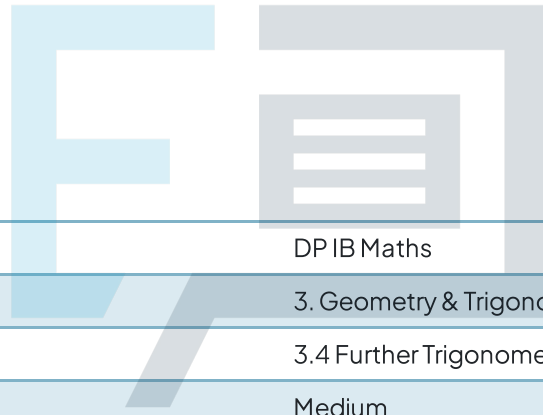




3.4 Further Trigonometry

Question Paper



Course	DP IB Maths
Section	3. Geometry & Trigonometry
Topic	3.4 Further Trigonometry
Difficulty	Medium

Exam Papers Practice

To be used by all students preparing for DP IB Maths AA SL
Students of other boards may also find this useful

Question 1

Complete the table.

Degrees	Radians	sin	cos	tan
	$\frac{\pi}{6}$		$\frac{\sqrt{3}}{2}$	
45°			$\frac{1}{\sqrt{2}}$	
60°	$\frac{\pi}{3}$			
	$\frac{2\pi}{3}$	$\frac{\sqrt{3}}{2}$		
270°				

[5 marks]



Exam Papers Practice

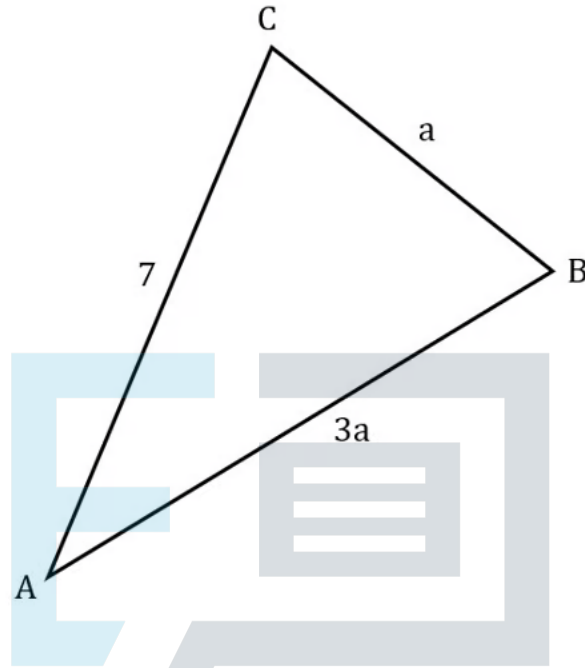
Question 2

Given that $\sin \theta = \frac{3}{5}$, where $\frac{\pi}{2} < \theta < \pi$, find the possible values of $\cos \theta$ and $\tan \theta$.

[3 marks]

Question 3

The following triangle shows triangle ABC, with $AB = 3a$, $BC = a$ and $AC = 7$.



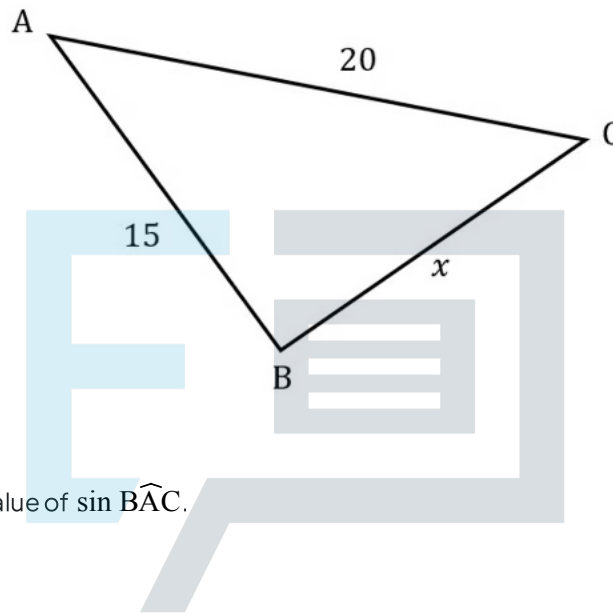
Given that $\cos \widehat{ABC} = \frac{1}{2}$, find the area of the triangle. Give your answer in the form $\frac{p\sqrt{3}}{r}$, where $p, q \in \mathbb{R}$.

[7 marks]

Exam Papers Practice

Question 4a

The following triangle shows triangle ABC, with $AB = 15$, $AC = 20$, $BC = x$.



Given that $\cos \widehat{BAC} = \frac{2}{3}$, find the value of $\sin \widehat{BAC}$.

[3 marks]

Exam Papers Practice

Question 4b

Find the exact area of triangle ABC.

[3 marks]

Question 4c

By finding the value of x , show that triangle ABC is isosceles.

[3 marks]

Question 5

A sector of a circle, OPQ , is such that it has radius 3.4 cm and the angle at its centre, O , is $\frac{3\pi}{4}$ radians.

- (i)
Find the length of the arc PQ .
- (ii)
Find the area of the sector OPQ .

Exam Papers Practice [4 marks]

Question 6

Two non-congruent triangles both have sides $AB = 5.3$ cm, $BC = 6.4$ cm and $\widehat{ACB} = 38^\circ$.

Show that the angle \widehat{BAC} for one of the triangles is 132° , to 3 significant figures.

Find the angle \widehat{ABC} for the other triangle.

[4 marks]

Question 7

A right-angled triangle has hypotenuse 8 cm. One of its other sides is 5 cm.

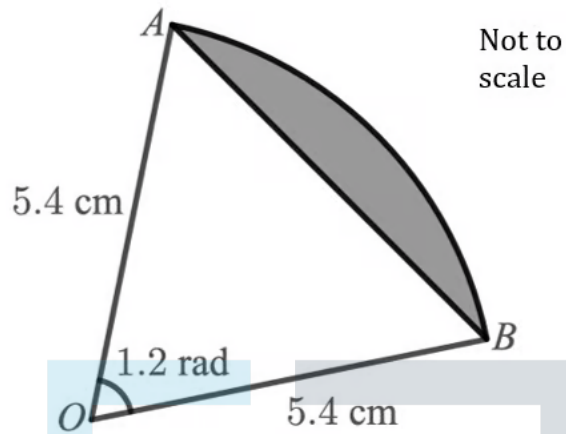
Find exact values for $\sin \theta$, $\cos \theta$ and $\tan \theta$, where θ is the smallest angle in the triangle.

[6 marks]

Exam Papers Practice

Question 8a

The diagram below shows the sector of a circle OAB .



- (i)
Find the area of the sector OAB , giving your answer to 3 significant figures.
- (ii)
Find the area of the triangle OAB , giving your answer to 3 significant figures.
- (iii)
Find the area of the shaded segment, giving your answer to 3 significant figures.

Exam Papers Practice [5 marks]

Question 8b

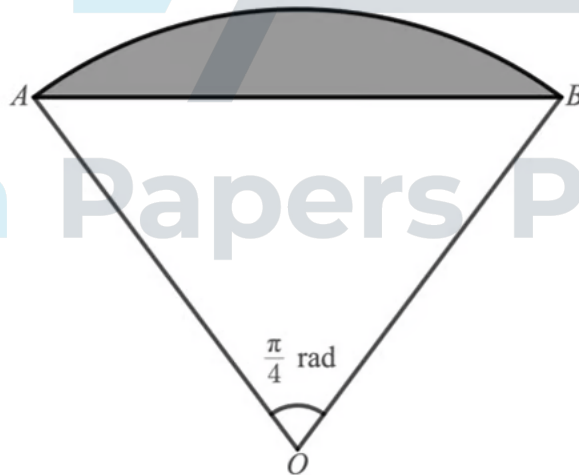
(i)
Find the length of the arc AB .

(ii)
Find the perimeter of the sector OAB .

[3 marks]

Question 9

The canopy of a parachute and the outermost connecting cords form a sector of a circle as shown in the diagram below, with the parachutist modelled as a particle at point O .



Not to scale

The area of the sector OAB is $\frac{81\pi}{200} \text{ m}^2$.

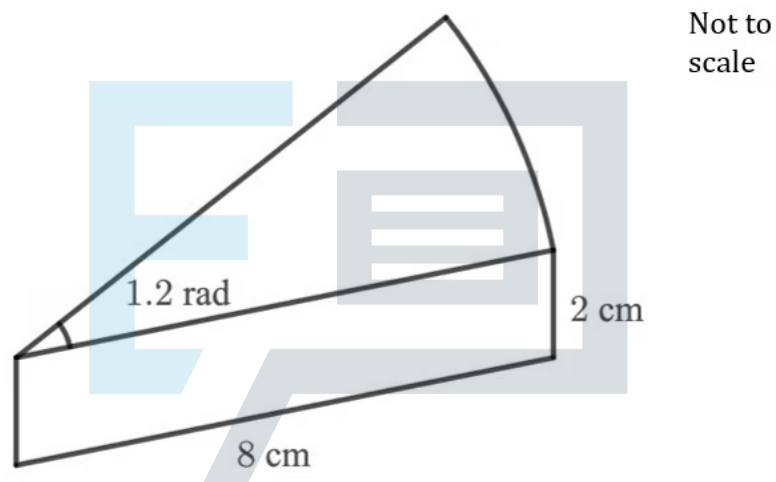
Find the length of one of the connecting cords on the parachute.

[3 marks]

Question 10

A plastic puzzle piece is in the form of a prism with a cross-section that is the sector of a circle, as shown in the diagram below. The radius of the sector is 8 cm, and the angle at the centre is 1.2 radians.

The height of the puzzle piece is 2 cm.



(i) Work out the area of the cross-section.

(ii) Hence, or otherwise, work out the volume of the puzzle piece.

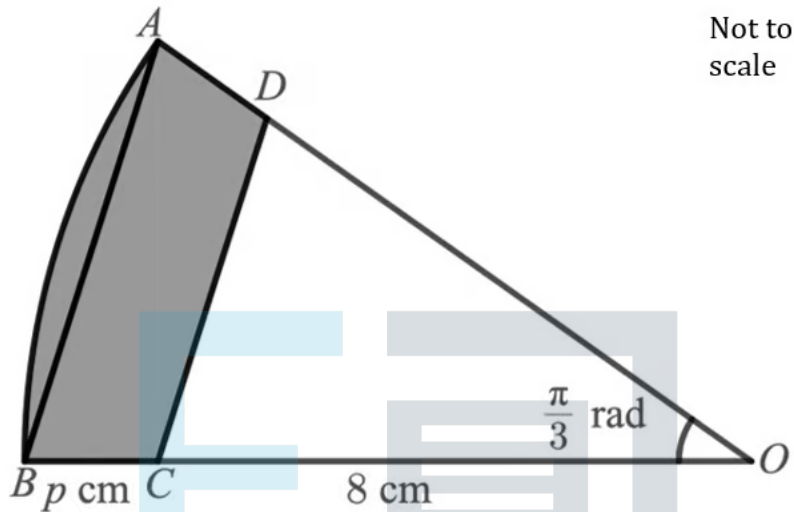
[3 marks]

Question 11a

The circle sector OAB is shown in the diagram below.

The angle at the centre is $\frac{\pi}{3}$ radians, and the line segments OC and BC have lengths of 8 cm and p cm respectively.

Additionally, CD is parallel to AB , so that $AD = BC$ and $OD = OC$.



Show that the area of the sector OAB is $\frac{\pi}{6}(p+8)^2 \text{ cm}^2$.

[2 marks]

Exam Papers Practice

Question 11b

Show that the area of the triangle OCD is $16\sqrt{3} \text{ cm}^2$.

[2 marks]

Question 11c

Given that the area of the shaded shape $ABCD$ is $\left(\frac{50\pi}{3} - 16\sqrt{3}\right) \text{ cm}^2$, find the value of p .

[4 marks]



Exam Papers Practice