes

Reference: Edexcel IGCSE June 2025 / Paper 2H / Q23

I Do

$ABCD$ is a quadrilateral.



Find the size of angle ABC. Give your answer correct to the nearest degree.

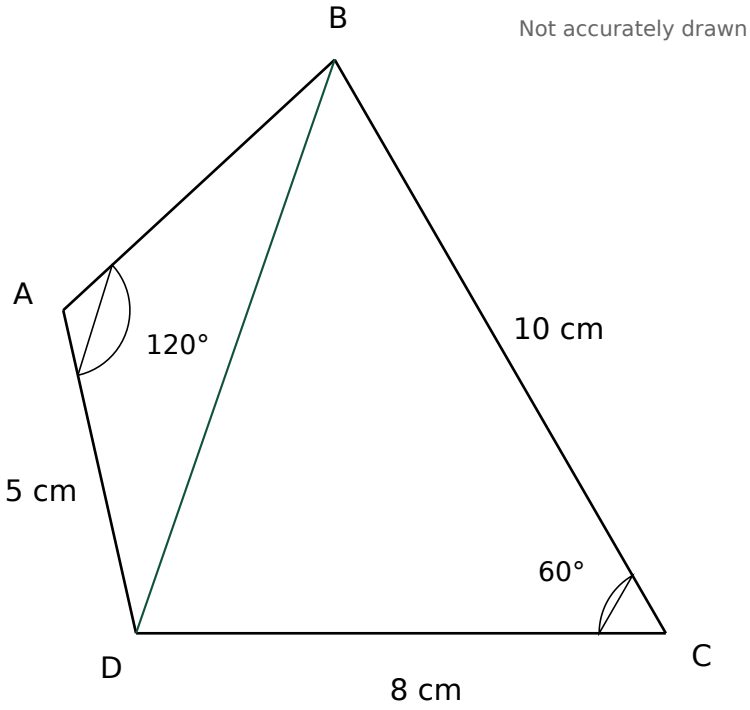
(Total for Question 1 is 5 marks)

Trigonometry in Quadrilaterals

We Do

ABCD is a quadrilateral. The lengths and angles are shown in the diagram.

Find angle ABC. Give your answer correct to the nearest degree.



Show all your working.

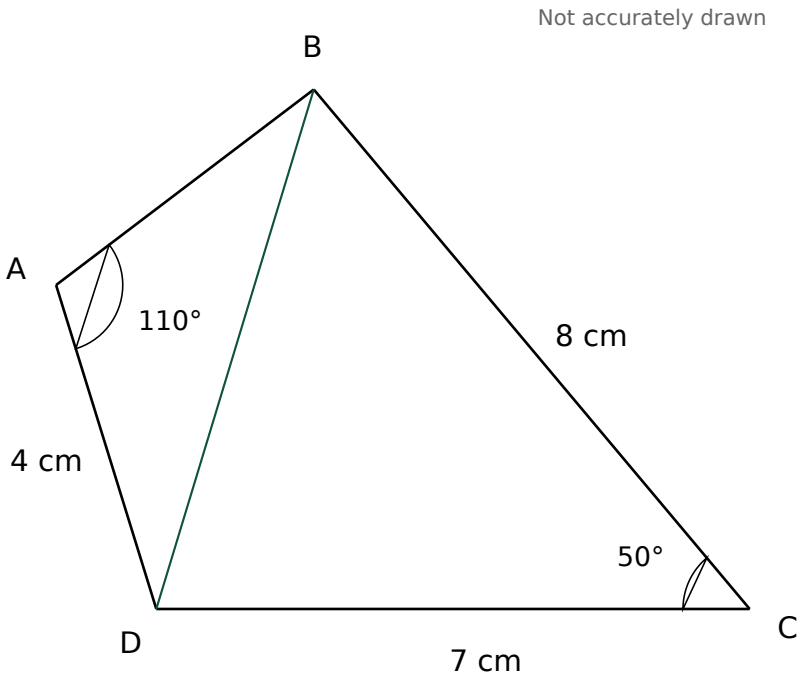
(Total: 5 marks)

Trigonometry in Quadrilaterals

You Do

ABCD is a quadrilateral. The lengths and angles are shown in the diagram.

Find angle ABC. Give your answer correct to 1 decimal place.



Show all your working.

(Total: 5 marks)

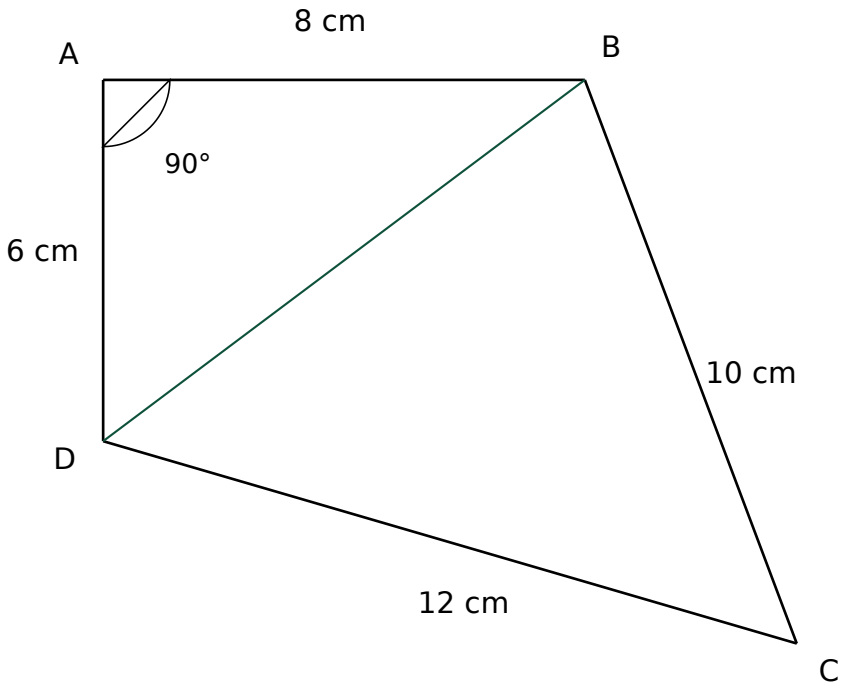
Trigonometry in Quadrilaterals

Challenge

ABCD is a quadrilateral. The lengths and angles are shown in the diagram.

Find angle BCD. Give your answer correct to 1 decimal place.

Not accurately drawn



Show all your working.

(Total: 5 marks)

Answers & Worked Solutions

• **I Do:**

1. In $\triangle BCD$***, find*** BD ***using the Cosine Rule:***

$BD^2 = 12^2 + 9^2 - 2(12)(9)\cos(60°) = 144 + 81 - 108 = 117 \implies BD = \sqrt{117} \approx 10.817$ ***cm***

2. In $\triangle BCD$***, find*** $\angle DBC$ ***using the Sine Rule:***

$\frac{\sin(\angle DBC)}{9} = \frac{\sin(60°)}{\sqrt{117}} \implies \sin(\angle DBC) \approx 0.72058 \implies \angle DBC \approx 46.10°$

3. In $\triangle ABD$***, find*** $\angle ABD$ ***using the Sine Rule:***

$\frac{\sin(\angle ABD)}{6} = \frac{\sin(125°)}{\sqrt{117}} \implies \sin(\angle ABD) \approx 0.45438 \implies \angle ABD \approx 27.02°$

4. Combine angles:

$\angle ABC = \angle ABD + \angle DBC = 27.02° + 46.10° = 73.12° \approx 73°$

Answer: $73°$

• **We Do:**

1. In $\triangle BCD$***, find*** BD ***using the Cosine Rule:***

$BD^2 = 10^2 + 8^2 - 2(10)(8)\cos(60°) = 100 + 64 - 80 = 84 \implies BD = \sqrt{84} \approx 9.165$ ***cm***

2. In $\triangle BCD$***, find*** $\angle DBC$ ***using the Sine Rule:***

$\frac{\sin(\angle DBC)}{8} = \frac{\sin(60°)}{\sqrt{84}} \implies \sin(\angle DBC) \approx 0.75593 \implies \angle DBC \approx 49.11°$

3. In $\triangle ABD$***, find*** $\angle ABD$ ***using the Sine Rule:***

$\frac{\sin(\angle ABD)}{5} = \frac{\sin(120°)}{\sqrt{84}} \implies \sin(\angle ABD) \approx 0.47246 \implies \angle ABD \approx 28.19°$

4. Combine angles:

$\angle ABC = \angle ABD + \angle DBC = 28.19° + 49.11° = 77.30° \approx 77°$

Answer: $77°$

• **You Do:**

1. In $\triangle BCD$***, find*** BD ***using the Cosine Rule:***

$BD^2 = 8^2 + 7^2 - 2(8)(7)\cos(50°) = 64 + 49 - 71.992 = 41.008 \implies BD \approx 6.404$ ***cm***

2. In $\triangle BCD$***, find*** $\angle DBC$ ***using the Sine Rule:***

$\frac{\sin(\angle DBC)}{7} = \frac{\sin(50°)}{6.404} \implies \sin(\angle DBC) \approx 0.83737 \implies \angle DBC \approx 56.86°$

3. In $\triangle ABD$***, find*** $\angle ABD$ ***using the Sine Rule:***

$\frac{\sin(\angle ABD)}{4} = \frac{\sin(110°)}{6.404} \implies \sin(\angle ABD) \approx 0.58697 \implies \angle ABD \approx 35.94°$

4. Combine angles:

$\angle ABC = 35.94° + 56.86° = 92.80° \approx 92.8°$

Answer: $92.8°$

• **Challenge:**

1. In right-angled $\triangle ABD$***, find*** BD ***using Pythagoras' Theorem:***

$BD^2 = 6^2 + 8^2 = 36 + 64 = 100 \implies BD = 10$ ***cm***

2. In $\triangle BCD$***, three sides are known*** $(BC = 10, CD = 12, BD = 10)$***. Find*** $\angle BCD$ ***using the Cosine Rule:***

$\cos(\angle BCD) = \frac{10^2 + 12^2 - 10^2}{2(10)(12)} = \frac{144}{240} = 0.6$

3. Solve for $\angle BCD$***:***

$\angle BCD = \cos^{-1}(0.6) \approx 53.13^\circ \approx 53.1^\circ$
Answer: 53.1°