

FREE SAMPLE: THE FIRST 3 QUESTIONS

SECTION A

Pure Mathematics · 40 marks · Questions 1 – 5

Answer ALL questions in Sections A and B. The paper lasts 3 hours and carries 100 marks. Section A has 40 marks. A graphing calculator without a computer algebra system is expected. Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified. Unsupported answers from a graphing calculator are allowed only where the question says so. Marks are shown in brackets.

Question 1 (6 marks)

An open box has a square base of side x cm and height h cm. The volume of the box is 500 cm^3 and the total outer surface area is $S \text{ cm}^2$.

- (a) Show that $S = x^2 + \frac{2000}{x}$. [3 marks]

Answer _____

- (b) Find the value of x for which S is a minimum. [3 marks]

Answer _____

Question 2 (7 marks)

- (a) Solve the equation $\ln(5x + 4) = 2$, giving your answer in exact form and correct to 3 significant figures. [2 marks]

Answer _____

(b) Solve the equation $2^{(2x - 1)} = 250$, giving your answer correct to 3 significant figures. [2 marks]

Answer _____

(c) Solve the equation $e^{(2x)} - 5e^x + 4 = 0$, giving your answers in exact form. [3 marks]

Answer _____

Question 3 (8 marks)

(a) Solve the inequality $x^2 + 2x - 3 \leq 0$. [3 marks]

Answer _____

(b) Find the range of values of k for which $x^2 + kx + 9 > 0$ for all real values of x . [3 marks]

Answer _____

(c) Find the set of values of x that satisfy both $x^2 + 2x - 3 \leq 0$ and $x > 0$. [2 marks]

Answer _____

THE WORKED ANSWERS TO THOSE 3 QUESTIONS

Question 1 (6 marks) [Differentiation and integration]

An open box has a square base of side x cm and height h cm. The volume of the box is 500 cm^3 and the total outer surface area is $S \text{ cm}^2$.

(a) Show that $S = x^2 + \frac{2000}{x}$.

(a) Answer: $S = x^2 + \frac{2000}{x}$

- Volume $x^2h = 500$ so $h = 500/x^2$.
- $S = x^2 + 4xh = x^2 + 4x(500/x^2) = x^2 + \frac{2000}{x}$.

(b) Find the value of x for which S is a minimum.

(b) Answer: $x = 10$

- $dS/dx = 2x - 2000/x^2$.
- Set $dS/dx = 0$: $2x^3 = 2000$, so $x^3 = 1000$ and $x = 10$.

LOS: Calculus · Differentiation and integration

KEY TAKEAWAY

Eliminate the height with the volume constraint to get S in terms of x , then minimise.

Question 2 (7 marks) [Exponential and logarithmic functions]

(a) Solve the equation $\ln(5x + 4) = 2$, giving your answer in exact form and correct to 3 significant figures.

(a) Answer: $x = \frac{e^2 - 4}{5} = 0.678$

- Write the equation in exponential form: $5x + 4 = e^2$.
- So $5x = e^2 - 4$, giving $x = \frac{e^2 - 4}{5} = 0.678$.

(b) Solve the equation $2^{(2x - 1)} = 250$, giving your answer correct to 3 significant figures.

(b) Answer: $x = 4.48$

- Take natural logarithms of both sides: $(2x - 1) \ln 2 = \ln 250$.
- So $2x - 1 = \ln 250 \div \ln 2 = 7.966$, giving $x = 4.48$.

(c) Solve the equation $e^{(2x)} - 5e^x + 4 = 0$, giving your answers in exact form.

(c) Answer: $x = 0$ or $x = \ln 4$

- Let $u = e^x$, so the equation becomes $u^2 - 5u + 4 = 0$.
- Factorising, $(u - 1)(u - 4) = 0$, so $e^x = 1$ or $e^x = 4$.
- Hence $x = 0$ or $x = \ln 4$.

LOS: Pure Mathematics · Exponential and logarithmic functions

KEY TAKEAWAY

To solve an equation of the form $e^{f(x)} = c$ take natural logarithms of both sides, and for $\ln f(x) = c$ use $f(x) = e^c$; the substitution $u = e^x$ turns $e^{(2x)}$ equations into quadratics.

Question 3 (8 marks) [Equations and inequalities]

(a) Solve the inequality $x^2 + 2x - 3 \leq 0$.

(a) Answer: $-3 \leq x \leq 1$

- Factorise: $x^2 + 2x - 3 = (x + 3)(x - 1)$.
- The critical values are -3 and 1 .
- The graph is $\cup$ -shaped, so the expression is ≤ 0 between the roots: $-3 \leq x \leq 1$.

(b) Find the range of values of k for which $x^2 + kx + 9 > 0$ for all real values of x .

(b) Answer: $-6 < k < 6$

- The graph is $\cup$ -shaped, so it is always positive when it has no real roots: discriminant $k^2 - 4(9) < 0$.
- $k^2 < 36$, so $-6 < k < 6$.

(c) Find the set of values of x that satisfy both $x^2 + 2x - 3 \leq 0$ and $x > 0$.

(c) Answer: $0 < x \leq 1$

- Use the solution to part (a) together with $x > 0$.
- The values common to both are $0 < x \leq 1$.

LOS: Algebra · Equations and inequalities

KEY TAKEAWAY

Quadratic inequalities: factorise, mark the roots on a number line, and read off the region above or below the axis; a positive-definite quadratic needs a negative discriminant.

LIKED THIS SAMPLE?

The full paper is the real thing.

THIS FREE SAMPLE

A short extract: the opening questions of Paper 1, then their worked answers. 4 pages in all.

THE FULL PAPER

One 3-hour paper of 100 marks: Section A pure maths (40 marks) and Section B probability and statistics (60 marks), with an application question of at least 12 marks. 24 pages, with a worked solution for every question.

What you get with each paper

- A complete, timed paper in the real exam layout, not just a taste of it.
- A worked solution for every question: numbered steps, why each wrong option is wrong, and a key takeaway.
- 20 different papers in this set. Every one uses new questions, so each extra paper is new practice, not a repeat.
- An A4 PDF emailed straight after payment, made for printing.

Get Paper 1 now

A\$11.99 one-off, instant PDF download. Tap or click here.

Or see all 20 Singapore A-Level H1 Maths papers:
testpapershub.com/collections/singapore-a-level-h1-maths/

Getting the most from a practice paper

- 1 Print it and set the timer shown on the cover. Answer every question before looking at any solution.
- 2 Mark it against the worked solutions and note the topics that cost you marks.
- 3 Retry the questions you missed a day later, then use the next paper to check the fix held.

Not sure which paper to start with, or have a question before you buy? Email support@testpapershub.com and a real person will reply, normally within one business day. These are original practice papers, not official past papers, and are not affiliated with any exam authority.