



**Victorian Certificate of Education
2006**

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

Letter

Figures									
Words									

**PHYSICS
Written examination 1**

Monday 5 June 2006

Reading time: 11.45 am to 12.00 noon (15 minutes)

Writing time: 12.00 noon to 1.30 pm (1 hour 30 minutes)

QUESTION AND ANSWER BOOK

Structure of book

<i>Section</i>	<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
A – Core – Areas of study			
1. Motion in one and two dimensions	16	16	40
2. Electronics and photonics	9	9	25
B – Detailed studies			
1. Einstein’s special relativity (page 17)	11	11	25
OR			
2. Investigating materials and their use in structures (page 23)	11	11	25
OR			
3. Further electronics (page 28)	12	12	25
			Total 90

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers, up to two pages (one A4 sheet) of pre-written notes (typed or handwritten) and one scientific calculator.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.

Materials supplied

- Question and answer book of 34 pages with a detachable data sheet in the centrefold.

Instructions

- Detach the data sheet from the centre of this book during reading time.
- Write your **student number** in the space provided above on this page.
- Answer all questions in the spaces provided.
- **Always** show your working where space is provided.
- Where an answer box has a unit printed in it, give your answer in that unit.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

SECTION A – Core**Instructions for Section A**

Answer **all** questions **for both** Areas of study in this section of the paper.
You should take the value of g to be 10 m s^{-2} .

SECTION B – Detailed studies**Instructions for Section B**

Choose **one** of the following **Detailed studies**. Answer **all** the questions on the Detailed study you have chosen.

SAMPLE
Number of questions and mark allocations
may vary from the information indicated.

PHYSICS

Written examination 1

DATA SHEET

Directions to students

Detach this data sheet before commencing the examination.

This data sheet is provided for your reference.

1	velocity; acceleration	$v = \frac{\Delta x}{\Delta t}; \quad a = \frac{\Delta v}{\Delta t}$
2	equations for constant acceleration	$v = u + at$ $x = ut + \frac{1}{2}at^2$ $v^2 = u^2 + 2ax$ $x = \frac{1}{2}(v + u)t$
3	Newton's second law	$F = ma$
4	circular motion	$a = \frac{v^2}{r} = \frac{4\pi^2 r}{T^2}$
5	Hooke's law	$F = -kx$
6	elastic potential energy	$\frac{1}{2}kx^2$
7	gravitational potential energy near the surface of the Earth	mgh
8	kinetic energy	$\frac{1}{2}mv^2$
9	Newton's law of universal gravitation	$F = G \frac{M_1 M_2}{r^2}$
10	gravitational field	$g = G \frac{M}{r^2}$
11	stress	$\sigma = \frac{F}{A}$
12	strain	$\varepsilon = \frac{\Delta L}{L}$
13	Young's modulus	$E = \frac{\text{stress}}{\text{strain}}$
14	transformer action	$\frac{V_1}{V_2} = \frac{N_1}{N_2}$
15	AC voltage and current	$V_{\text{RMS}} = \frac{1}{2\sqrt{2}} V_{\text{P-P}} \quad I_{\text{RMS}} = \frac{1}{2\sqrt{2}} I_{\text{P-P}}$
16	voltage; power	$V = RI \quad P = VI$

17	resistors in series	$R_T = R_1 + R_2$
18	resistors in parallel	$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$
19	capacitors	time constant : $\tau = RC$
20	Lorentz factor	$\gamma = \frac{1}{\left(1 - \frac{v^2}{c^2}\right)^{\frac{1}{2}}}$
21	time dilation	$t = t_0 \gamma$
22	length contraction	$L = L_0 / \gamma$
23	relativistic mass	$m = m_0 \gamma$
24	universal gravitational constant	$G = 6.67 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$
25	mass of Earth	$M_E = 5.98 \times 10^{24} \text{ kg}$
26	radius of Earth	$R_E = 6.37 \times 10^6 \text{ m}$
27	mass of the electron	$m_e = 9.1 \times 10^{-31} \text{ kg}$
28	charge on the electron	$q = -1.6 \times 10^{-19} \text{ C}$
29	speed of light	$c = 3.0 \times 10^8 \text{ m s}^{-1}$

Prefixes/Units

p = pico = 10^{-12}

n = nano = 10^{-9}

μ = micro = 10^{-6}

m = milli = 10^{-3}

k = kilo = 10^3

M = mega = 10^6

G = giga = 10^9

t = tonne = 10^3 kg

END OF DATA SHEET