

Pure Mathematics 2 (P2)

Edexcel IAL Maths · Knowledge organiser



KEY DEFINITIONS

Remainder theorem

When $f(x)$ is divided by $(x - a)$, the remainder is $f(a)$.

Geometric series

The sum of a geometric sequence; when $|r| < 1$ it has a sum to infinity $a/(1 - r)$.

Logarithm

$\log_a b = x$ means $a^x = b$.

Trapezium rule

An estimate of the area under a curve using strips of equal width h .

YOU SHOULD BE ABLE TO...

- Simplify algebraic fractions by factorising, and divide polynomials such as $x^3 - 3x^2 + 4$ by $(x - 2)$ using algebraic long division.
- Use the perpendicular radius-tangent property and chord properties to find equations of tangents and lengths in circle problems.
- Expand $(a + bx)^n$ for positive integer n using the binomial expansion, simplifying each coefficient and the powers of x .
- Write sums in sigma notation and evaluate them, such as the sum of 2^r from $r = 1$ to 10, using arithmetic and geometric series formulae.
- Solve trigonometric equations that are quadratic in $\sin$ or $\cos$, such as $2\cos^2 x + 3\sin x = 3$, using identities and factorising.
- Use the trapezium rule to estimate the area under a curve, and decide whether the estimate is too big or too small from the curve's shape.

COMMON MISTAKES

- ✗ Logarithms: log laws not shown, and roots not rejected
- ✗ Trapezium rule: strip width and brackets
- ✗ $F(a) = 0$ read as ' $(x + a)$ is a factor'
- ✗ Remainder of $f(x) \div (2x - 1)$ found with $f(-\frac{1}{2})$ or $f(2)$

KEY FORMULAS

B = given in the exam (formula booklet or list); learn the rest.

Factor &
remainder
theorems

$$f(a) = 0 \iff (x - a) \text{ a factor; remainder } f(a)$$

Circle

$$(x - a)^2 + (y - b)^2 = r^2; \text{ tangent } \perp \text{ radius}$$

Arithmetic series

B

$$S_n = \frac{1}{2}n(a + l) = \frac{1}{2}n[2a + (n - 1)d]$$

n th terms

B

$$u_n = a + (n - 1)d, \quad u_n = ar^{n-1}$$

Geometric series

B

$$S_n = \frac{a(1 - r^n)}{1 - r}, \quad S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Binomial, $n \in \mathbb{N}$

B

$$(a + b)^n = a^n + \binom{n}{1}a^{n-1}b + \dots + b^n, \\ \binom{n}{r} = \frac{n!}{r!(n-r)!}$$

Log laws

$$\log_a xy = \log_a x + \log_a y, \\ \log_a \frac{x}{y} = \log_a x - \log_a y, \quad \log_a x^k = k \log_a x$$

Change of base

B

$$\log_a x = \frac{\log_b x}{\log_b a}$$

Trig

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

Trapezium rule,

$$h = \frac{b-a}{n} \quad \text{B}$$

$$\int_a^b y \, dx \approx \frac{1}{2}h\{(y_0 + y_n) + 2(y_1 + \dots + y_{n-1})\}$$

Stationary points

$$f'(x) = 0; \quad f'' < 0 \text{ max, } f'' > 0 \text{ min}$$

Area under a
curve

$$\int_a^b y \, dx$$

WORKED EXAMPLE

Find the remainder when $f(x) = 2x^3 - 3x^2 + 4$ is divided by $(x - 2)$.

1. Remainder theorem: remainder = $f(2)$
2. $f(2) = 16 - 12 + 4$

Answer: The remainder is 8