THE TABLES

You are allowed to use the official Department of Education table book in the exam hall. There is a lot of information in this book that you do not need. The information on the following pages has been extracted from the official table book and is exactly what you need for the Leaving Cert. Honours Maths papers.

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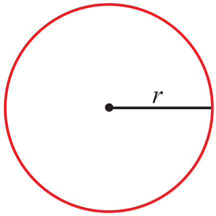
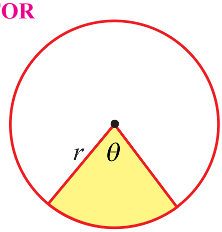
CIRCLE



Length $= 2\pi r$

Area $= \pi r^2$

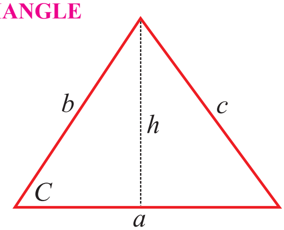
SECTOR



Length $= r\theta$ (θ in radians)

Area $= \frac{1}{2} r^2 \theta$ (θ in radians)

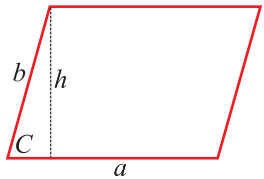
TRIANGLE



Area $= \frac{1}{2} ah$

Area $= \frac{1}{2} ab \sin C$

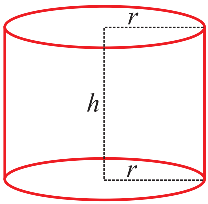
PARALLELOGRAM



Area $= ah$

Area $= ab \sin C$

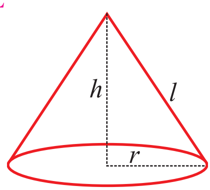
CYLINDER



Area of curved surface $= 2\pi rh$

Volume $= \pi r^2 h$

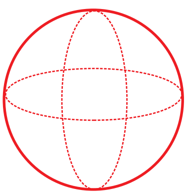
CONE



Curved surface area $= \pi rl$

Volume $= \frac{1}{3} \pi r^2 h$

SPHERE



Area of surface $= 4\pi r^2$

Volume $= \frac{4}{3} \pi r^3$

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There are 6 trig functions. They can all be written in terms of sine and cosine.

$\cos^2 A + \sin^2 A = 1$ [Prove]

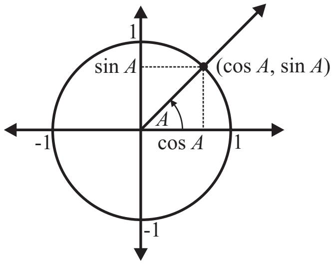
$\tan A = \dfrac{\sin A}{\cos A}$

$\sec^2 A = 1 + \tan^2 A = \dfrac{1}{\cos^2 A}$

$\cot A = \dfrac{1}{\tan A}$

$\sec A = \dfrac{1}{\cos A}$

$\operatorname{cosec} A = \dfrac{1}{\sin A}$

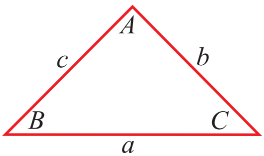


A	0	π	$\frac{\pi}{2}$	$\frac{\pi}{3}$	$\frac{\pi}{4}$	$\frac{\pi}{6}$	[Radians]
A	0°	180°	90°	60°	45°	30°	[Degrees]
$\cos A$	1	-1	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	
$\sin A$	0	0	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	
$\tan A$	0	0	∞	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	

This is how you deal with negative angles.

$\cos(-A) = \cos A$ $\qquad$ $\sin(-A) = -\sin A$ $\qquad$ $\tan(-A) = -\tan A$

Use the Sine and Cosine rules to solve triangles.



Sine formula: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine formula: $a^2 = b^2 + c^2 - 2bc \cos A$

Compound Angle formulae

$\cos(A+B) = \cos A \cos B - \sin A \sin B$

$\sin(A+B) = \sin A \cos B + \cos A \sin B$

$\tan(A+B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B}$

The formulae for $\cos(A-B)$, $\sin(A-B)$, $\tan(A-B)$ can be obtained by changing the signs in these formulae. You need to be able to prove $\cos(A \pm B)$ and $\sin(A \pm B)$.

These formulae are obtained by replacing B by A in the compound angle formulae.

$$\cos 2A = \cos^2 A - \sin^2 A$$

$$\sin 2A = 2\sin A\cos A$$

$$\tan 2A = \frac{2\tan A}{1-\tan^2 A}$$

$$\cos 2A = \frac{1-\tan^2 A}{1+\tan^2 A} \qquad \sin 2A = \frac{2\tan A}{1+\tan^2 A}$$

Use these when integrating trig squares.

$$\cos^2 A = \tfrac{1}{2}(1+\cos 2A) \qquad \sin^2 A = \tfrac{1}{2}(1-\cos 2A)$$

Used to change products to sums, useful when integrating products of trig functions.

$$2\cos A\cos B = \cos(A+B)+\cos(A-B)$$

$$2\sin A\cos B = \sin(A+B)+\sin(A-B)$$

$$2\sin A\sin B = \cos(A-B)-\cos(A+B)$$

$$2\cos A\sin B = \sin(A+B)-\sin(A-B)$$

Used to change sums into products, useful when solving trig equations.

$$\sin A+\sin B = 2\sin(\tfrac{A+B}{2})\cos(\tfrac{A-B}{2})$$

$$\sin A-\sin B = 2\cos(\tfrac{A+B}{2})\sin(\tfrac{A-B}{2})$$

$$\cos A+\cos B = 2\cos(\tfrac{A+B}{2})\cos(\tfrac{A-B}{2})$$

$$\cos A-\cos B = -2\sin(\tfrac{A+B}{2})\sin(\tfrac{A-B}{2})$$

De Moivre's Therorem

$$(\cos\theta + i\sin\theta)^n = \cos n\theta + i\sin n\theta$$

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DIFFERENTIATION

$f(x)$	$f'(x) \equiv \frac{d}{dx}[f(x)]$
x^n	nx^{n-1}
$\ln x$	$\frac{1}{x}$
$\cos x$	$-\sin x$
$\sin x$	$\cos x$
$\tan x$	$\sec^2 x$
$\sec x$	$\sec x \tan x$
$\operatorname{cosec} x$	$-\operatorname{cosec} x \cot x$
$\cot x$	$-\operatorname{cosec}^2 x$
e^x	e^x
e^{ax}	ae^{ax}
$\sin^{-1}\frac{x}{a}$	$\frac{1}{\sqrt{a^2-x^2}}$
$\tan^{-1}\frac{x}{a}$	$\frac{a}{a^2+x^2}$

Products and Quotients:

$$y = uv; \quad \frac{dy}{dx} = u\frac{dv}{dx} + v\frac{du}{dx}$$

$$y = \frac{u}{v}; \quad \frac{dy}{dx} = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$$

INTEGRATION

We take $a > 0$ and omit constants of integration.

$f(x)$	$\int f(x)\,dx$
$x^n\ (n \neq -1)$	$\frac{x^{n+1}}{n+1}$
$\frac{1}{x}$	$\ln\lvert x\rvert$
$\cos x$	$\sin x$
$\sin x$	$-\cos x$
$\tan x$	$\ln\lvert\sec x\rvert$
e^x	e^x
e^{ax}	$\frac{1}{a}e^{ax}$
$\frac{1}{\sqrt{a^2-x^2}}$	$\sin^{-1}\frac{x}{a}$
$\frac{1}{a^2+x^2}$	$\frac{1}{a}\tan^{-1}\frac{x}{a}$
$\cos^2 x$	$\frac{1}{2}[x+\frac{1}{2}\sin 2x]$
$\sin^2 x$	$\frac{1}{2}[x-\frac{1}{2}\sin 2x]$

Integration by parts:

$$\int u\,dv = uv - \int v\,du$$