Year 2002

VCE

Specialist Mathematics

Trial Examination 1

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SPECIALIST MATHEMATICS

Written examinations 1 and 2

FORMULA SHEET

Directions to students

Detach this formula sheet during reading time.

This formula sheet is provided for your reference.

Specialist Mathematics Formulas

Mensuration

area of a trapezium: $\frac{1}{2}(a+b)h$

curved surface area of a cylinder: $2\pi rh$

volume of a cylinder: $\pi r^2 h$

volume of a cone: $\frac{1}{3}\pi r^2 h$

volume of a pyramid: $\frac{1}{3}Ah$

volume of a sphere: $\frac{4}{3}\pi r^3$

area of a triangle: $\frac{1}{2}bc\sin A$

sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

cosine rule: $c^2 = a^2 + b^2 - 2ab\cos C$

Coordinate geometry

ellipse: $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$

hyperbola: $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$

Circular (trigometric) functions

$\cos^2 x + \sin^2 x = 1$

$1 + \tan^2 x = \sec^2 x$ $\quad\quad$ $\cot^2 x + 1 = \operatorname{cosec}^2 x$

$\sin(x+y) = \sin x\cos y + \cos x\sin y$ $\quad\quad$ $\sin(x-y) = \sin x\cos y - \cos x\sin y$

$\cos(x+y) = \cos x\cos y - \sin x\sin y$ $\quad\quad$ $\cos(x-y) = \cos x\cos y + \sin x\sin y$

$\tan(x+y) = \frac{\tan x + \tan y}{1 - \tan x\tan y}$ $\quad\quad$ $\tan(x-y) = \frac{\tan x - \tan y}{1 + \tan x\tan y}$

$\cos 2x = \cos^2 x - \sin^2 x = 2\cos^2 x - 1 = 1 - 2\sin^2 x$

$\sin 2x = 2\sin x\cos x$ $\quad\quad$ $\tan 2x = \frac{2\tan x}{1 - \tan^2 x}$

function	Sin^{-1}	Cos^{-1}	Tan^{-1}
domain	$[-1, 1]$	$[-1,1]$	R
range	$\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$	$[0, \pi]$	$\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

Algebra (Complex numbers)

$z = x + yi = r(\cos\theta + i\sin\theta) = r\operatorname{cis}\theta$

$|z| = \sqrt{x^2 + y^2} = r$ $\quad\quad$ $-\pi < \text{Arg } z \leq \pi$

$z_1 z_2 = r_1 r_2 \operatorname{cis}(\theta_1 + \theta_2)$ $\quad\quad$ $\frac{z_1}{z_2} = \frac{r_1}{r_2}\operatorname{cis}(\theta_1 - \theta_2)$

$z^n = r^n \operatorname{cis} n\theta$ (de Moivre's theorem)

Calculus

$$\frac{d}{dx}\left(x^n\right) = nx^{n-1} \qquad \int x^n dx = \frac{1}{n+1}x^{n+1} + c, n \neq -1$$

$$\frac{d}{dx}\left(e^{ax}\right) = ae^{ax} \qquad \int e^{ax} dx = \frac{1}{a}e^{ax} + c$$

$$\frac{d}{dx}(\log_e x) = \frac{1}{x} \qquad \int \frac{1}{x} dx = \log_e x + c, \text{ for } x > 0$$

$$\frac{d}{dx}(\sin ax) = a\cos ax \qquad \int \sin ax\, dx = -\frac{1}{a}\cos ax + c$$

$$\frac{d}{dx}(\cos ax) = -a\sin ax \qquad \int \cos ax\, dx = \frac{1}{a}\sin ax + c$$

$$\frac{d}{dx}(\tan ax) = a\sec^2 ax \qquad \int \sec^2 ax\, dx = \frac{1}{a}\tan ax + c$$

$$\frac{d}{dx}\left(\text{Sin}^{-1}x\right) = \frac{1}{\sqrt{1-x^2}} \qquad \int \frac{1}{\sqrt{a^2-x^2}} dx = \text{Sin}^{-1}\frac{x}{a} + c, a > 0$$

$$\frac{d}{dx}\left(\text{Cos}^{-1}x\right) = \frac{-1}{\sqrt{1-x^2}} \qquad \int \frac{-1}{\sqrt{a^2-x^2}} dx = \text{Cos}^{-1}\frac{x}{a} + c, a > 0$$

$$\frac{d}{dx}\left(\text{Tan}^{-1}x\right) = \frac{1}{1+x^2} \qquad \int \frac{a}{a^2+x^2} dx = \text{Tan}^{-1}\frac{x}{a} + c$$

product rule: $\frac{d}{dx}(uv) = u\frac{dv}{dx} + v\frac{du}{dx}$

quotient rule: $\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$

chain rule: $\frac{dy}{dx} = \frac{dy}{du}\frac{du}{dx}$

mid-point rule: $\int_a^b f(x)dx \approx (b-a)f\left(\frac{a+b}{2}\right)$

trapezoidal rule: $\int_a^b f(x)dx \approx \frac{1}{2}(b-a)\left(f(a) + f(b)\right)$

Euler's method: If $\frac{dy}{dx} = f(x)$, $x_0 = a$ and $y_0 = b$, then $x_{n+1} = x_n + h$ and $y_{n+1} = y_n + hf(x_n)$

acceleration: $a = \frac{d^2x}{dt^2} = \frac{dv}{dt} = v\frac{dv}{dx} = \frac{d}{dx}\left(\frac{1}{2}v^2\right)$

constant (uniform) acceleration: $v = u + at$ $\quad s = ut + \frac{1}{2}at^2$ $\quad v^2 = u^2 + 2as$ $\quad s = \frac{1}{2}(u+v)t$

Vectors in two and three dimensions

$$\underset{\sim}{r} = x\underset{\sim}{i} + y\underset{\sim}{j} + z\underset{\sim}{k}$$

$$|\underset{\sim}{r}| = \sqrt{x^2 + y^2 + z^2} = r$$

$$\underset{\sim}{r}_1 \cdot \underset{\sim}{r}_2 = r_1 r_2 \cos\theta = x_1x_2 + y_1y_2 + z_1z_2$$

$$\dot{\underset{\sim}{r}} = \frac{d\underset{\sim}{r}}{dt} = \frac{dx}{dt}\underset{\sim}{i} + \frac{dy}{dt}\underset{\sim}{j} + \frac{dz}{dt}\underset{\sim}{k}$$

Mechanics

momentum: $\underset{\sim}{p} = m\underset{\sim}{v}$

equation of motion: $\underset{\sim}{R} = m\underset{\sim}{a}$

friction: $F \leq \mu N$

END OF FORMULA SHEET

VICTORIAN CERTIFICATE OF EDUCATION
2002

SPECIALIST MATHEMATICS

Trial Written Examination 1 (Facts, skills and applications)

Reading time: 15 minutes
Total writing time: 1 hour 30 minutes

PART I

MULTIPLE-CHOICE QUESTION BOOK

Directions to students

This examination has two parts: Part I (multiple-choice questions) and Part II (short answer questions)
Part I consists of this question book and must be answered on the answer sheet provided for multiple-choice questions.
Part II consists of a separate question and answer book.
You must complete **both** parts in the time allotted. When you have completed one part continue immediately to the other part. A detachable formula sheet for use in both parts is included.

At the end of the task

Place the answer sheet for multiple-choice questions (Part I) inside the front cover of the question and answer book (Part II). You may retain this question book.

Structure of book

Number of questions	*Number of questions to be answered*	*Number of marks*
30	30	30

Directions to students

Materials

Question book of 14 pages.
Answer sheet for multiple-choice questions.
Working space is provided throughout the book.
You may bring to the examination up to four pages (two A4 sheets) of pre-written notes.
You may use an approved scientific and/or graphics calculator, ruler, protractor, set-square and aids for curve sketching
You should have at least one pencil and an eraser.

The task

Detach the formula sheet from the book during reading time.
Please ensure that your **name and student number** as printed on your answer sheet for multiple-choice questions are correct, **and** sign your name in the space provided to verify this.
Answer **all** questions.
There is a total of 30 marks available for the multiple-choice part of this examination.
All questions should be answered on the answer sheet provided for multiple-choice questions.
Unless otherwise indicated, the diagrams in this book are **not** necessarily drawn to scale.
Take the **acceleration due to gravity** to have magnitude g m/s^2, where g = 9.8.

At the end of the task

Place the answer sheet for multiple-choice questions (Part I) inside the front cover of the question and answer book (Part II). You may retain this question book.

VCE SPECIALIST MATHEMATICS 2002
Trial Written Examination 1
ANSWER SHEET

NAME: _____

STUDENT NUMBER _____

SIGNATURE_____

Instructions

- Write your name in the space provided above.
- Write your student number in the space provided above. Sign your name.
- Use a **PENCIL** for **ALL** entries.
  If you make a mistake, **ERASE** it - **DO NOT** cross it out.
- Marks will **NOT** be deducted for incorrect answers.
- **NO MARK** will be given if more than **ONE** answer is completed for any question.
- All answers must be completed like **THIS** example.

A	**B**	C	D	E

1	A	B	C	D	E	**16**	A	B	C	D	E
2	A	B	C	D	E	**17**	A	B	C	D	E
3	A	B	C	D	E	**18**	A	B	C	D	E
4	A	B	C	D	E	**19**	A	B	C	D	E
5	A	B	C	D	E	**20**	A	B	C	D	E
6	A	B	C	D	E	**21**	A	B	C	D	E
7	A	B	C	D	E	**22**	A	B	C	D	E
8	A	B	C	D	E	**23**	A	B	C	D	E
9	A	B	C	D	E	**24**	A	B	C	D	E
10	A	B	C	D	E	**25**	A	B	C	D	E
11	A	B	C	D	E	**26**	A	B	C	D	E
12	A	B	C	D	E	**27**	A	B	C	D	E
13	A	B	C	D	E	**28**	A	B	C	D	E
14	A	B	C	D	E	**29**	A	B	C	D	E
15	A	B	C	D	E	**30**	A	B	C	D	E

Please DO NOT fold, bend or staple this form

Specific Instructions to students

This part consists of 30 questions.
Answer **all** questions in this part on the answer sheet provided for multiple-choice questions.
A correct answer scores 1, an incorrect answer scores 0. No mark will be given for a question if two or more letters are shaded for that question. Marks will not be deducted for incorrect answers. You should attempt every question.

Question 1

If A, B, C and D are integers then $\frac{8x^2 - 5x + 3}{(x-1)^2(x+2)}$ could equal

A. $\frac{A}{x-1} + \frac{Bx + C}{(x-1)^2} + \frac{D}{x+2}$

B. $\frac{A}{x-1} + \frac{B}{x+2}$

C. $\frac{A}{x-1} + \frac{B}{(x-1)^2} + \frac{C}{x+2}$

D. $\frac{A}{(x-1)^2} + \frac{B}{x+2}$

E. $\frac{Ax + B}{(x-1)^2} + \frac{C}{x+2}$

Question 2

If $Z = 4 - 3i$, then Z^{-1} equals

A. $-4-3i$

B. $4 + 3i$

C. $-4 + 3i$

D. $\frac{4}{7} + \frac{3}{7}i$

E. $\frac{4}{25} + \frac{3}{25}i$

Question 3

A factor of $Z^4 - Z^2 - 20$ is

A. $Z + 2i$

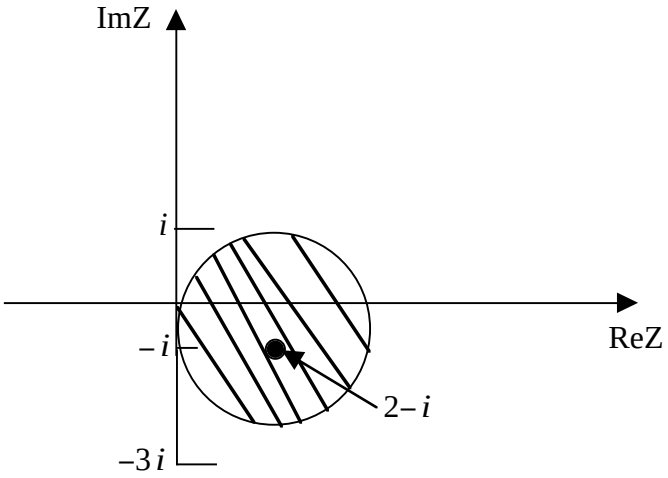
B. $Z + 5i$

C. $Z - 5i$

D. $Z + \sqrt{5}\,i$

E. $Z + \sqrt{2}\,i$

Question 4



The shaded region in the above diagram can be described as

A. $|Z + 2 - i| \leq 2$

B. $|Z - 2 + i| \leq 2$

C. $|Z + 2 - i| \geq 2$

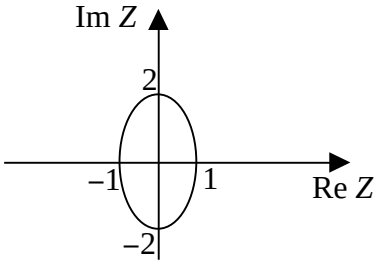
D. $|Z - 2 + i| \geq 2$

E. $|Z - 2 + i| \geq 3$

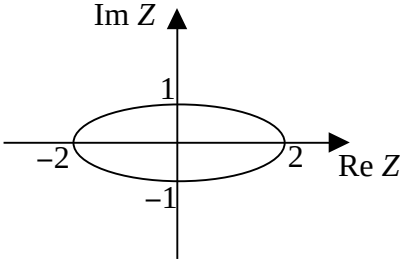
Question 5

The graph which represents $3(\text{Re } Z)^2 + 6(\text{Im } Z) - 6 = 0$ is:

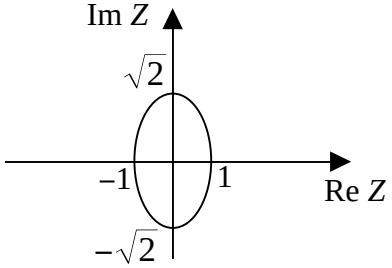
A.



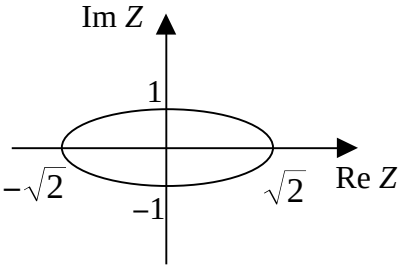
B.



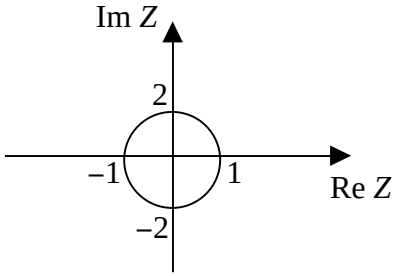
C.



D.



E.



Question 6

The graph of $y = \dfrac{x^3 - 32}{x^2}$ has

A. a vertical asymptote when $x = \sqrt[3]{32}$

B. a local minimum when $x = 4$

C. a local maximum when $x = 4$

D. a local minimum when $x = -4$

E. a local maximum when $x = -4$

Question 7

An antiderivative of $\dfrac{2x}{\sqrt{x^2 + 6}}$ equals

A. $\dfrac{1}{2}\sqrt{x^2 + 6}$

B. $2\sqrt{x^2 + 6}$

C. $\log_e(x^2 + 6)$

D. $\dfrac{1}{2}\log_e(x^2 + 6)$

E. $2\log_e(x^2 + 6)$

Question 8

$\int_0^{\frac{\pi}{3}} \sin^2(5x)dx$ equals

A. $\frac{20\pi + 3\sqrt{3}}{120}$

B. $\frac{20\pi - 3\sqrt{3}}{120}$

C. $\frac{\sqrt{3}}{8}$

D. $\sqrt{3}$

E. $\frac{40 - \sqrt{3}}{40}$

Question 9

The volume generated when the area bounded by the curve $y = \frac{1}{2}(e^x + e^{-x})$ and the lines $x = 0$ and $x = 1$ is rotated about the X axis is closest to

A. 2.4

B. 3.4

C. 4.4

D. 6.4

E. 8.4

Question 10

If $y = \cos^{-1}(2x-1)$ then $\frac{dy}{dx}$ equals

A. $\frac{-2}{\sqrt{x^2-4x}}$

B. $\frac{-2}{\sqrt{2-4x^2}}$

C. $\frac{-1}{\sqrt{1-2x^2}}$

D. $\frac{-1}{\sqrt{x^2-x}}$

E. $\frac{-1}{\sqrt{x-x^2}}$

Question 11

If $y = \cos^{-1}(4x+1)$ then which one of the following statements is true?

A. $0 \le x \le \frac{1}{2}$

B. $-\frac{1}{2} \le x \le 0$

C. $0 \le x \le \frac{1}{4}$

D. $-\frac{1}{4} \le x \le 0$

E. $-\frac{1}{4} \le x \le \frac{1}{4}$

Question 12

The area bounded by the graph $y = x \log_e x$, the Y axis and the lines $x = 1$ and $x = 3$ can be found using the trapezoidal rule with four equal intervals to be closest to

A. 2.89

B. 2.93

C. 2.97

D. 3.08

E. 3.19

Question 13

If $\frac{d^2y}{dx^2} = \frac{-(\sin \log_e x + \cos \log_e x)}{x^2}$ then y equals

A. $\sin(\log_e x)$

B. $\cos(\log_e x)$

C. $\sin x \log_e x$

D. $\cos x \log_e x$

E. $\sin \frac{1}{x} \log_e x$

Question 14

If $\cos\theta = \frac{3}{4}$ where $\frac{3\pi}{2} < \theta < 2\pi,$ then the exact value of $\sin 2\theta$ is

A. $\frac{-\sqrt{5}}{2}$

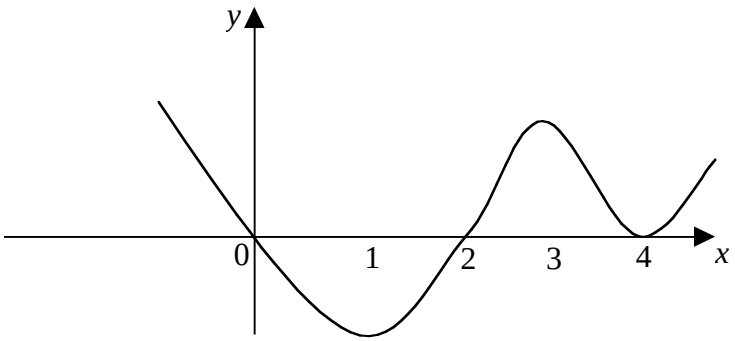
B. $\frac{\sqrt{5}}{2}$

C. $\frac{-15}{16}$

D. $\frac{3\sqrt{7}}{8}$

E. $\frac{-3\sqrt{7}}{8}$

Question 15



The graph of $y = f'(x)$ is shown above.
Which one of the following statements is true for the graph of $y = f(x)$?

A. There is a local minimum at $x = 4$

B. There is a local minimum at $x = 0$

C. There is a local minimum at $x = 1$

D. There is a local minimum at $x = 2$

E. The gradient equals 0 when $x = 3$

Question 16

If $\vec{a} = 3\hat{i} - 2\hat{j} + \hat{k}$ and
$\vec{b} = \hat{i} + 2\hat{j} + 2\hat{k}$ then the value of $\cos\theta$ where θ is the angle between $\vec{a}$ and $\vec{b}$ is

A. $\frac{1}{\sqrt{14}}$

B. $\frac{1}{3}$

C. $\frac{\sqrt{11}}{33}$

D. $\frac{\sqrt{14}}{42}$

E. 1

Question 17

The acceleration of a particle is given by $a = -6v$ where v is the velocity of the particle. If the particle is projected with an initial velocity of 3, then at any time t, v equals

A. $3e^{-6t}$

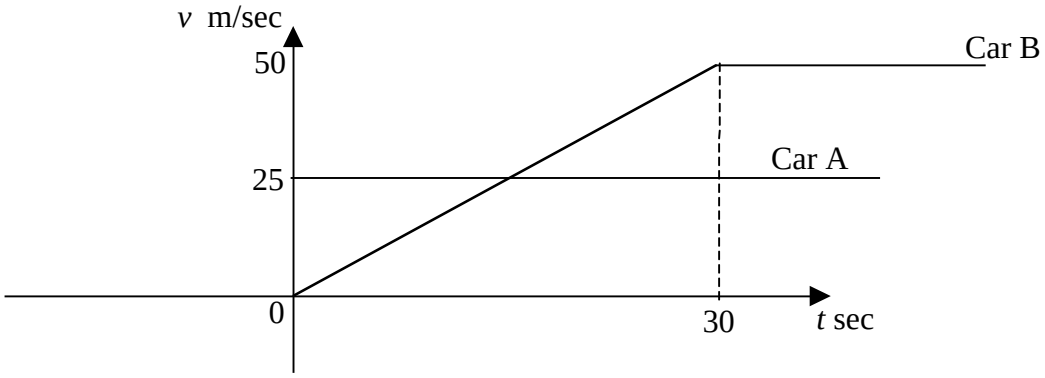
B. $2 + e^{-3t}$

C. $e^{-3t}(3 - 3t)$

D. $3 - \frac{1}{3}t$

E. $\sqrt{\frac{27 - t}{3}}$

Question 18



The above graph shows the motion of two cars A and B that cross the starting line when $t = 0$.
The time when car B overtakes car A is closest to

A. 10 seconds

B. 15 seconds

C. 30 seconds

D. 35 seconds

E. 40 seconds

Question 19

If $\vec{a} = 3\hat{i} - 2\hat{j} + 4\hat{k}$ and
$\vec{b} = 2\hat{i} - 3\hat{j} - \hat{k}$ then $3\vec{a} - 2\vec{b}$ equals

A. $5\hat{i} - 12\hat{j} + 10\hat{k}$

B. $5\hat{i} - 12\hat{j} + 14\hat{k}$

C. $5\hat{i} + 14\hat{k}$

D. $13\hat{i} + 10\hat{k}$

E. $13\hat{i} - 12\hat{j} + 10\hat{k}$

Question 20

If $\vec{a} = 6\hat{i} + 12\hat{j}$ and $\vec{b} = -3\hat{i} + 2\hat{j}$ then the vector resolute of $\vec{a}$ in the direction of $\vec{b}$ is

A. $\frac{-6}{13}(3\hat{i} - 2\hat{j})$

B. $\frac{-6}{13}(3\hat{i} + 2\hat{j})$

C. $-18\hat{i} + 12\hat{j}$

D. $\frac{6}{\sqrt{13}}(-3\hat{i} + 2\hat{j})$

E. $\frac{-6}{\sqrt{13}}(3\hat{i} + 2\hat{j})$

Question 21

If $\frac{dy}{dx} = 2x$ and $\frac{dx}{dt} = 3$, then $\frac{d^2y}{dt^2}$ equals

A. $3t^2$

B. $6t$

C. 2

D. 6

E. 18

Question 22

If $\vec{a} \cdot \frac{d\vec{a}}{dt} = 0$, then which one of the following statements could be true?

A. $\vec{a}$ moves on an elliptical path

B. $\vec{a}$ moves in a straight line

C. $\vec{a}$ moves on a parabolic path

D. $\vec{a} = 3t$

E. $\vec{a}$ is a constant vector

Question 23

A curve has the parametric equations

$$x = 1 + \cos t$$
$$y = 3\sin t$$

The curve is

A. an ellipse with centre at (−1,0)

B. a circle with centre at (−1,0)

C. an hyperbola with centre at (1,0)

D. an ellipse whose semi major axis equals 1 and whose semi minor axis equals 3

E. a circle with radius of 1

Question 24

A particle moves in a straight line with a constant retardation of 6 m/sec^2. If the particle was initially moving at 10 m/sec, then the distance moved by the time the particle comes to rest is closest to

A. 1.7m

B. 2.9m

C. 3.6m

D. 7.0m

E. 8.3m

Question 25

A body has a position vector $\vec{r}(t) = \cos 2t\,\hat{i} - \sin 2t\,\hat{j}$. The distance of the body from origin when $t = \frac{\pi}{16}$ is closest to

A. 0.54

B. 1

C. 1.31

D. 1.67

E. 2

Question 26

A force of $3\hat{j} - 6\hat{k}$ newton acts on a mass of 3 kg for a period of 2 seconds. If the mass was initially at rest with a position vector $3\hat{i} + \hat{j} - \hat{k}$ then the position of the particle after two seconds is given by the position vector,

A. $3\hat{i} + 3\hat{j} - 5\hat{k}$

B. $3(\hat{i} + \hat{j} + 3\hat{k})$

C. $3(\hat{i} + \hat{j} - 3\hat{k})$

D. $3\hat{i} + 3\hat{j} + 5\hat{k}$

E. $2\hat{j} - 4\hat{k}$

Question 27

A mass of 10 kg is moving with a velocity of 40 km/hr along a straight track. Another mass of 30 kg is moving along the same track in the same direction with a velocity of 20km/hr. After they collide, the masses are coupled together. The velocity of the coupled masses after impact is

A. 15 km/hr in the original direction

B. 25 km/hr in the original direction

C. 26.5 km/hr in the original direction

D. 45.5 km/hr in the original direction

E. 60 km/hr in the original direction

Question 28
A mass of 8 kg is suspended by two strings, 15 cm and 20 cm long. The strings are attached to two points which are 25 cm apart on the same horizontal level. The tension in the shorter string is

A. 4.8 N

B. 6.4 N

C. 47.04 N

D. 62.72 N

E. 93.24 N

Question 29

$\int_1^{e^2} x^{-1} \log_e x dx$ is closest to

A. 1.7

B. 2

C. 17.7

D. 23.4

E. 26.8

Question 30
A 4 kg mass on a smooth bench top is attached by a light inextensible string passing over a smooth pulley to a mass of 3 kg. The 3 kg mass hangs vertically down by the side of the bench top. The acceleration of the system is closest to

A. 2.3 m/sec^2

B. 4.2 m/sec^2

C. 9.8 m/sec^2

D. 22.9 m/sec^2

E. 29.4 m/sec^2

END OF PART I
MULTIPLE CHOICE QUESTION BOOK

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STUDENT NUMBER									Letter
Figures									
Words									

VICTORIAN CERTIFICATE OF EDUCATION
2002

SPECIALIST MATHEMATICS

Trial Written Examination 1 (Facts, skills and applications)

Reading time: 15 minutes
Total writing time: 1 hour 30 minutes

PART II

QUESTION AND ANSWER BOOK

Directions to students

This examination has two parts: Part I (multiple-choice questions) and Part II (short answer questions)
Part I consists of a separate question book and must be answered on the answer sheet provided for multiple-choice questions.
Part II consists of this question and answer book.
You must complete **both** parts in the time allotted. When you have completed one part continue immediately to the other part. A detachable formula sheet for use in both parts is included.

At the end of the task
Place the answer sheet for multiple-choice questions (Part I) inside the front cover of this question and answer book (Part II).

Structure of book

Number of questions	*Number of questions to be answered*	*Number of marks*
6	6	20

Directions to students

Materials

Question and answer book of 6 pages.
Working space is provided throughout the book.
You may bring to the examination up to four pages (two A4 sheets) of pre-written notes.
You may use an approved scientific and/or graphics calculator, ruler, protractor, set-square and aids for curve sketching

The task

Detach the formula sheet during reading time.
Please ensure that your **student number** in the space provided on the cover of this book.
The marks allotted to each question are indicated at the end of the question.
There is a total of 20 marks available for Part II.
You need not give numerical answers as decimals unless instructed to do so. Alternative forms may involve, for example, π, e, surds or fractions.
Where an exact answer is required to a question, appropriate working must be shown and calculus must be used to evaluate derivatives and definite integrals.
Unless otherwise indicated, the diagrams in this book are **not** necessarily drawn to scale.
Take the **acceleration due to gravity** to have magnitude g m/s^2, where g = 9.8.
All written responses should be in English.

At the end of the task

Place the answer sheet for multiple-choice questions (Part I) inside the front cover of this question and answer book (Part II).

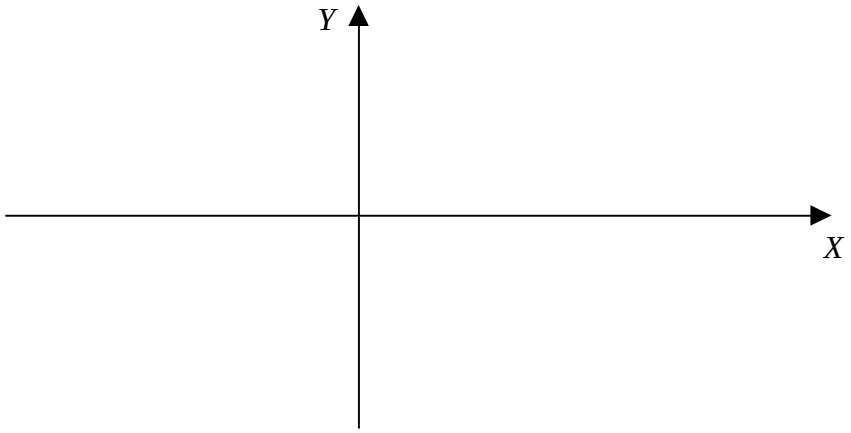
Specific Instructions to students

Answer **all** questions in this part in the spaces provided.

Question 1

a. Use the method of adding ordinates to sketch the graph of $y = \dfrac{2x^3 + 1}{x}$ on the axes below.

1 mark

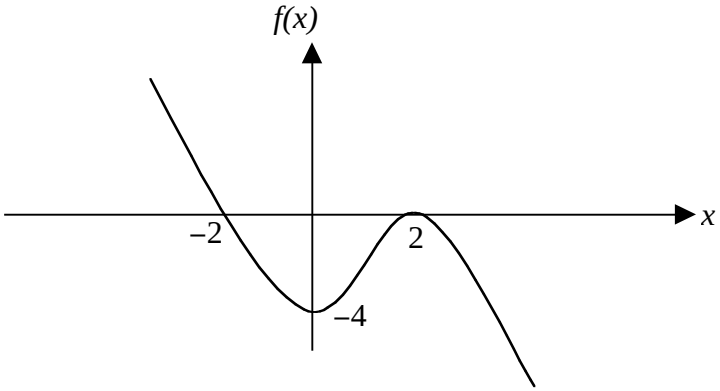


b. Find the exact value of the coordinates of the local minimum of the graph $y = \dfrac{2x^3 + 1}{x}$

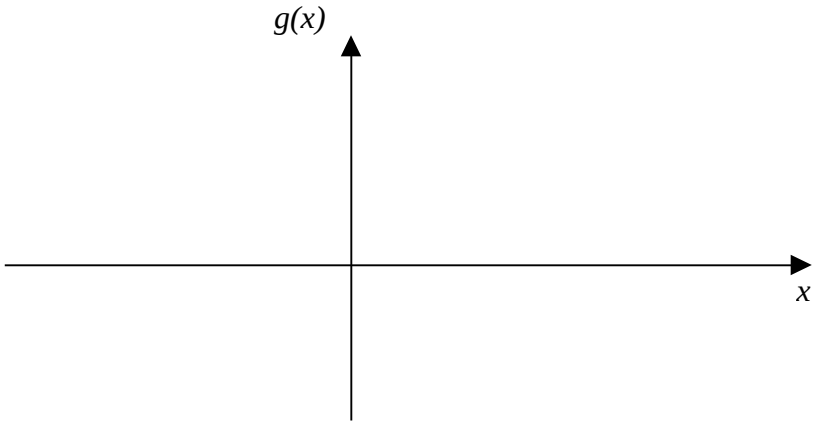
2 marks

Question 1(continued)

c.



The above is the graph of y = *f (x)*. Sketch the graph of *g* (*x)* on the axes below, where $g(x) = \frac{1}{f(x)}$.



1 mark

Question 2

Find the exact solutions of $\tan^2(x + \frac{\pi}{3}) = \frac{1}{3}$ for $0 \leq x \leq 2\pi$

3 marks

Question 3

If $Z = 2 + 2i$ and $W = -2 + 2i$

Use De Moivre's theorem to write $Z^2 \div W^5$ in the form $a + bi$

4 marks

Question 4

a. If $y = \frac{1}{2}e^x(\sin x + \cos x)$ find $\frac{dy}{dx}$

1 mark

b. Find an antiderivative of $7(e^x \cos x - 1) + \frac{1}{\sqrt{e^2 - 4x^2}}$

2 marks

Question 5

A body is sliding down a rough inclined plane which makes an angle of 30° with the horizontal. If the acceleration is 2 m/sec^2, find the coefficient of friction to two decimal places.

3 marks

Question 6

If $\vec{a} = 2\hat{i} + \hat{j} + 3\hat{k}$

and $\vec{b} = \hat{i} - 2\hat{j} - \hat{k}$

then find a vector $\vec{u}$ which is perpendicular to both $\vec{a}$ and $\vec{b}$

3 marks

END OF PART II
QUESTION AND ANSWER BOOK

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