Radians-problems involving area 5ii

Subject & topics

Maths

Status

Not started

Stage & difficulty

A Level Practice 1

Figure 1 shows a sector OAB of a circle, centre O and radius $8\,\mathrm{cm}$. The angle AOB is $46\,^\circ$.

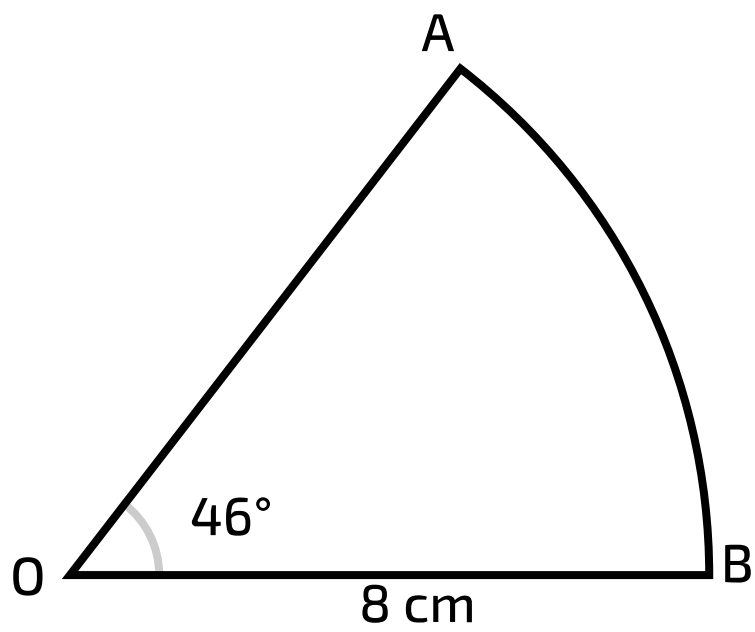


Figure 1: Sector AOB.

Part A

Convert angle to radians

Express $46\,^\circ$ in radians, correct to 3 significant figures.

Part B

Arc length

Find the length of the arc AB.

Part C

Area of sector

Find the area of the sector OAB.

Radians-problems involving area 1ii

Subject & topics

Maths

Status

Not started

Stage & difficulty

A Level Practice 1

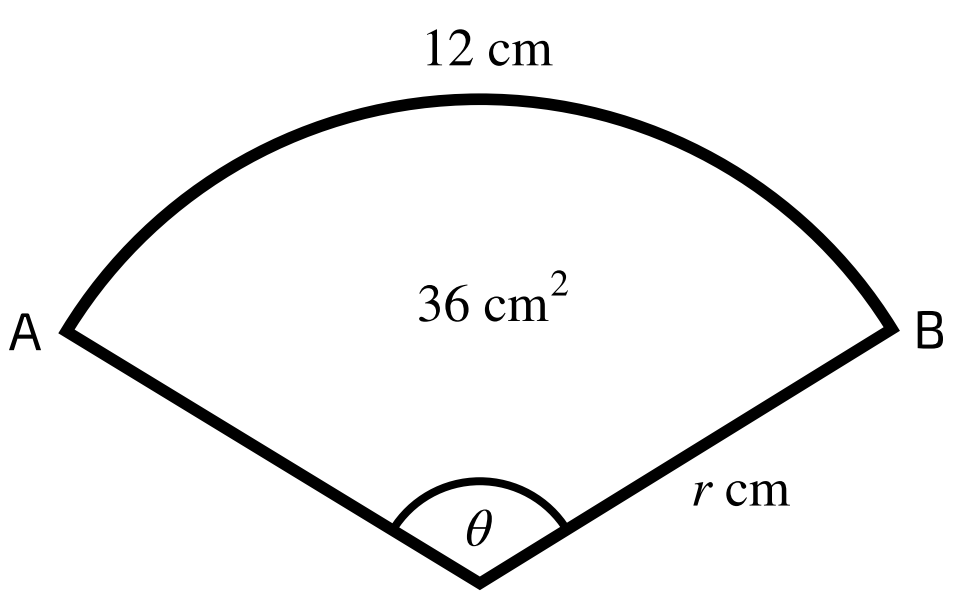


Figure 1: The sector OAB.

A sector OAB of a circle of radius $r\,\mathrm{cm}$ has angle $\theta\,\mathrm{radians}$. The length of the arc of the sector is $12\,\mathrm{cm}$ and the area of the sector is $36\,\mathrm{cm}^2$ (see **Figure 1**).

Part A

First equation

By considering the length of the arc of the sector, write down an equation involving r and θ, where one side of the equation is a numerical constant.

The following symbols may be useful: `r, theta`

Part B

Second equation

By considering the area of the sector, write down another equation involving r and θ, where one side of the equation is a numerical constant.

The following symbols may be useful: `r, theta`

Part C

Values of r and θ

Hence show that $r = 6\,\text{cm}$ and find the value of θ.

Part D

Area of segment

Find the area of the segment bounded by the arc AB and the chord AB. Give your answer to 3 sf.

Question deck:

STEM SMART Double Maths 24 - Radians, Trigonometric Reciprocals & t-Formulae

Radians and Trig Functions 1i

Subject & topics

Maths

Status

Not started

Stage & difficulty

A Level Practice 2

A curve has equation $y = \sin(ax)$, where a is a positive constant and x is in radians.

Part A

Period

State the period of $y = \sin(ax)$, giving your answer in an exact form in terms of a.

The following symbols may be useful: `a, pi, t`

Part B

$\sin(ax) = k$

The two smallest positive solutions of $\sin(ax) = k$, where k is a positive constant, are $x = \frac{1}{5}\pi$ and $x = \frac{2}{5}\pi$.

Find the exact values of a and k.

$a =$ ☐

$k =$ ☐ $\sqrt{}$ ☐

Part C

$\sin(ax) = \sqrt{3}\cos(ax)$

Given instead that $\sin(ax) = \sqrt{3}\cos(ax)$, find the two smallest positive solutions for x, giving your answers in an exact form.

Enter your answers in order from lowest value of x to highest.

$x =$ [ ] $\frac{\pi}{a}$ (lowest value)

$x =$ [ ] $\frac{\pi}{a}$ (highest value)

Question deck:

STEM SMART Double Maths 24 - Radians, Trigonometric Reciprocals & t-Formulae

Small Angle Approximations 3ii

Subject & topics

Maths

Status

Not started

Stage & difficulty

A Level Practice 1

Part A

Expression

Use the small angle approximation to write an approximate expression for $(\cos\theta + 5)(1 + \sin(2\theta))$ in powers of θ up to θ^2.

The following symbols may be useful: `theta`

Part B

Approximation

Use your answer from the above part to work out an approximate value for $(\cos\theta + 5)(1 + \sin(2\theta))$ when $\theta = 0.075$. Give your answer to 3 significant figures.

Sketching Reciprocal Trigonometric Functions

Subject & topics

Maths | Functions | Graph Sketching

Status

Not started

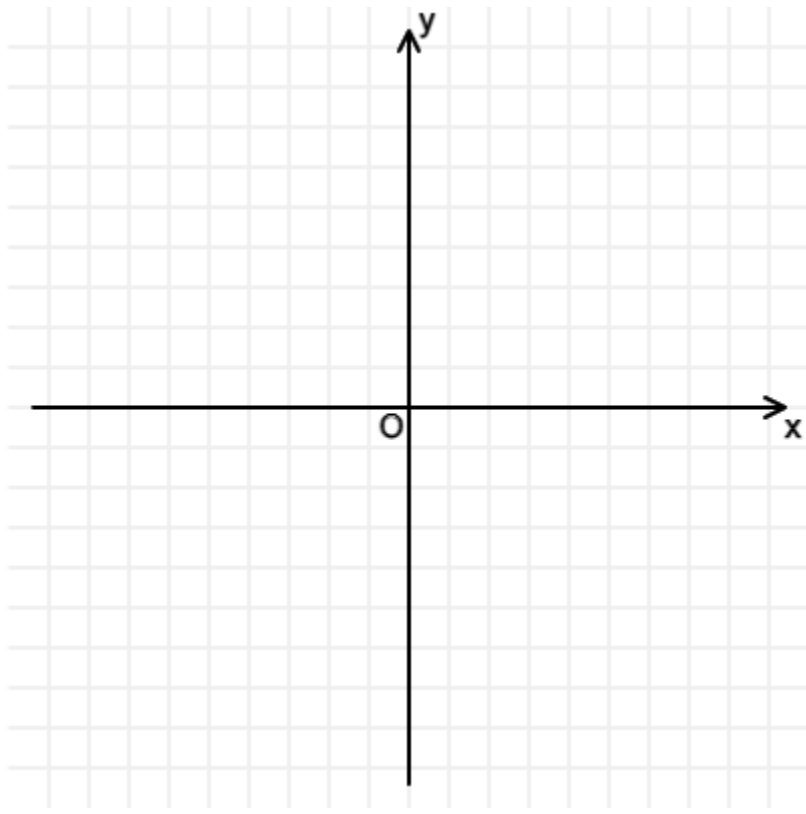
Stage & difficulty

A Level Practice 2

Part A

Sketch $2\sec x + 2$

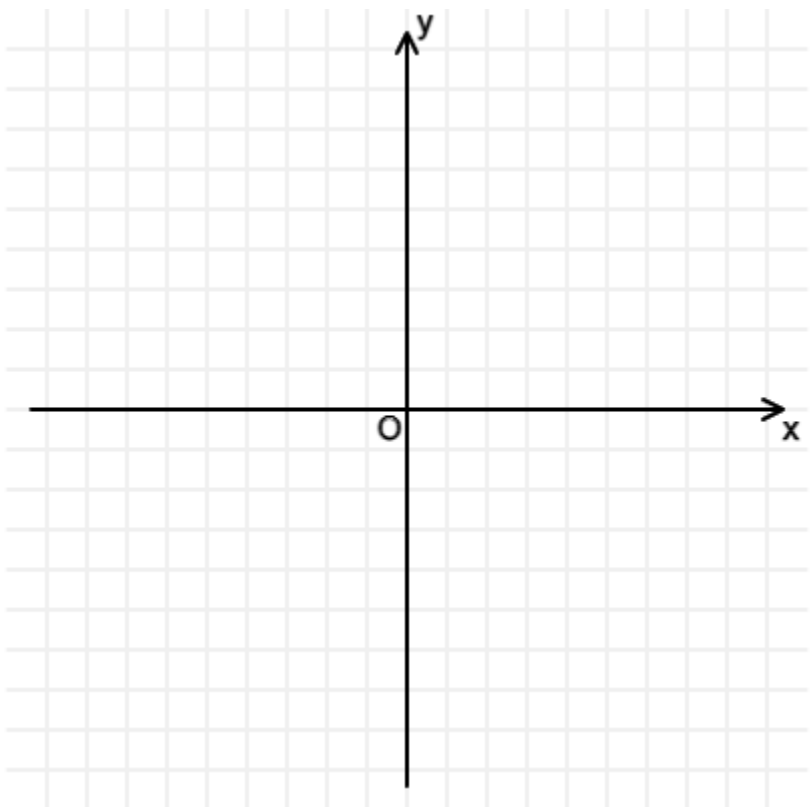
Sketch the graph of $y = 2\sec x + 2$ in the interval $0° \leq x \leq 360°$.



Part B

Sketch $\cot\left(x+\frac{\pi}{4}\right)-1$

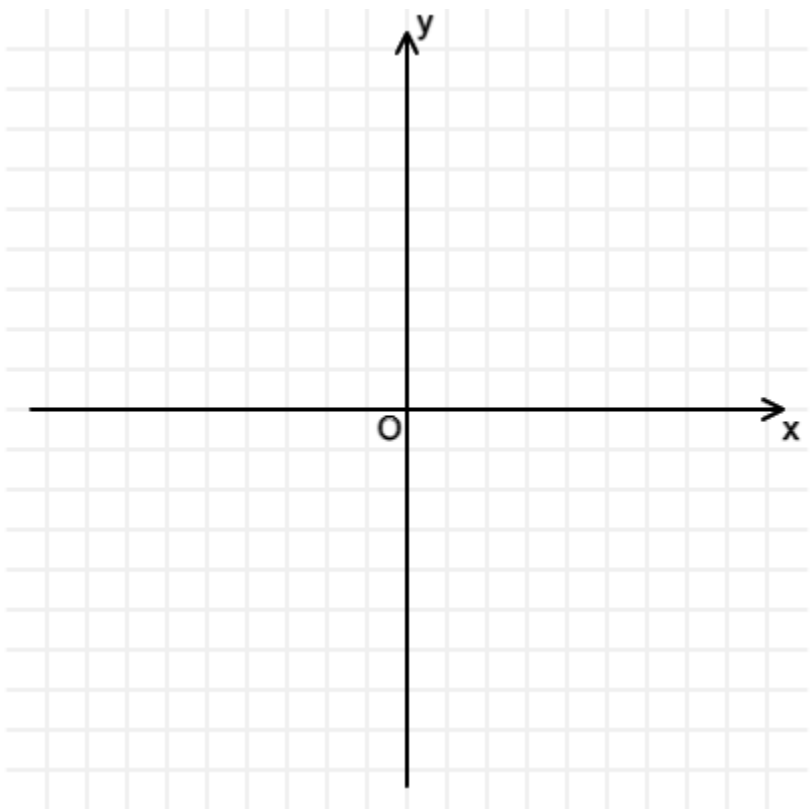
Sketch the graph of $y=\cot\left(x+\frac{\pi}{4}\right)-1$ in the interval $0\leq x\leq 2\pi$.



Part C

Sketch $-\operatorname{cosec}\frac{x}{2}-3$

Sketch the graph of $y=-\operatorname{cosec}\frac{x}{2}-3$ in the interval $-2\pi \leq x \leq 2\pi$.



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Advanced Trig Identities 2ii

Subject & topics

Maths

Status

Not started

Stage & difficulty

A Level Practice 2

Part A

$2\tan^2\theta - \frac{1}{\cos\theta}$

Express $2\tan^2\theta - \frac{1}{\cos\theta}$ in terms of $\sec\theta$.

The following symbols may be useful: `sec(), theta`

Part B

Solve

Hence solve, for $0° < \theta < 360°$, the equation

$$2\tan^2\theta - \frac{1}{\cos\theta} = 4$$

Enter your answers in order from lowest value of θ to highest. Give inexact answers to 1 dp.

(lowest value)

(highest value)

Sketching Inverse Trigonometric Functions

Subject & topics

Maths | Functions | Graph Sketching

Status

Not started

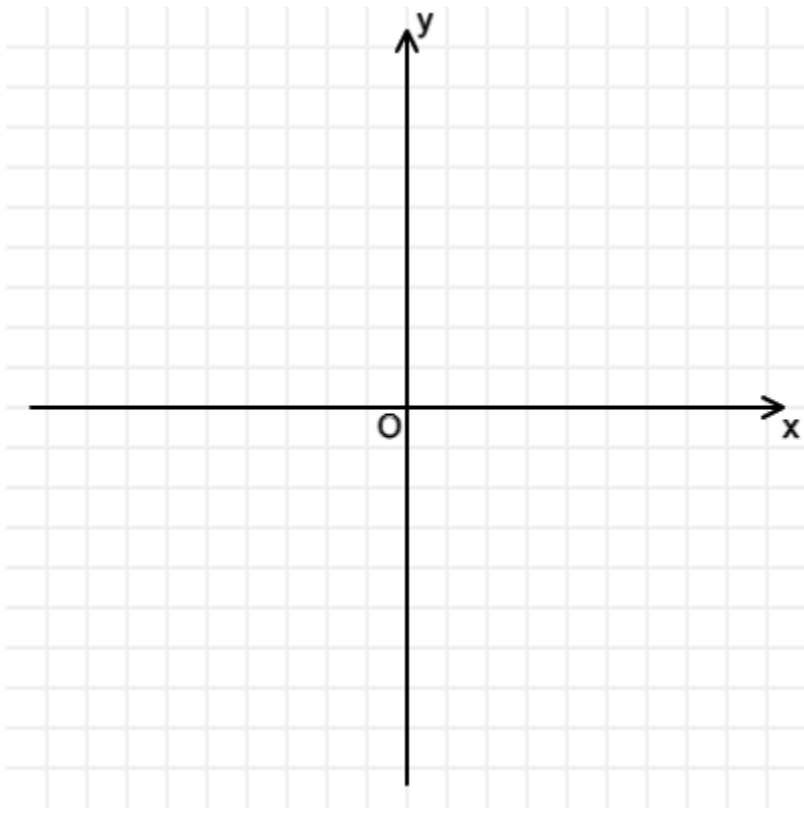
Stage & difficulty

A Level Practice 2

Part A

Sketch $\arcsin \frac{x}{3} + \frac{\pi}{2}$

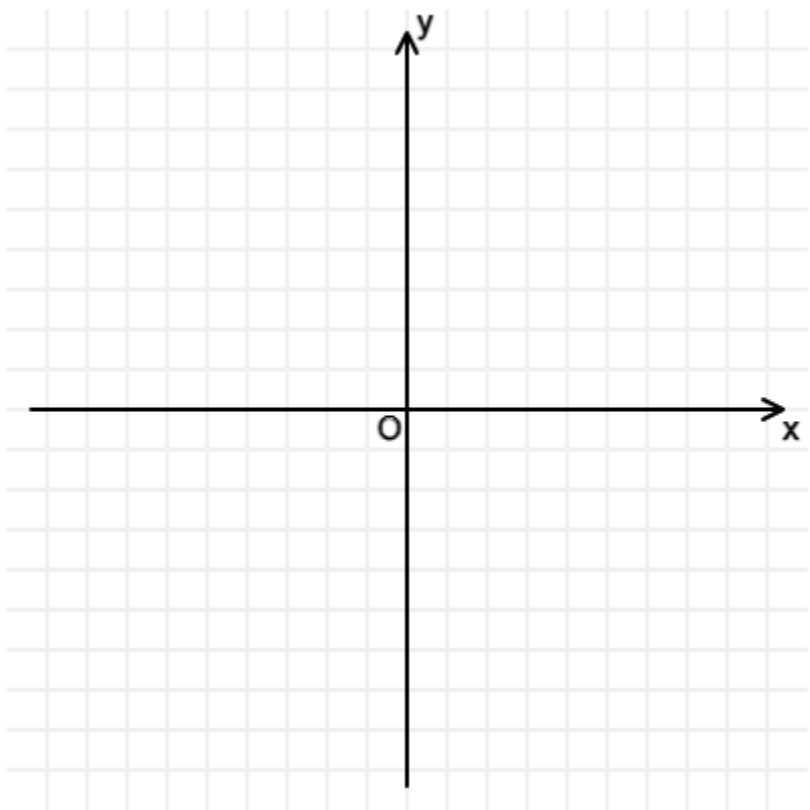
Sketch the graph of $y = \arcsin \frac{x}{3} + \frac{\pi}{2}$.



Part B

Sketch $2\arctan(x-1)$

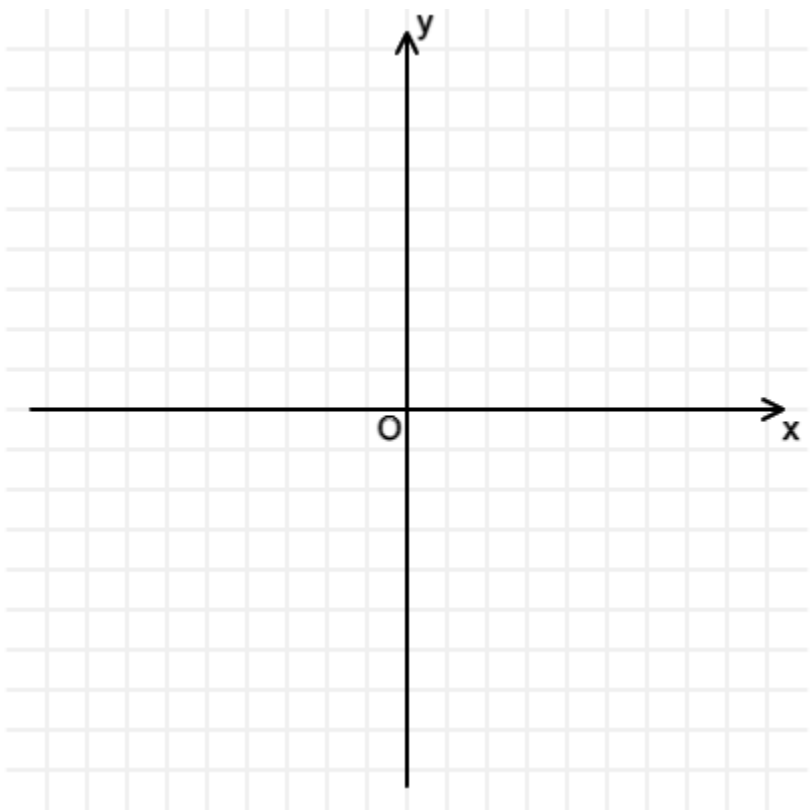
Sketch the graph of $y = 2\arctan(x-1)$.



Part C

Sketch $\arccos\left(-\frac{x}{2}+\frac{1}{2}\right)-\frac{\pi}{3}$

Sketch the graph of $y=\arccos\left(-\frac{x}{2}+\frac{1}{2}\right)-\frac{\pi}{3}$.



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Question deck:

STEM SMART Double Maths 24 - Radians, Trigonometric Reciprocals & t-Formulae

Functions: Reciprocal Trig 1i

Subject & topics

Maths

Status

Not started

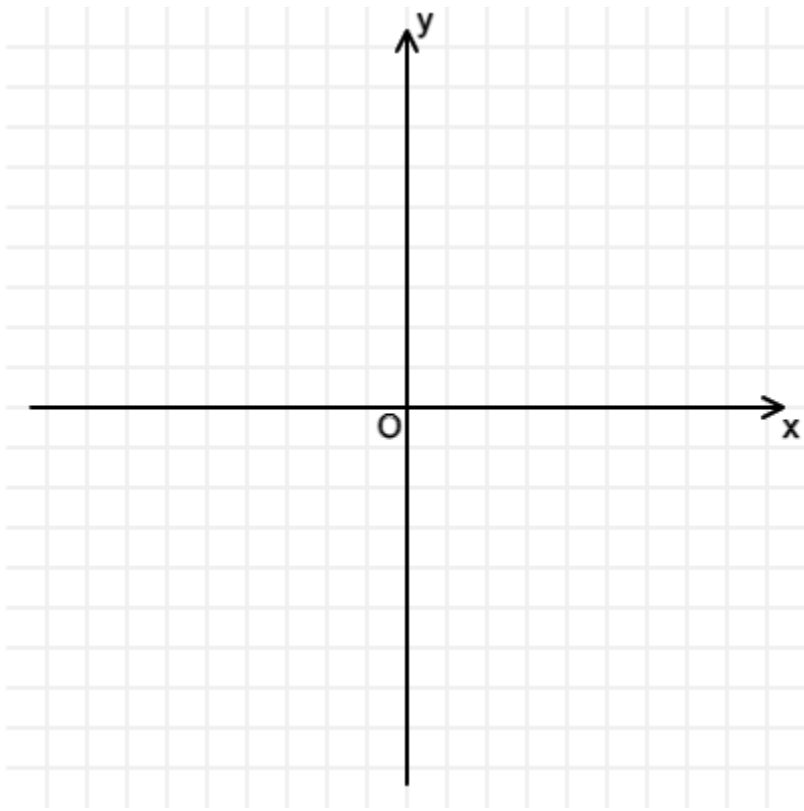
Stage & difficulty

A Level Practice 2

Part A

Sketch

Sketch the graph of $y = \operatorname{cosec} x$ for $0 < x < 4\pi$.



Part B

β in terms of α

It is given that $\operatorname{cosec}\alpha = \operatorname{cosec}\beta$, where $\frac{1}{2}\pi < \alpha < \pi$ and $2\pi < \beta < \frac{5}{2}\pi$. By using your sketch, or otherwise, express β in terms of α.

The following symbols may be useful: `alpha, beta, pi`

Part C

Double angle $\tan$ properties

Write down the identity giving $\tan 2\theta$ in terms of $\tan\theta$.

The following symbols may be useful: `cos(), sin(), tan(), theta`

Part D

$\tan\phi\cot 2\phi\tan 4\phi$

Given that $\cot\phi = 4$, find the exact value of $\tan\phi\cot 2\phi\tan 4\phi$.

The following symbols may be useful: `phi`

Question deck:

STEM SMART Double Maths 24 - Radians, Trigonometric Reciprocals & t-Formulae

t-Formulae Substitution

Subject & topics

Maths | Geometry | Trigonometry

Status

Not started

Stage & difficulty

Further A Practice 3

Part A
Substitution

Using the substitution $t = \tan\frac{\theta}{2}$, write the equation $2\cos\theta - 5\sin\theta = 2 - 5\tan\theta$ in the form $f(t) = 0$ where $f(t)$ is a polynomial with integer coefficients and degree 4.

The following symbols may be useful: `cos(), cosec(), cot(), sec(), sin(), t, tan()`

Part B
Solutions

Hence find all the solutions to the equation $2\cos\theta - 5\sin\theta = 2 - 5\tan\theta$ in the range $0 \leq \theta < 2\pi$. Where necessary, give irrational solutions to 3 sf.

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