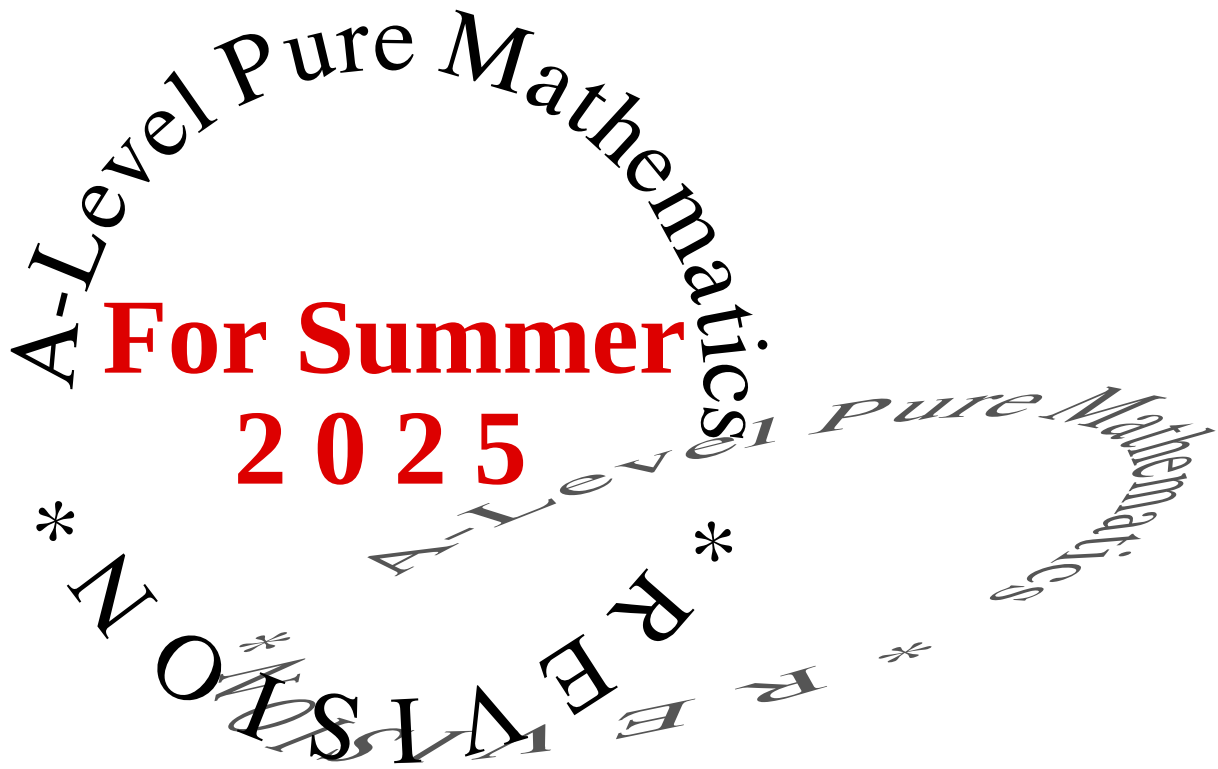
G R A D E G R A B B E R

Numbers 1 to 5

(With answers)



A-Level Pure Mathematics
Year 1, Year 2 Revision

Grade Grabber 1

Any solution based entirely on graphical or numerical methods is not acceptable

Marks Available : 34

Question 1

Given that

$$\sum_{m=1}^{k} (7m + 3) = 777$$

determine the value of the integer constant k

[4 marks]

Question 2

Sid claims that it's always true that

$$x^2 < (x + 1)^2$$

Exhibit a counter-example that shows Sid's claim is not true

[2 marks]

Question 3

The equation

$$5x^2 + k = 3x + 7$$

has two distinct real roots.

Find the range of possible values for k.

[4 marks]

Question 4

A circle of radius r cm is divided by two radii into two sectors.

The smaller sector has perimeter $(2r + 4)$ cm and the larger sector has area 12 cm^2.

Calculate the value or r correct to 3 decimal places.

[6 marks]

Question 5

(i) Use the binomial theorem to write $\frac{1}{(1-x)^3}$ as a polynomial, in ascending powers of x, up to and including the term in x^3

[4 marks]

(ii) By spotting a connection with the triangular numbers, state the coefficient in the expansion of x^8

[2 marks]

Question 6

Given that

$$f(x) = e^{5x} - 1, \qquad x \in \mathbb{R}$$

find $f^{-1}(x)$ and state its domain.

[4 marks]

Question 7

With respect to a fixed origin O, the points A and B have coordinates $(-4, 0)$ and $(12, 12)$ respectively.

The mid-point of AB is M.

Find an equation of the line in the plane of the coordinate axes Ox and Oy which passes through M and is perpendicular to AB.

Hence, or otherwise, find, in cartesian form, an equation of the circle which passes through O, A and B.

[8 marks]