



Higher MATHEMATICS Revision Guide 2022-23

Formula List given in assessments

FORMULAE LIST

Circle
The equation $x^2 + y^2 + 2gx + 2fy + c = 0$ represents a circle centre $(-g, -f)$ and radius $\sqrt{g^2 + f^2 - c}$.
The equation $(x-a)^2 + (y-b)^2 = r^2$ represents a circle centre (a, b) and radius r .

Scalar product $\mathbf{a} \cdot \mathbf{b} = |\mathbf{a}||\mathbf{b}|\cos \theta$, where θ is the angle between \mathbf{a} and \mathbf{b}
or $\mathbf{a} \cdot \mathbf{b} = a_1b_1 + a_2b_2 + a_3b_3$ where $\mathbf{a} = \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix}$.

Trigonometric formulae
 $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
 $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
 $\sin 2A = 2 \sin A \cos A$
 $\cos 2A = \cos^2 A - \sin^2 A$
 $= 2 \cos^2 A - 1$
 $= 1 - 2 \sin^2 A$

Table of standard derivatives

$f(x)$	$f'(x)$
$\sin ax$	$a \cos ax$
$\cos ax$	$-a \sin ax$

Table of standard integrals

$f(x)$	$\int f(x)dx$
$\sin ax$	$-\frac{1}{a} \cos ax + c$
$\cos ax$	$\frac{1}{a} \sin ax + c$

**NOTE: RECURRENCE RELATIONS
AND VECTORS WILL NOT BE
ASSESSED THIS YEAR!**

**Exam Length:
Paper 1 (Non-Calculator) 1 hour 15 minutes
Paper 2 (Calculator) 1 hour 30 minutes**

**DO NOT WRITE ON THE PAST PAPERS!
WRITE ON SEPARATE PAPER SO THAT YOU CAN COMPLETE
QUESTIONS MORE THAN ONCE!**

Past Papers by Topic

	2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019	
	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2		
Straight Line	1		1	1	1		1	1	1		7	1	3,5,15,21		1,21		2,8,21		4,23	1	5	1		1	9	1	1	1	7,11	1	1,8		5,7	1
Functions	8	2,5	4	7	3,7	8	3	7	3	8	8,17,19,20	3	10,14,23	2	4,11,16,19	3,20,22	2	9,12	4	1,4,11,13,17		11,12	3	5,13	2	6,10,12		1,6,15		2	6	10,12	5,8	
Differentiation	5	8	6	5,9	5	6	5	3,9,12	9,10	6	15,22	6	4,8,10,18	1	12,15,17	5	4,13,16		2,6,8,16,18	3	2,7,18	7	21	2,8	2,8	8	2,9	7	3,8	7	7	3,9	1,6	7b,11
Recurrence Relations (NOT ASSESSED THIS YEAR)	4			4	6		4		7		1,4		1,6		2,7			3	1	6	8	2	1,10		3	3		9	8		7	4	4	
Trigonometry	9	6,7,10	3	6	9,10	2	7	8,10	6,11	2,4	6,9	5	7,11,13		23	4	10,12,23	6	5,22	6,7,10	9,10,15,23	8	4,7,9,12,18	6,9	4,10	7,9	13	8,11	14	6,11	3,13	8	12,15,17a	6
Quadratics	2,7		8,10	3		5	8	2	4		10,13,16		12,19		5,6,13,18,20		5,9,18		3,13,19		3,19,21		17				2	4	4		4,10	2	7a	
Polynomials		1	2		8	11	10			10	21			3	22		7,17		21		6	3	15,22		3		15		2	15			10	
Integration		3	7	11		1	6	5	8	7	14	7	16	5	9,14	6	11	4	11,14,21		16	4,6		5,7	7	12,15	5	10	3,9,13	10	10,14	1	8,11,17	2,13
Circle	10	4		8	2,11	3	2	4	5	3,5	2,5	4	2,9	4	8	3	6	7		2	22		2,23	8	11,14	5	4,8	4	2	3,10	4	5,12	3,16	15
Logs & Exponentials	11	11	9	10		7,9	11	11		9,11	23		6		7	19	5	20	7	20	5,9	3,20,24		6		14	6	12	9	6,11	11	14	9,12	
Vectors (NOT ASSESSED THIS YEAR)	3,6	9	5	2	3	4,10	9	6	2	1	3,11,12,18	2	17,22	7	3,10	1	1,14,15	1	7,10,15,17	5	12,14,24		6,13,14,16,19	4	1	6	7,11	5	5	5	5,9,12	2	9	3,14

Study Timetable

W/B	Tasks
2 nd /9 th / 16 th Jan	Prelim Revision – ask teacher for advice.
23 rd Jan	Straight Line and Functions Past Paper Qs.
30 th Jan	Differentiation Past Paper Qs.
6 th Feb	Trigonometry Past Paper Qs.
13 th Feb	Integration Past Paper Qs.
20 th Feb	Polynomials, Quadratics and Circle Past Paper Qs.
27 th Feb	Logs & Exponentials Past Paper Qs.
6 th Mar	Full papers 2003-2005.
13 th Mar	Full papers 2006-2008.
20 th Mar	Full papers 2009-2011.
27 th Mar	Full papers 2012-2014.
3 rd /10 th Apr	Full papers 2015-2019.
17 th /24 th Apr	Focused Past paper revision on areas for development.
1 st May	SQA Applications Mathematics Exam Thursday 4 th May at 9am

Properties you will need to remember

$y = \log_a x \Leftrightarrow x = a^y$ where $a, x > 0$. Logs

$\log_a x^n = n \log_a x$ where $a, x > 0$.

$\log_a x + \log_a y = \log_a(xy)$ where $a, x, y > 0$.

$\log_a x - \log_a y = \log_a\left(\frac{x}{y}\right)$ where $a, x, y > 0$.

$\log_a 1 = 0$ since $a^0 = 1$, $\log_a a = 1$ since $a^1 = a$.

In general:

$\frac{dy}{dx} = ax^n \rightarrow y = \frac{ax^{n+1}}{n+1} + c$

When integrating algebraic expressions of the form:

$\int (ax+b)^n dx \rightarrow \frac{(ax+b)^{n+1}}{a(n+1)} + c$

$\int_a^b ax^n dx = \left[\frac{ax^{n+1}}{n+1}\right]_a^b$

The general rule for differentiation is:

$f(x) = ax^n \rightarrow f'(x) = nax^{n-1}$

$y = \sin x \rightarrow \frac{dy}{dx} = \cos x$

$y = \cos x \rightarrow \frac{dy}{dx} = -\sin x$

Differentiation and Integration

In general:

$\int \sin x dx \rightarrow -\cos x + c$

and:

$\int \cos x dx \rightarrow \sin x + c$

$\int \cos(ax+b)dx = \frac{1}{a} \sin(ax+b) + c$

$\int \sin(ax+b)dx = -\frac{1}{a} \cos(ax+b) + c$

Straight Line

Gradient: $m = \frac{y_2 - y_1}{x_2 - x_1}$ or $m = \tan \theta$

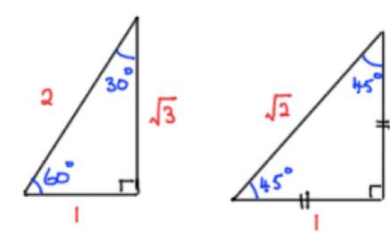
Equation of a line: $y - b = m(x - a)$

Distance formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Midpoint formula: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Perpendicular lines: $m_1 \times m_2 = -1$

Trigonometry



$\sin^2 x + \cos^2 x = 1$, $\tan x = \frac{\sin x}{\cos x}$

Circle

