

Chapter 6 - Trigonometric Functions

6.1 - Secant, cosecant and cotangent - Pg. 2

6.2 - Graphs of $\operatorname{cosec} x$, $\sec x$ and $\cot x$ - Pg. 3 - 4

6.3 - Using $\operatorname{cosec} x$, $\sec x$ and $\cot x$ - Pg. 5 - 7

6.4 - Trigonometric identities - Pg. 8 - 9

6.5 - Inverse trigonometric identities - Pg. 10 - 11

Personal notes:



6.1 - Secant, cosecant and cotangent

Notes

The following functions are known as _____trigonometric functions:

Example

Work out the values of

- a) $\sec 280^\circ$
- b) $\cot 115^\circ$
- c) $\operatorname{cosec} \frac{\pi}{4}$
- d) $\sec \frac{5\pi}{3}$

I know the difference

Original	$\sin x$	$\cos x$	$\tan x$
Squared			
Reciprocal			
Inverse			



6.2 - Graphs of $\operatorname{cosec} x$, $\sec x$ and $\cot x$

Sketching graphs of $\operatorname{cosec} x$, $\sec x$, $\cot x$

Example

- Sketch the graph of $y = 4\operatorname{cosec} x$, $-\pi \leq x \leq \pi$.
- On the same axes, sketch the line $y = x$.
- State the number of solutions to the equation $4\operatorname{cosec} x - x = 0$, $-\pi \leq x \leq \pi$



6.2 - Graphs of $\operatorname{cosec} x$, $\sec x$ and $\cot x$

Practice

Sketch $y = \sec 2x - 1$ in the interval $0 \leq x < 2\pi$.



6.3 - Using $\operatorname{cosec} x$, $\sec x$ and $\cot x$

Notes

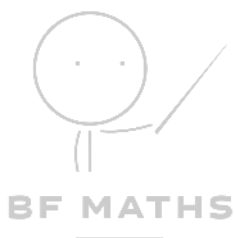
- Exam questions usually come in two types:
 - Prove / Show (Start from either the LHS/RHS and prove your way to the other side)
 - Solve

Example

a) Simplify $\sin \theta \cot \theta \sec \theta$

b) Simplify $\sin \theta \cos \theta$

c) Prove that $\frac{\cot \theta \operatorname{cosec} \theta}{\sec^2 \theta + \operatorname{cosec}^2 \theta} \equiv \cos^3 \theta$



6.3 - Using $\operatorname{cosec} x$, $\sec x$ and $\cot x$

Practice

Prove that $\sec x - \cos x \equiv \sin x \tan x$

Practice

Prove that $(1 + \cos x)(\operatorname{cosec} x - \cot x) \equiv \sin x$

Example

Solve the following equations in the interval $0 \leq \theta \leq 360^\circ$:

- a) $\sec \theta = -2.5$
- b) $\cot 2\theta = 0.6$



6.3 - Using $\operatorname{cosec} x$, $\sec x$ and $\cot x$

Example (Special)

Solve $\cot \theta = 0$ in the interval $0 \leq \theta \leq 2\pi$

Practice

Solve in the interval $0 \leq \theta < 360^\circ$:

$$\operatorname{cosec} 3\theta = 2$$



6.4 - Trigonometric identities

Recall

How many trigonometric identities could you remember?

Notes (New trig identities)

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-

Example

Prove that $\operatorname{cosec}^4 \theta - \cot^4 \theta = \frac{1+\cos^2 \theta}{1-\cos^2 \theta}$

Practice

Prove that $\sec^2 \theta - \cos^2 \theta = \sin^2 \theta (1 + \sec^2 \theta)$



6.4 - Trigonometric identities

Example

Solve the equation $4 \operatorname{cosec}^2 \theta - 9 = \cot \theta$ in the interval $0 \leq \theta \leq 360^\circ$

Exam Practice

Edexcel C3 June 2013 (R)

6. (ii) Solve, for $0 \leq \theta < 2\pi$, the equation

$$3\sec^2 \theta + 3 \sec \theta = 2 \tan^2 \theta$$

You must show all your working. Give your answers in terms of π .

(6)



6.5 - Inverse trigonometric identities

Recall

There are two types of mapping function (Yr 2 Chp 2.2)

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Only one of the above two has an inverse function:

-> Why?

Inverse Trig functions and graphs

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•

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6.5 - Inverse trigonometric identities

Example

Work out, in radians, the values of:

a) $\arcsin\left(-\frac{\sqrt{2}}{2}\right)$

b) $\arccos(-1)$

c) $\arctan(\sqrt{3})$

Example (Ex. 6E Q6)

E/P 6 Given that x satisfies $\arcsin x = k$, where $0 < k < \frac{\pi}{2}$,

a state the range of possible values of x (1 mark)

b express, in terms of x ,

i $\cos k$ **ii** $\tan k$ (4 marks)

Given, instead, that $-\frac{\pi}{2} < k < 0$,

c how, if at all, are your answers to part **b** affected? (2 marks)

Exam Practice

Edexcel C3 Jan 2007

8. (ii) Given that

$$y = \arccos x, \quad -1 \leq x \leq 1 \quad \text{and} \quad 0 \leq y \leq \pi,$$

(a) express $\arcsin x$ in terms of y . (2)

(b) Hence evaluate $\arccos x + \arcsin x$. Give your answer in terms of π . (1)

