EXAMINATION HINTS

Before the examination

- Obtain a copy of the formulae book – and use it!
- Write a list of and LEARN any formulae not in the formulae book
- Learn basic definitions
- Make sure you know how to use your calculator!
- Practise all the past papers - TO TIME!

At the start of the examination

- Read the instructions on the front of the question paper and/or answer booklet
- Open your formulae book at the relevant page

During the examination

- Read the WHOLE question before you start your answer
- Start each question on a new page (traditionally marked papers) or
- Make sure you write your answer within the space given for the question (on-line marked papers)
- Draw clear well-labelled diagrams
- Look for clues or key words given in the question
- Show ALL your working - including intermediate stages
- Write down formulae before substituting numbers
- Make sure you finish a ‘prove’ or a ‘show’ question – quote the end result
- Don’t fudge your answers (particularly if the answer is given)!
- Don’t round your answers prematurely
- Make sure you give your final answers to the required/appropriate degree of accuracy
- Check details at the end of every question (e.g. particular form, exact answer)
- Take note of the part marks given in the question
- If your solution is becoming very lengthy, check the original details given in the question
- If the question says “hence” make sure you use the previous parts in your answer
- Don’t write in pencil (except for diagrams) or red ink
- Write legibly!
- Keep going through the paper – go back over questions at the end if time

At the end of the examination

- If you have used supplementary paper, fill in all the boxes at the top of every page

C2 KEY POINTS

C2 Algebra and functions

Algebraic division by $(x \pm a)$

Remainder theorem: When f(x) is divided by $(x - a)$, f(x) = $(x - a)Q(x) + R$ where $Q(x)$ is the quotient and R is the remainder

Factor theorem: If f(a) = 0 then $(x - a)$ is a factor of f(x)

C2 Coordinate geometry

Circle, centre (0, 0) radius r: $x^2 + y^2 = r^2$

Circle centre (a, b) radius r: $(x - a)^2 + (y - b)^2 = r^2$

Useful circle facts:

The angle between the tangent and the radius is 90°

Tangents drawn from a common point to a circle are equal in length

The centre of a circle is on the perpendicular bisector of any chord

The angle subtended by a diameter at the circumference is 90°

C2 Sequences and Series

A geometric series is a series in which each term is obtained from the previous term by multiplying by a constant called the common ratio, r

nth term = ar^{n-1}, $S_n = \dfrac{a(1-r^n)}{1-r}$, $S_\infty = \dfrac{a}{1-r}$ where $|r| < 1$.

The following expansions are valid for all $n \in$ N:

$(a + b)^n = a^n + {}^nC_1 a^{n-1}b + {}^nC_2 a^{n-1}b^2 + \ldots + {}^nC_r a^{n-r}b^r + \ldots + b^n$

$(1 + x)^n = 1 + nx + {}^nC_2 x^2 + \ldots + {}^nC_r x^r + \ldots + x^n = 1 + nx + \dfrac{n(n-1)}{2!}x^2 + \dfrac{n(n-1)(n-2)}{3!} + \ldots + x^n$

where ${}^nC_r = \dfrac{n!}{r!(n-r)!}$

C2 Trigonometry

Sine rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$ and ambiguous case

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$ or $\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

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

$\sin x° = \cos(90 - x)°$, $\cos x° = \sin(90 - x)°$, $\tan x° = \dfrac{1}{\tan(90° - x)}$

Graphs of trigonometric functions

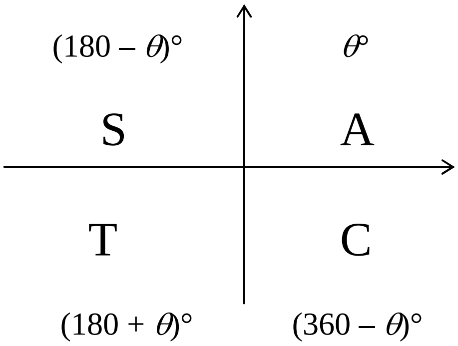
$\sin(-x) = -\sin x$, $\cos(-x) = \cos x$, $\tan(-x) = \tan x$

$\sin 30° = \cos 60° = \frac{1}{2}$, $\cos 30° = \sin 60° = \frac{\sqrt{3}}{2}$, $\tan 30° = \frac{1}{\sqrt{3}}$, $\tan 60° = \sqrt{3}$

$\cos 45° = \sin 45° = \frac{1}{\sqrt{2}}$, $\tan 45° = 1$

Degrees	360°	180°	90°	45°	60°	30°	270°	120°	135°	etc
Radians	2π	π	$\frac{\pi}{2}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{6}$	$\frac{3\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	

Arc length = $r\theta$, Area of sector = $\frac{1}{2}r^2\theta$ (θ in radians)



$\cos^2\theta + \sin^2\theta = 1$, $\tan\theta = \dfrac{\sin\theta}{\cos\theta}$

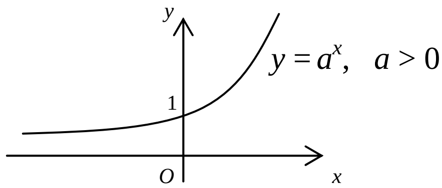
C2 Exponentials and Logarithms

If $y = a^x$ then $\log_a y = x$

Laws of logarithms: $\log_a pq = \log_a p + \log_a q$, $\log_a \dfrac{p}{q} = \log_a p - \log_a q$, $\log_a x^n = n.\log_a x$

Other useful results: $\log_a x = \dfrac{\log_b x}{\log_b a}$, $\log_a 1 = 0$, $\log_a a = 1$

f: $x \to a^x$ $x \in$ R $a > 0$ (a is constant)
is an exponential function, e.g. 7^{2x+4}



Solve equations of the form $a^x = b$

C2 Differentiation

If $\dfrac{dy}{dx} = 0$ and $\dfrac{d^2y}{dx^2} > 0$ the stationary point is a minimum turning point

If $\dfrac{dy}{dx} = 0$ and $\dfrac{d^2y}{dx^2} < 0$ the stationary point is a maximum turning point

For an increasing function, $\dfrac{dy}{dx} > 0$, for a decreasing function, $\dfrac{dy}{dx} < 0$

Maxima and minima problems: (a) Find the point at which $f'(x) = 0$. (b) Find the nature of the turning point to confirm that the value is a maximum or minimum as required. (c) Make sure that all parts of the question have been answered (e.g. finding the maximum/minimum as well as the value of x at which it occurs).

C2 Integration

If $\int f(x)\,dx = F(x) + c$ then $\int_a^b f(x)\,dx = \left[F(x)\right]_a^b = F(b) - F(a)$

If $y > 0$ for $a \le x \le b$, then area is given by $A = \int_a^b y\,dx$

Trapezium rule

$\int_a^b f(x)\,dx \approx \tfrac{1}{2}h[y_0 + y_n + 2(y_1 + ... + y_{n-1})]$ where $y_i = f(a + ih)$ and $h = \dfrac{b-a}{n}$