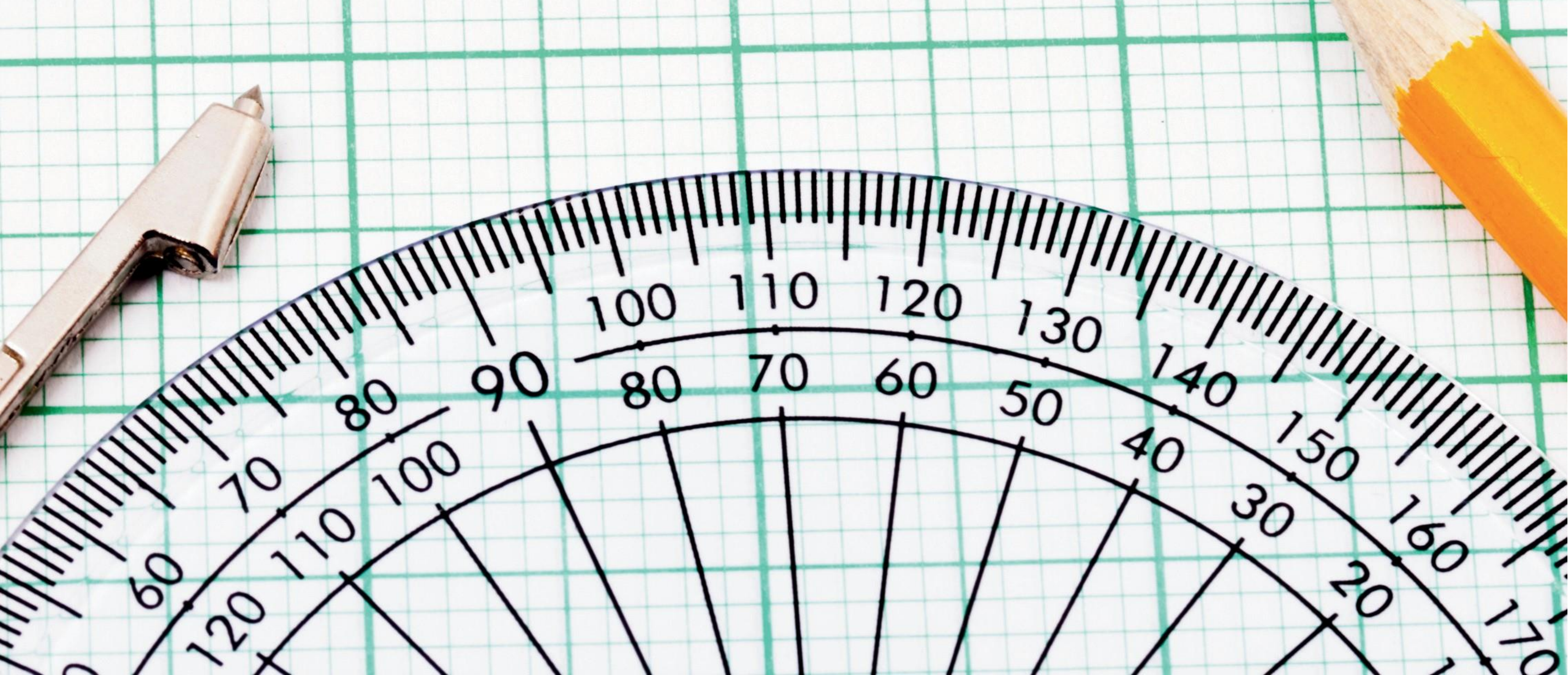
Your International Curriculum Expert

ELEVATE

MATH TOPICAL WORKSHEETS

IGCSE- Additional Mathematics (0606)
Trigonometry and Circular Measures



1 Solve $3\cot^2 x - 14\operatorname{cosec} x - 2 = 0$ for $0° < x < 360°$.

(5 marks)

2 A circle has a radius of 6 cm. A sector of this circle has a perimeter of $2(6 + 5\pi)$ cm. Find the area of this sector.

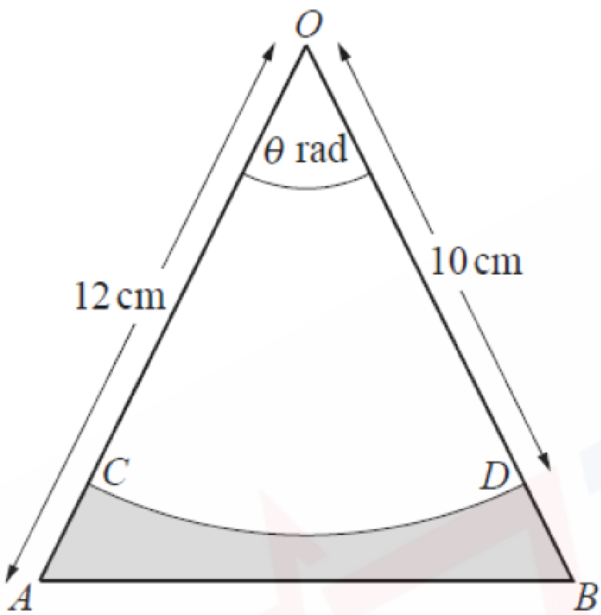
(4 marks)

3 Show that $\dfrac{\sin^4 y - \cos^4 y}{\cot y} = \tan y - 2\cos y \sin y$.

(4 marks)

+918591171615 https://pointsedulab.com/ info@pointsedulab.com

4 (a)



The diagram shows an isosceles triangle OAB such that $OA = OB = 12\text{cm}$ and angle $AOB = \theta$ radians.

Points C and D lie on OA and OB respectively such that CD is an arc of the circle, centre O, radius 10 cm.

The area of the sector $OCD = 35\text{cm}^2$.

Show that $\theta = 0.7$.

(1 mark)

(b) Find the perimeter of the shaded region.

(4 marks)

(c) Find the area of the shaded region.

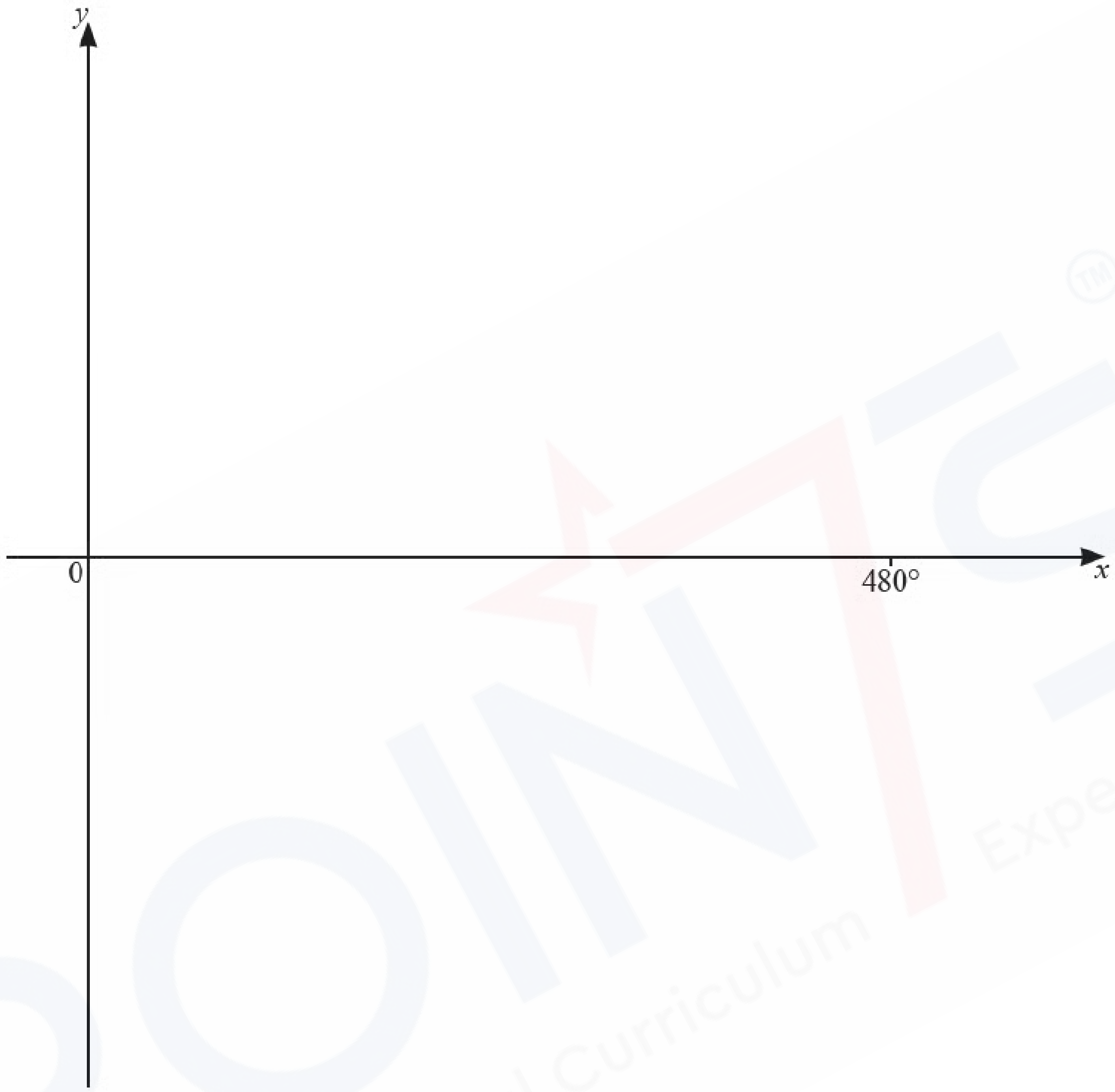
(3 marks)

5 (a) The graph of $y = a + 2\tan bx$, where a and b are constants, passes through the point $(0, -4)$ and has period $480°$.

Find the value of a and of b.

(3 marks)

(b) On the axes, sketch the graph of y for values of x between 0° and 480°.



(2 marks)

6 (i) Show that $\dfrac{1}{(1+\operatorname{cosec}\theta)(\sin\theta-\sin^2\theta)}=\sec^2\theta$.

[4]

(ii) Hence solve $(1+\operatorname{cosec}\theta)(\sin\theta-\sin^2\theta)=\dfrac{3}{4}$ for $-180° \le \theta \le 180°$.

[4]

7 The curve $y = a\sin bx + c$ has a period of 180°, an amplitude of 20 and passes through the point $(90°, -3)$. Find the value of each of the constants a, b and c.

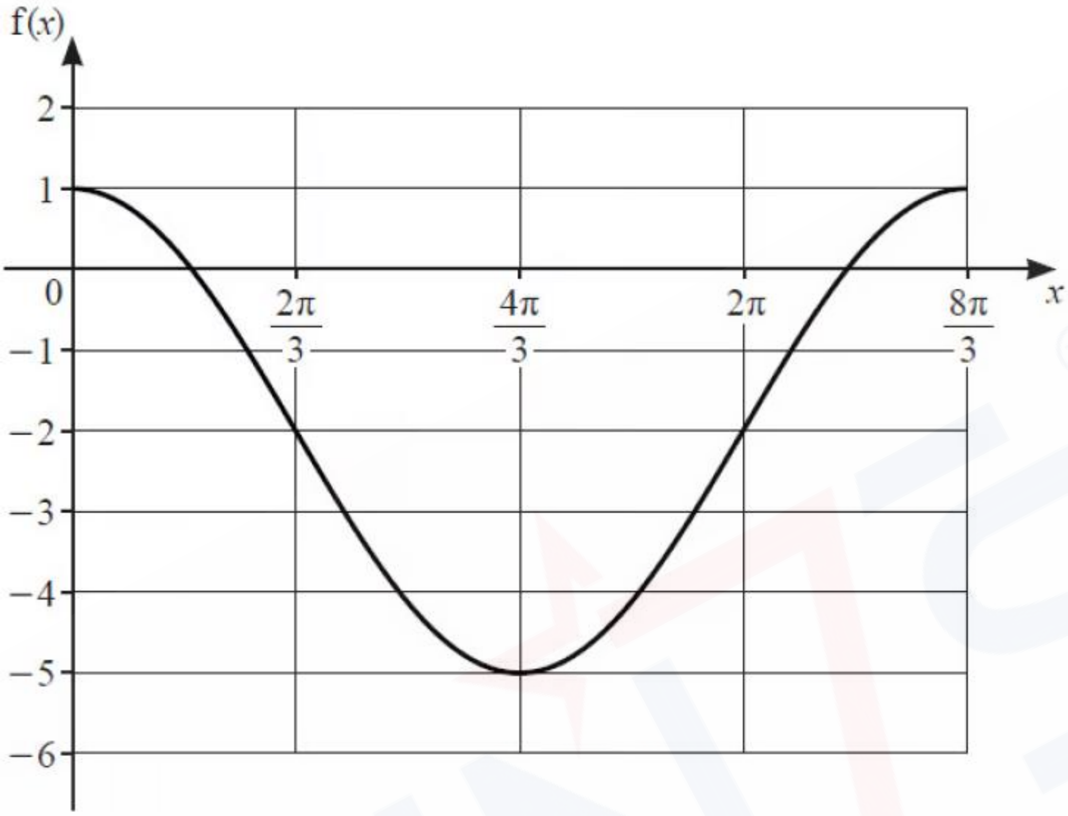
(3 marks)

8 (i) Write $6xy + 3y + 4x + 2$ in the form $(ax + b)(cy + d)$, where a, b, c and d are positive integers.

(ii) Hence solve the equation $6 \sin \theta \cos \theta + 3 \cos \theta + 4 \sin \theta + 2 = 0$ for $0° < \theta < 360°$.

(5 marks)

9



The diagram shows the graph of $f(x) = a\cos bx + c$ for $0 \le x \le \frac{8\pi}{3}$ radians.

Find the value of each of the constants a, b and c.

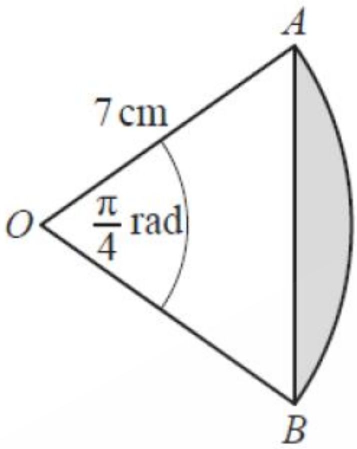
(4 marks)

10 Solve the equation $5\sin\left(4B-\frac{\pi}{8}\right)+2=0$ for $-\frac{\pi}{4}\leq B\leq\frac{\pi}{4}$ radians

(4 marks)

+918591171615 https://pointsedulab.com/ info@pointsedulab.com

11



The diagram shows the sector AOB of a circle with centre O and radius 7 cm.

Angle $AOB = \frac{\pi}{4}$ radians. Find the perimeter of the shaded region.

(3 marks)

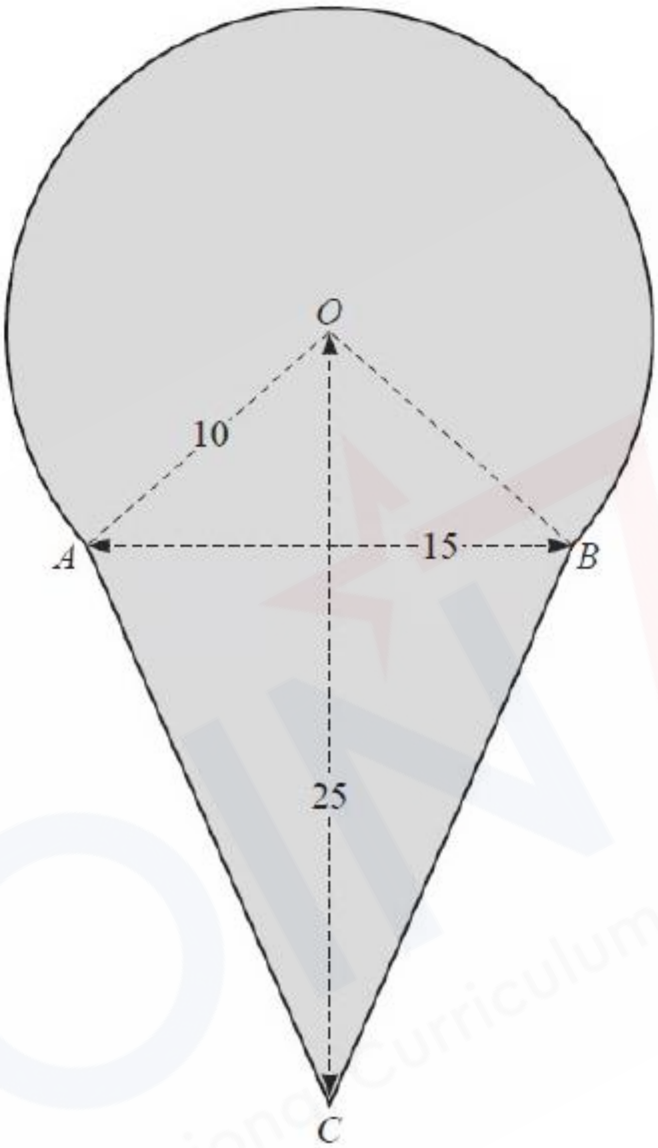
12 (i) Show that $\dfrac{1}{\sin\theta-1}-\dfrac{1}{\sin\theta+1}=a\sec^2\theta$, where a is a constant to be found.

[3]

(ii) Hence solve $\dfrac{1}{\sin 3\phi-1}-\dfrac{1}{\sin 3\phi+1}=-8$ for $-\dfrac{\pi}{3}\leq\phi\leq\dfrac{\pi}{3}$ radians.

[5]

13 (a) In this question all lengths are in centimetres.



The diagram shows a shaded shape. The arc AB is the major arc of a circle, centre O, radius 10. The line AB is of length 15, the line OC is of length 25 and the lengths of AC and BC are equal.

Show that the angle AOB is 1.70 radians correct to 2 decimal places.

(2 marks)

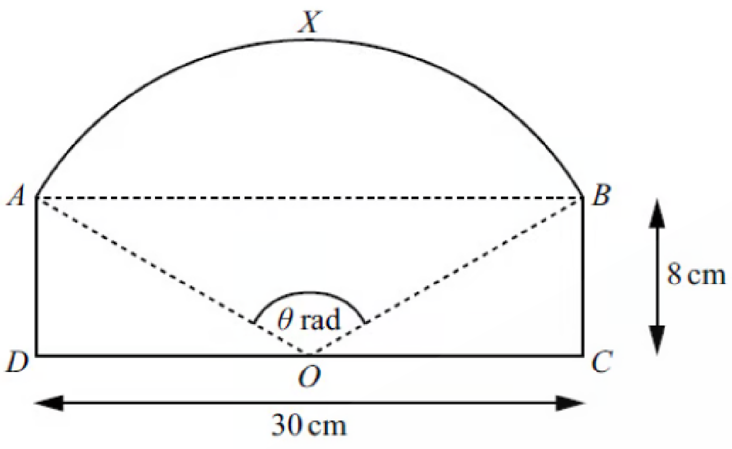
(b) Find the perimeter of the shaded shape.

(4 marks)

(c) Find the area of the shaded shape.

(5 marks)

14 (a)



NOT TO SCALE

The diagram shows a rectangle $ABCD$ and an arc AXB of a circle with centre at O, the midpoint of DC.
The length of BC is 8 cm and the length of DC is 30 cm. Angle AOB is θ radians.

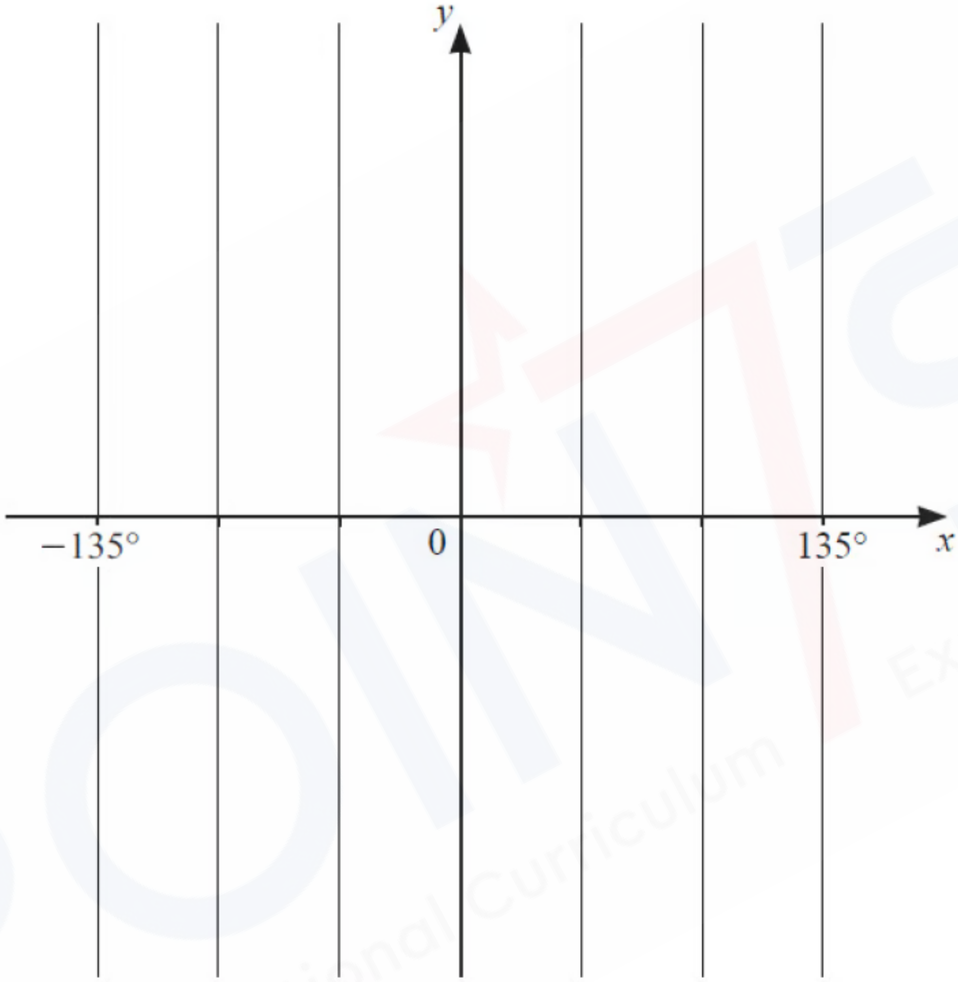
Find the perimeter of the shape $ADOCBX$.

(5 marks)

(b) Find the area of the shape $ADOCBX$.

(2 marks)

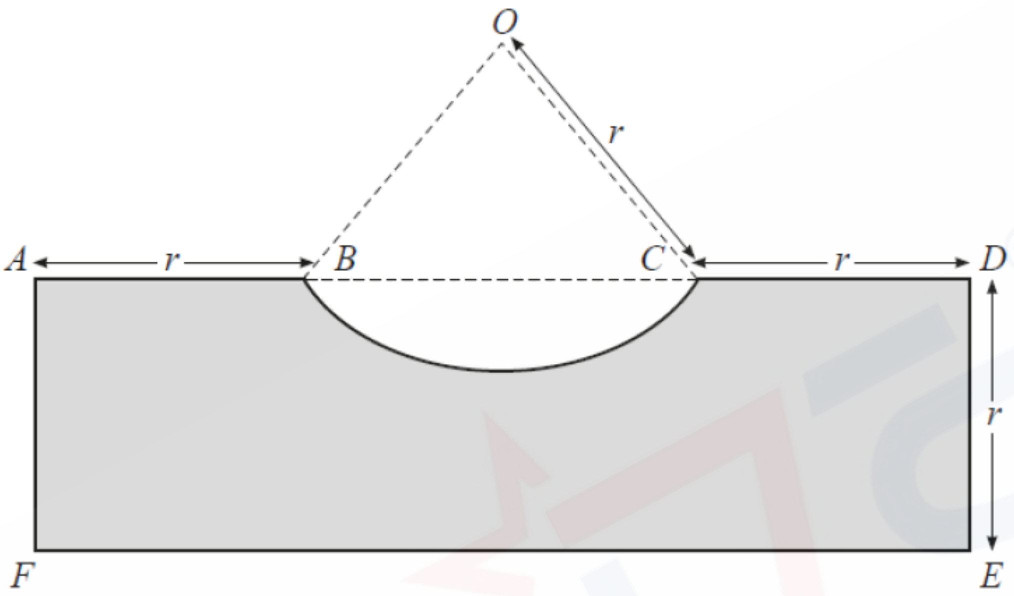
15 The function g is defined, for $-135° \leq x \leq 135°$, by $g(x) = 3\tan\frac{x}{2} - 4$. Sketch the graph of $y = g(x)$ on the axes below, stating the coordinates of the point where the graph crosses the y-axis.



(2 marks)

+918591171615 https://pointsedulab.com/ info@pointsedulab.com

16 (a) In this question all lengths are in centimetres and all angles are in radians.



The diagram shows the rectangle $ADEF$, where $AF = DE = r$. The points B and C lie on AD such that $AB = CD = r$. The curve BC is an arc of the circle, centre O, radius r and has a length of $1.5r$.

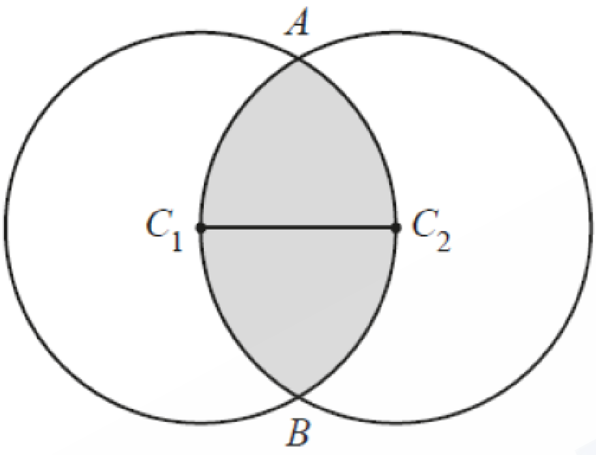
Show that the perimeter of the shaded region is $(7.5 + 2\sin 0.75)r$.

(5 marks)

(b) Find the area of the shaded region, giving your answer in the form kr^2, where k is a constant correct to 2 decimal places.

(4 marks)

17 (a)



The circles with centres C_1 and C_2 have equal radii of length r cm. The line C_1C_2 is a radius of both circles. The two circles intersect at A and B.

Given that the perimeter of the shaded region is 4π cm, find the value of r. [4]

(4 marks)

(b) Find the exact area of the shaded region.

(4 marks)

18 Solve the equation $\cot\left(y - \frac{\pi}{2}\right) = \sqrt{3}$, where y is in radians and $0 \leqslant y \leqslant \pi$.

(3 marks)

19 Show that $\dfrac{\sin x \tan x}{1 - \cos x} = 1 + \sec x$.

(4 marks)

20 (i) Show that $\dfrac{\cos^2 2x}{1+\sin 2x} = 1 - \sin 2x$.

(ii) Hence solve the equation for $\dfrac{3\cos^2 2x}{1+\sin 2x} = 1$ for $0° \leqslant x \leqslant 90°$.

(6 marks)

21 Solve the equation $\frac{1}{2}\sec\left(2\phi+\frac{\pi}{4}\right)=\frac{1}{\sqrt{3}}$ for $-\pi<\phi<\pi$, where ϕ is in radians. Give your answers in terms of π.

(5 marks)

22 (a) In this question, all angles are in radians.

Write down the amplitude of $2 \cos \frac{x}{3} - 1$.

(1 mark)

(b) Write down the period of $2 \cos \frac{x}{3} - 1$.

(2 marks)

(c) On the axes below, sketch the graph of $y = 2\cos\frac{x}{3} - 1$ for $-\pi \leqslant x \leqslant 3\pi$.

(3 marks)