



Test Papers
Hub.

HSC Mathematics Extension 2 Practice Paper 1

Practice Examination

**Reading time 10 minutes · Working time 3 hours · Section I: 10 multiple-choice ·
Section II: 90 marks · 100 marks in all**

How to use this booklet

- Reading time – 10 minutes. Working time – 3 hours. Write using black pen. Calculators approved by NESA may be used.
- A reference sheet is assumed to be provided, as in the real examination. For questions in Section II, show relevant mathematical reasoning and/or calculations.
- Worked solutions follow the paper: every question has step-by-step working and a key takeaway.

SECTION I

10 marks · Attempt Questions 1 – 10

Allow about 15 minutes for this section. Choose the best answer for each question.

1. Using technology, the value of $\int$ from 0 to 1 of $\frac{4}{x^2 + 1} dx$, correct to three decimal places, is

- A 6.283
- B 3.642
- C 3.142
- D 2

2. The length of the curve $y = 3\sin(x)$ from $x = 0$ to $x = 1$, correct to three decimal places, is

- A 2.72
- B 2.97
- C 2.524
- D 1

3. A particle of mass 4 kg falls from rest under gravity ($g = 10 \text{ m/s}^2$) against a resistive force of magnitude $10v$ newtons, where $v \text{ m/s}$ is its speed. The terminal velocity of the particle is

- A 400 m/s
- B 4 m/s
- C 2 m/s
- D 0.25 m/s

4. $dy/dx = 0.25y$ and $y = 4$ when $x = 0$. The value of y when $x = 1$, correct to two decimal places, is

- A 1.28
- B 5.14
- C 4.25
- D 218.39

5. In how many ways can 7 people stand in a line if two particular people must stand next to each other?

- A 5040
- B 1442
- C 720
- D 1440

6. Find the remainder when $P(x) = x^3 + x^2 + 4x + 6$ is divided by $(x - -1)$.

- A 12
- B 6
- C 1
- D 2

7. The region under $y = 4x + 1$ from $x = 0$ to $x = 4$ is rotated about the x-axis. The volume of the solid formed is

- A 36π
- B $\frac{1228\pi}{3}$
- C $\frac{2456\pi}{3}$
- D $\frac{1228}{3}$

8. The set of complex numbers z satisfying $|z - (3i)| = 2$ is a circle with

- A centre (0, 3), radius 4
- B centre (0, -3), radius 2
- C centre (0, 3), radius 2
- D centre (3, 0), radius 2

9. The gradient of the curve $2x^2 + 3y^2 + xy = 16$ at the point (1, 2) is

- A $-\frac{6}{13}$
- B $\frac{13}{6}$
- C $\frac{6}{13}$
- D -0.3333333333333333

WORKED SOLUTIONS

Answers & worked solutions

Multiple-choice answer key

1	C	2	A	3	B	4	B	5	D	6	D
7	B	8	C	9	A	10	A				

SECTION I

1. Using technology, the value of $\int$ from 0 to 1 of $\frac{4}{x^2+1} dx$, correct to three decimal places, is [Definite integrals (CAS)]

Correct answer: C — 3.142

- Evaluate with the CAS integral command over $[0, 1]$.
- $= 3.142$.
- Why the other options are wrong:
- A (6.283): Check the integrand and limits.
- B (3.642): This value does not result from a valid step in the working above, which reaches 3.142. It usually comes from using the wrong formula, the wrong quantity or a unit that was not converted. The correct method starts: Evaluate with the CAS integral command over $[0, 1]$.
- D (2): That is the integrand at the upper limit, not the integral.

LOS: Methods: multiple choice

KEY TAKEAWAY

For integrals without a nice antiderivative, use the CAS definite integral and round as requested.

2. The length of the curve $y = 3\sin(x)$ from $x = 0$ to $x = 1$, correct to three decimal places, is [Arc length]

Correct answer: A — 2.72

- Arc length $= \int \sqrt{1 + (dy/dx)^2} dx$ from 0 to 1.
- $dy/dx = 3\cos(x)$; integrate on the CAS: 2.72.
- Why the other options are wrong:
- B (2.97): This value does not result from a valid step in the working above, which reaches 2.72. It usually comes from using the wrong formula, the wrong quantity or a unit that was not converted. The correct method starts: Arc length $= \int \sqrt{1 + (dy/dx)^2} dx$ from 0 to 1.
- C (2.524): Use the arc-length formula $\sqrt{1 + (dy/dx)^2}$.
- D (1): That is the horizontal distance only.

LOS: Methods: multiple choice