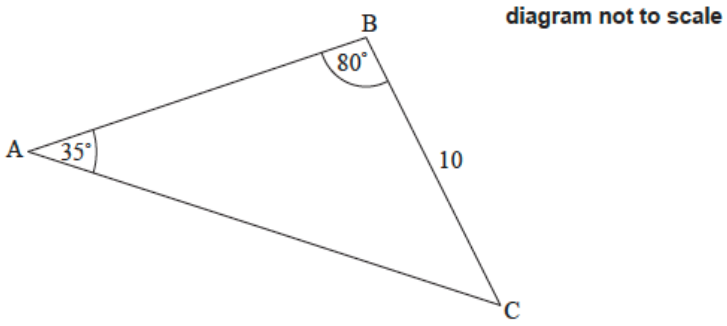
BECA / Huson / IB Math Name:
2 October 2019
Trig rules

1a. The following diagram shows triangle ABC.

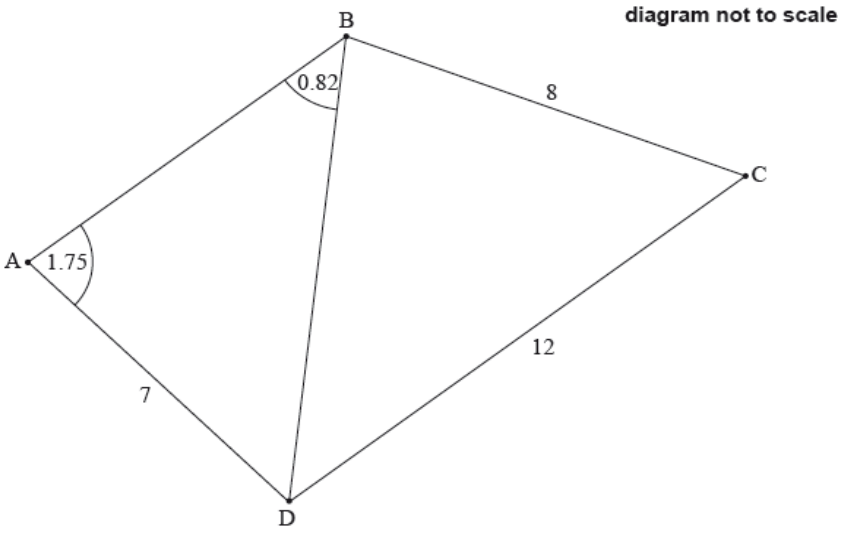


$$\text{BC} = 10 \text{ cm}, \hat{\text{ABC}} = 80^\circ \text{ and } \hat{\text{BAC}} = 35^\circ.$$

Find AC. *[3 marks]*

1b. Find the area of triangle ABC. *[3 marks]*

2a. The following diagram shows a quadrilateral ABCD.



$$\text{AD} = 7 \text{ cm}, \text{BC} = 8 \text{ cm}, \text{CD} = 12 \text{ cm}, \hat{\text{DAB}} = 1.75 \text{ radians}, \hat{\text{ABD}} = 0.82 \text{ radians}.$$

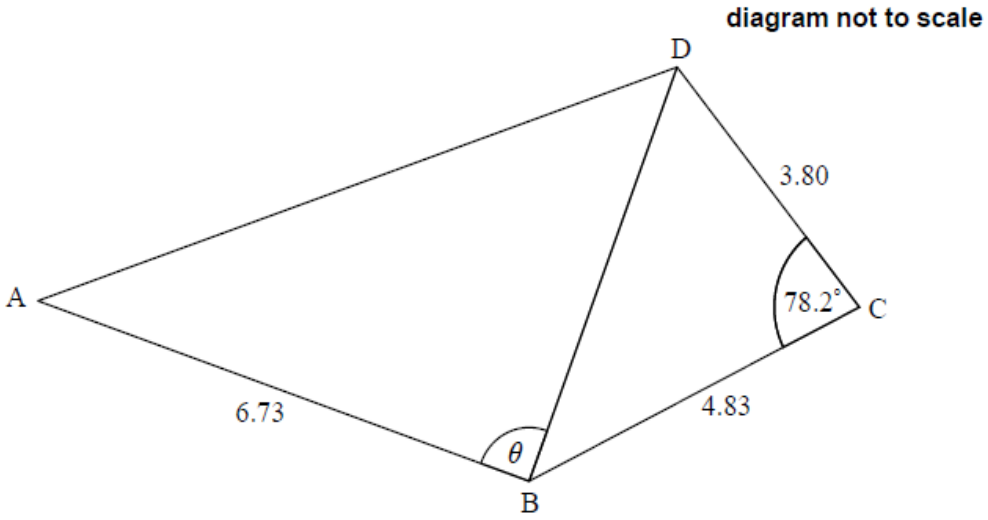
Find BD. *[3 marks]*

2b. Find $\hat{\text{DBC}}$. *[3 marks]*

BECA / Huson / IB Math
2 October 2019

Name:

3a. The following diagram shows the quadrilateral ABCD.

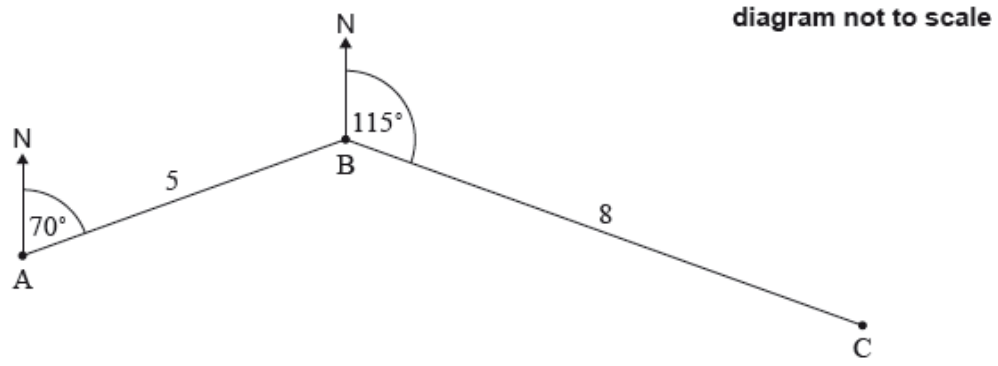


AB = 6.73 cm, BC = 4.83 cm, $B\hat{C}D = 78.2°$ and CD = 3.80 cm.

Find BD. *[3 marks]*

3b. The area of triangle ABD is 18.5 cm^2. Find the possible values of θ. *[4 marks]*

4a. The following diagram shows three towns A, B and C. Town B is 5 km from Town A, on a bearing of 070°. Town C is 8 km from Town B, on a bearing of 115°.



Find $A\hat{B}C$. *[2 marks]*

4b. Find the distance from Town A to Town C. *[3 marks]*

4c. Use the sine rule to find $A\hat{C}B$. *[2 marks]*

Name:

5a. In triangle ABC, $\mathrm{AB} = 6\,\mathrm{cm}$ and $\mathrm{AC} = 8\,\mathrm{cm}$. The area of the triangle is $16\,\mathrm{cm}^2$.

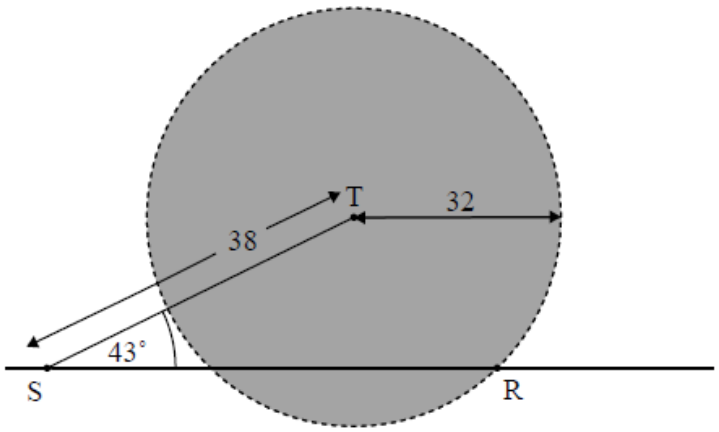
Find the two possible values for $\hat{A}$. *[4 marks]*

5b. Given that $\hat{A}$ is obtuse, find BC. *[3 marks]*

6a. A communication tower, T, produces a signal that can reach cellular phones within a radius of 32 km. A straight road passes through the area covered by the tower's signal.

The following diagram shows a line representing the road and a circle representing the area covered by the tower's signal. Point R is on the circumference of the circle and points S and R are on the road. Point S is 38 km from the tower and $\mathrm{R\hat{S}T} = 43^\circ$.

diagram not to scale



Let SR = x. Use the cosine rule to show that $x^2 - (76\cos 43^\circ)\,x + 420 = 0$. *[2 marks]*

6b. Hence or otherwise, find the total distance along the road where the signal from the tower can reach cellular phones. *[4 marks]*

7a. The following diagram shows the quadrilateral $ABCD$.

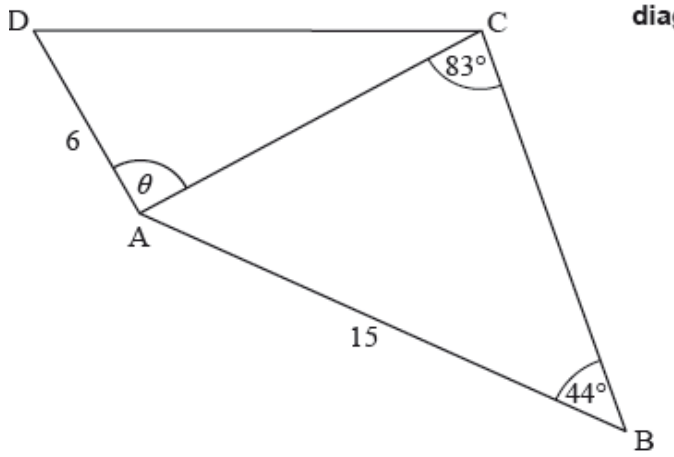


diagram not to scale

$$\text{AD} = 6 \text{ cm},\ \text{AB} = 15 \text{ cm}, \text{A}\hat{\text{B}}\text{C} = 44^\circ, \text{A}\hat{\text{C}}\text{B} = 83^\circ \text{and} \text{D}\hat{\text{A}}\text{C} = \theta$$

Find AC. *[3 marks]*

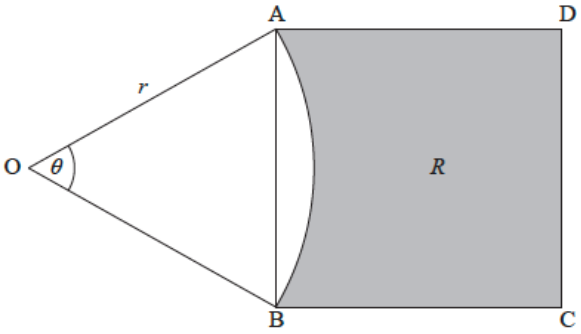
7b. Find the area of triangle ABC. *[3 marks]*

7c. The area of triangle ACD is half the area of triangle ABC.

Find the possible values of θ. *[5 marks]*

7d. Given that θ is obtuse, find CD. *[3 marks]*

8a. The following diagram shows a square $ABCD$, and a sector OAB of a circle centre O, radius r. Part of the square is shaded and labelled R.



$$\text{A}\hat{\text{O}}\text{B} = \theta, \text{ where } 0.5 \leq \theta < \pi.$$

Show that the area of the square $ABCD$ is $2r^2(1 - \cos\theta)$. *[4 marks]*

8b. When $\theta = \alpha$, the area of the square $ABCD$ is equal to the area of the sector OAB. *[4 marks]*

(i) Write down the area of the sector when $\theta = \alpha$.

(ii) Hence find α.