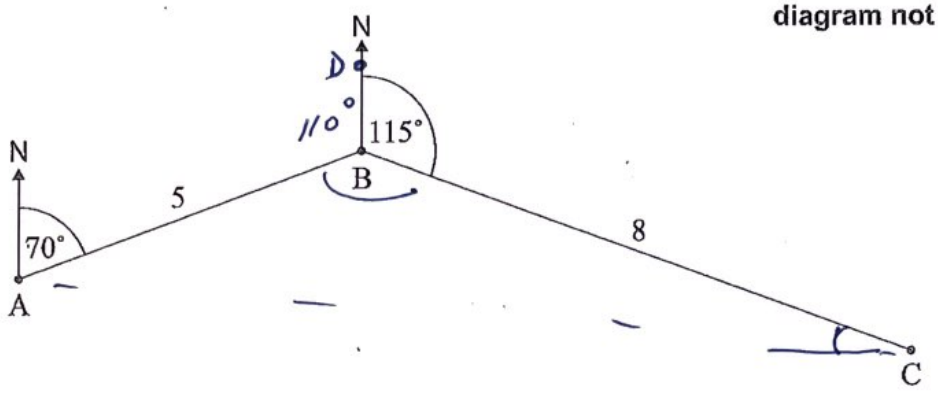
La Scuola d'Italia / Huson / IB Mathematics
.5 November 2025

SOLUTIONS

1 Geometry: Law of Cosines, Law of Sines

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°.

diagram not to scale



(a) Find $A\hat{B}C$. [2]

(b) Find the distance from Town A to Town C. [3]

(c) Use the sine rule to find $A\hat{C}B$. [2]

(a) $A\hat{B}D = 180 - 70 = 110$

$A\hat{B}C = 360 - (110 + 115)$

$= 135°$

(b) $AC = \sqrt{5^2 + 8^2 - 2(5)(8)\cos 135°}$

$= 12.0652$

≈ 12.1

(c) $\frac{5}{\sin C} = \frac{12.1}{\sin 135}$

$\sin C = \frac{5}{12.1} \sin 135 = 0.29305...$

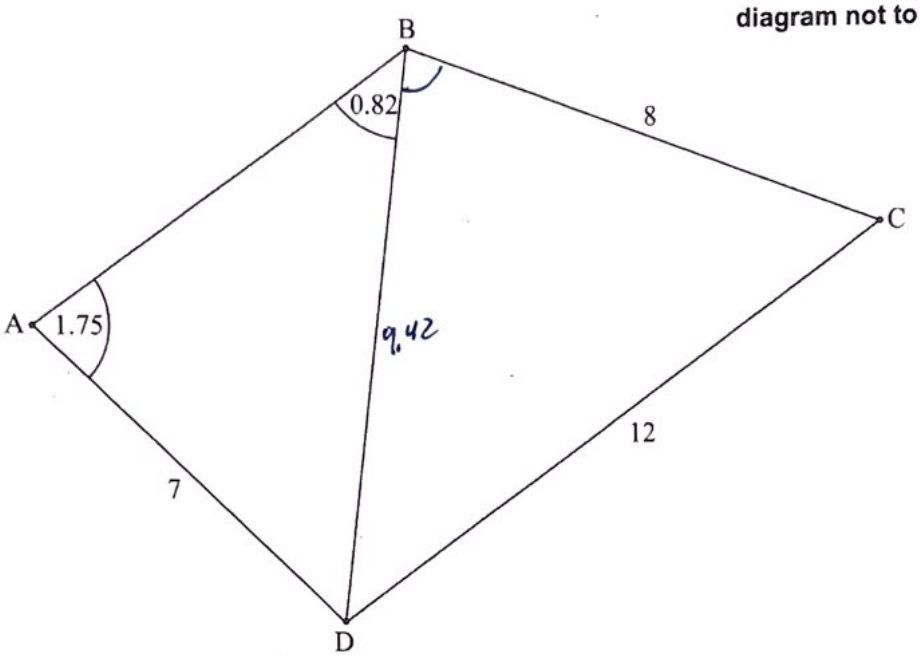
$C = \sin^{-1}(0.293...) = 17.0398...$

$\approx 17.0°$

2. [Maximum mark: 6]

The following diagram shows a quadrilateral ABCD.

diagram not to scale



AD = 7 cm, BC = 8 cm, CD = 12 cm, $D\hat{A}B = 1.75$ radians, $A\hat{B}D = 0.82$ radians.

(a) Find BD. [3]

(b) Find $D\hat{B}C$. [3]

(a) $\frac{BD}{\sin 1.75} = \frac{7}{\sin 0.82}$

$BD = 9.42069...$

≈ 9.42

(b) $\cos B = \frac{8^2 + 9.42^2 - 12^2}{2(8)(9.42)} = 0.058047...$

$B = \cos^{-1}(0.0580...) = 1.5127...$

≈ 1.51 radians

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1. Geometry : Law of Cosines, Sines — Solutions

5. Pauline owns a piece of land

(a) $BD = \sqrt{190^2 + 120^2 - 2(120)(190)\cos 75^\circ}$
$= 196.718...$
≈ 197 m

(b) $196.718... \times 17 = 3344.20$
≈ 3344 Accept (3349)

(c) $\frac{\sin(A\hat{B}D)}{70} = \frac{\sin 115}{197}$
$\sin A\hat{B}D = 0.3225...$
$A\hat{B}D = \sin^{-1}(0.3225...) = 18.8142...$ (18.7862...)
≈ 18.8

(d) $B\hat{D}A = 180 - 115 - 18.8$
$= 46.2^\circ$

$A_{ABD} = \frac{1}{2}(\sin 46.2)197 \cdot 70$ accept (4976.54)
$= 4969.41...$ (4980)
$\approx 4970.$ m^2

(e) $120 \cdot 4970 = 596{,}400$ 596,329 , 597,184
597,600

(f) $(1+r)^{15} = 2$
$r = \sqrt[15]{2} - 1$
$= 0.04729...$
4.73%

SNOO 2025

1. Geometry: Law of Cosines, Sines SOLUTIONS

4. The diagram represents a small, triangular field

(a) 50°

(b) $\frac{AC}{\sin 50} = \frac{25}{\sin 55}$

$AC = 23.3792\ldots$

≈ 23.4 m

(c) $A = \frac{1}{2}(23.4)(25)\sin 75$

$= 282.282\ldots$ (282.533... accept 283)

≈ 282 m^2

(d) $\sin 55 = \frac{CN}{23.4}$ (23.3752...)

$CN = 19.1511\ldots$

$MN = \frac{1}{2} CN = 9.57556$ (9.584...)

≈ 9.58

(e) $\frac{MP}{12.5} = \cos 50$

$MP = 12.5 \cos 50$

$= 8.03485 > 7$m

yes