IB Maths: AA HL

Trigonometry Toolkit

Topic Questions

These practice questions can be used by students and teachers and is Suitable for IB Maths AA HL Topic Questions

Course	IB Maths
Section	3. Geometry & Trigonometry
Topic	3.3 Trigonometry Toolkit
Difficulty	Medium

Level: IB Maths

Subject: IB Maths AA HL

Board: IB Maths

Topic: Trigonometry Toolkit

Question 1

Owen, Henry and Tom are rugby players passing a ball in a park. Owen is at point O, Henry is at point H and Tom is at point T. The distance between Owen and Henry is 25 m and the distance between Henry and Tom is 18 m. The angle OĤT is 96°.

(a) (i) Draw and label a diagram to represent the situation described above.

(ii) Find the length of the line OT.

[4 marks]

(b) Find the size of the angle OT̂H.

[3 marks]

(c) Find the area of the section of the park the players are using to pass the ball.

[3 marks]

Question 2

A sailboat race takes place annually for under 18's on a large lake. The competitors must sail around five flagged buoys at the points A, B, C, D and E, in a clockwise direction.

B is due east of A, C is due south of B and A is due north of E.
The bearing from A to C is 110° and the bearing from C to D is 220°.
The distance AB = 1200 m, the distance BC = 600 m, the distance CD = 800 m and the distances DE = EA = 1000 m.

(a) Draw and label a diagram to show the buoys A, B, C, D and E and clearly mark the bearings and distances given above.

[3 marks]

The boats all start at A and must complete the course 5 times. A support motorboat is present and can travel across the course from A to C and A to D in case of an emergency.

(b) Calculate the distance from A to C.

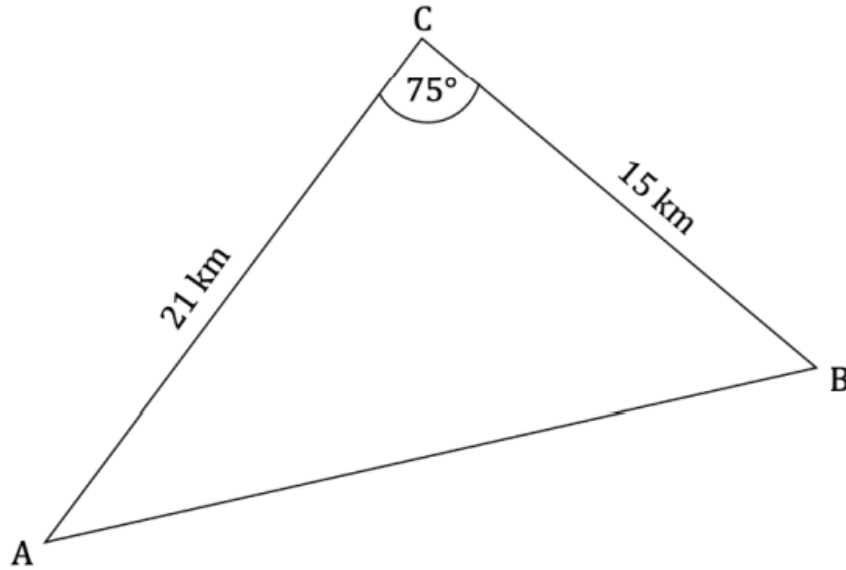[2 marks]

(c) Calculate the distance from A to D.

[3 marks]

(d) Calculate the bearing the support boat must follow to travel from A to D.

[4 marks]

Question 3

The following diagram shows triangle ABC. AC = 21 km, CB = 15 km, A$\hat{C}$B = 75°.

(a) Find the area of triangle ABC.

[2 marks]

(b) Find AB.

[3 marks]

(c) Given that it is acute, find C$\hat{A}$B.

[2 marks]

Question 4

Triangle ABC has an area of 122 cm^2, AB = 24 cm and BC = 11 cm.

(a) Draw and label a diagram to show triangle ABC and clearly mark the distances given.
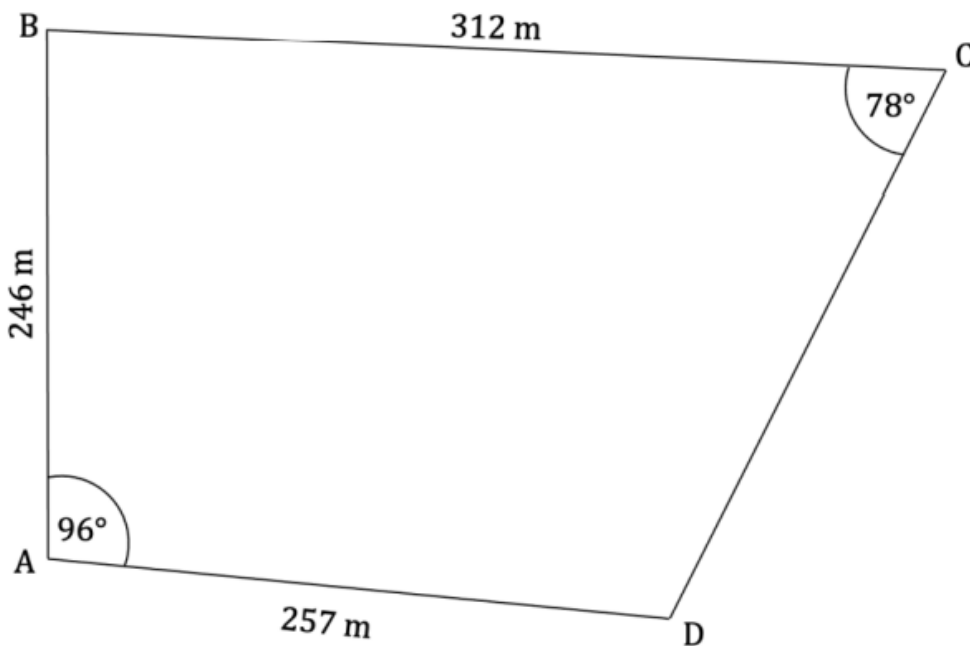
[1 mark]

(b) Given that $A\hat{B}C$ is acute, find

    (i) $A\hat{B}C$

    (ii)   AC.

[4 marks]

Question 5

The quadrilateral ABCD shown below represents a farm paddock, where AB = 246 m, BC = 312 m and AD = 257 m. Angle $D\hat{A}B$ = 96° and angle $B\hat{C}D$ = 78°.

A fence is built connecting points B and D to split the paddock into two.

(a) Find the length of the fence.

[3 marks]

(b) Find the area of the paddock ABCD.

[5 marks]

Question 6

A 38 m high cliff is perpendicular to the sea and the angle of depression from the cliff to a boat at sea is 24°. Climbing the cliff is a rock climber and the angle of elevation from the boat to the climber 14°.

(a) Draw and label a diagram to show the top of the cliff, T, the foot of the cliff, F, the climber, C, the boat, B, labelling all the angles and distances given above.

[2 marks]

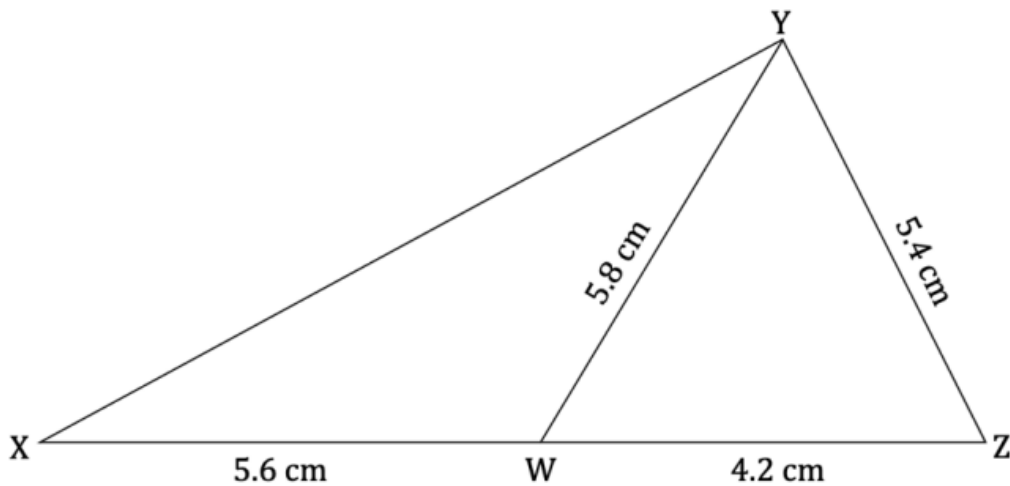(b) Find the distance from the boat to the foot of the cliff.

[2 marks]

(c) Find how far the climber must climb to reach the top of the cliff.

[4 marks]

Question 7

The diagram below shows triangle XYZ with side length YZ = 5.4 cm. The point W is placed such that XW = 5.6 cm and WZ = 4.2 cm and YW = 5.8 cm.

(a) Find the angle YẐW.

[2 marks]

(b) Find the area of triangle XYZ.

[2 marks]

(c) Find the area of triangle XYW.

[3 marks]

Question 8

The distance between towns X and Y is 134.2 km. The bearing of town X from town Y is 119°. Town Z is 54 km south of town X. The bearing of town Z from town X is 207°.

(a) Draw and label a diagram to show towns X, Y and Z, clearly marking the bearings and distances given above.

[2 marks]

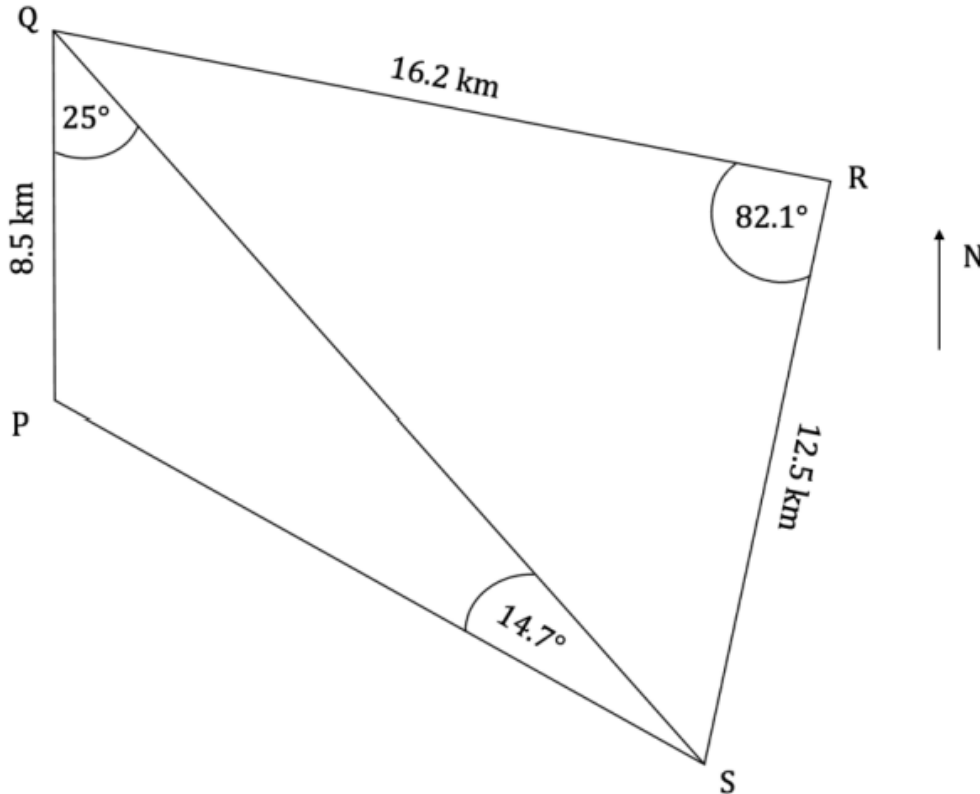(b) Calculate the distance between towns X and Z.

[2 marks]

(c) Calculate the distance between towns Y and Z.

[4 marks]

Question 9

The diagram below shows four Islands P, Q, R and S. PQ = 8.5 km, QR = 16.2 km and RS = 12.5 km. Angle $P\hat{Q}S = 25°$, angle $Q\hat{S}P = 14.7°$ and angle $Q\hat{R}S = 82.1°$. Island Q is due north from Island P.

Mark is making deliveries around the Islands. He takes milk from Island Q to Island S, then takes wood from Island S to Island P, finally he delivers fruit from Island P to Island R.

Find the total distance Mark travels.

[8 marks]

Question 10

Nathan (N) stands 10 m above the ground on the second-floor balcony of an apartment building and can see Melissa (M) in the car park. The angle of elevation from Melissa to Nathan is 21.6°.

(a) Calculate the distance from M to N.

[2 marks]

Louisa (L) is standing on the other side of the car park. The distance between Louisa and Nathan is 1.5 times the distance between Melissa and Nathan.

(b) Calculate the angle of depression from N to L.

[3 marks]