Diploma Programme
Programme du diplôme
Programa del Diploma

Mathematics
Standard level
Paper 2

Friday 4 May 2012 (afternoon)

Candidate session number

1 hour 30 minutes

Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- A graphic display calculator is required for this paper.
- Section A: answer all questions in the boxes provided.
- Section B: answer all questions in the answer booklet provided. Fill in your session number on the front of the answer booklet, and attach it to this examination paper and your cover sheet using the tag provided.
- Unless otherwise stated in the question, all numerical answers should be given exactly or correct to three significant figures.
- A clean copy of the **mathematics SL formula booklet** is required for this paper.
- The maximum mark for this examination paper is **[90 marks]**.

EXAMPLE

2212 – 7303

Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. In particular, solutions found from a graphic display calculator should be supported by suitable working, for example if graphs are used to find a solution, you should sketch these as part of your answer. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.

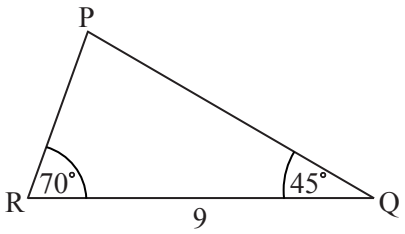
Section A

Answer all questions in the boxes provided. Working may be continued below the lines if necessary.

1. [Maximum mark: 6]

The following diagram shows ΔPQR, where $RQ = 9 \text{ cm}$, $P\hat{R}Q = 70^\circ$ and $P\hat{Q}R = 45^\circ$.

diagram not to scale



(a) Find $R\hat{P}Q$. [1]

(b) Find PR. [3]

(c) Find the area of ΔPQR. [2]

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2. [Maximum mark: 7]

A rocket moving in a straight line has velocity v km s^{-1} and displacement s km at time t seconds. The velocity v is given by $v(t) = 6e^{2t} + t$. When $t = 0$, $s = 10$. Find an expression for the displacement of the rocket in terms of t.

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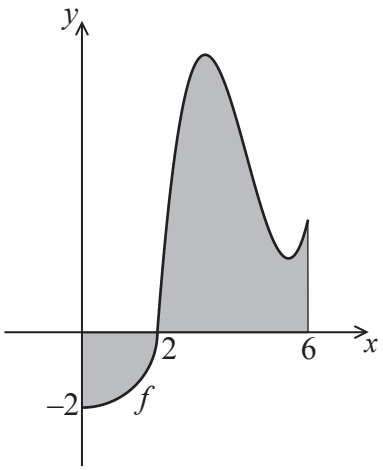
3. [Maximum mark: 7]

The following is the graph of a function f, for $0 \le x \le 6$.



The first part of the graph is a quarter circle of radius 2 with centre at the origin.

(a) Find $\int_0^2 f(x)\,\mathrm{d}x$. [4]

(b) The shaded region is enclosed by the graph of f, the x-axis, the y-axis and the line $x = 6$. The area of this region is 3π.

Find $\int_2^6 f(x)\,\mathrm{d}x$. [3]

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Do **not** write solutions on this page.

Section B

Answer **all** questions in the answer booklet provided. Please start each question on a new page.

4. [Maximum mark: 15]

Consider the points $A(5, 2, 1)$, $B(6, 5, 3)$, and $C(7, 6, a+1)$, where $a \in \mathbb{R}$.

(a) Find

(i) $\vec{AB}$;

(ii) $\vec{AC}$. [3]

Let θ be the angle between $\vec{AB}$ and $\vec{AC}$.

(b) Find the value of a for which $\theta = \frac{\pi}{2}$. [4]

(c) (i) Show that $\cos\theta = \frac{2a+14}{\sqrt{14a^2+280}}$.

(ii) Hence, find the value of a for which $\theta = 1.2$. [8]