REVISION ONE

Year 11 Examination

Question/Answer Booklet

MATHEMATICS METHODS UNITS 1 AND 2

Section One:
Calculator-free

Time allowed for this section

Reading time before commencing work: five minutes
Working time for this section: fifty minutes

Materials required/recommended for this section

To be provided by the supervisor

This Question/Answer Booklet
Formula Sheet

To be provided by the candidate

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: nil

Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Section One: Calculator-free **(51 Marks)**

This section has **eight (8)** questions. Answer **all** questions. Write your answers in the spaces provided.

Working time for this section is 50 minutes.

Question 1 **(5 marks)**

Calculate the value of

(a) $16^{-0.5}$. (2 marks)

(b) $\left(a \div b\right)^2$ when $a = 4 \times 10^2$ and $b = 8 \times 10^3$, leaving your answer in scientific notation. (3 marks)

Question 2 **(9 marks)**

(a) Determine $\frac{dy}{dx}$ for

(i) $y = \frac{4x^4}{3}$. (1 mark)

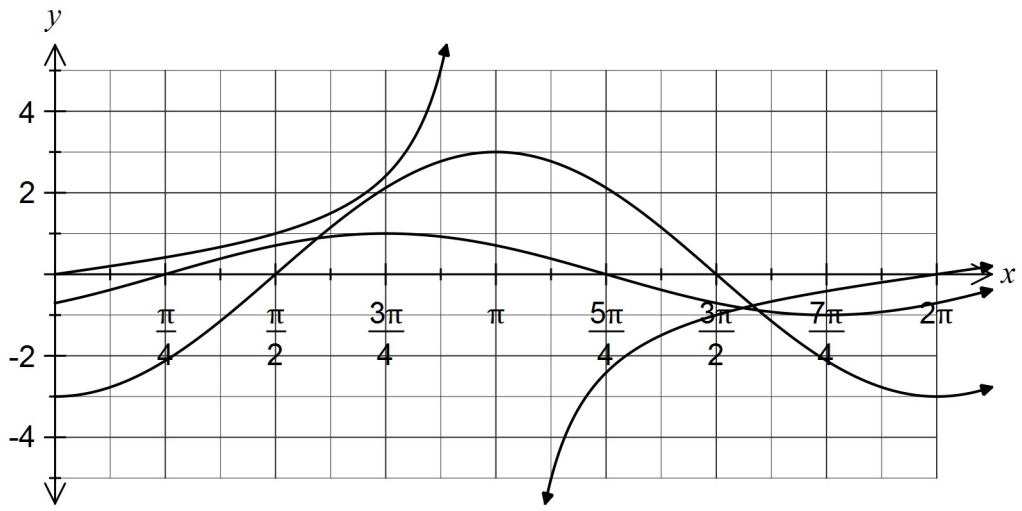
(ii) $y = \frac{12}{\sqrt{x}}$. (2 marks)

(b) Determine $f'(2)$ if $f(x) = \frac{x^2}{4} - \frac{4}{x}$. (3 marks)

(c) Determine $g(x)$ if $g(1) = -1$ and $g'(x) = 2x^2 + \frac{2x}{3} + 5$. (3 marks)

Question 3 **(6 marks)**

(a) The graphs of $y = \tan(ax)$, $y = b\cos(x)$ and $y = \sin(x + c)$ are shown below.



Determine the values of the constants a, b and c. (3 marks)

(b) Solve the equation $\sqrt{3}\cos\left(x - \frac{\pi}{2}\right) = \cos(x)$ for $0 \le x \le 2\pi$. (3 marks)

Question 4 **(7 marks)**

(a) Evaluate $x^{2a} \cdot x^b$ when $x = 64$, $a = 2$ and $b = -4.5$. (3 marks)

(b) The first two terms of a geometric sequence are 3×10^{-4} and 6×10^{-6}. Calculate the fifth term of the sequence, giving your answer in scientific notation. (4 marks)

Question 5 **(9 marks)**

Solve the following equations for x:

(a) $(x-11)^2-49=0$. (2 marks)

(b) $27^{x+1}=9^{1-x}$. (3 marks)

(c) $\sin^2 x-\cos^2 x=\frac{1}{2}, 0\leq x\leq 360°$. (4 marks)

Question 6 **(5 marks)**

(a) Determine $f'(x)$ if

(i) $f(x) = 5x^4 + x$. (1 mark)

(ii) $f(x) = (2x + 3)^2$. (2 marks)

(b) The area of an oil slick, at time t hours, is given by $A(t) = 0.5t^3 - 2t^2 + 7$ square meters. Determine the instantaneous rate of change of the area of the slick when $t = 10$ hours.

(2 marks)

Question 7 **(10 marks)**

(a) Expand $(x-2)^4$. (3 marks)

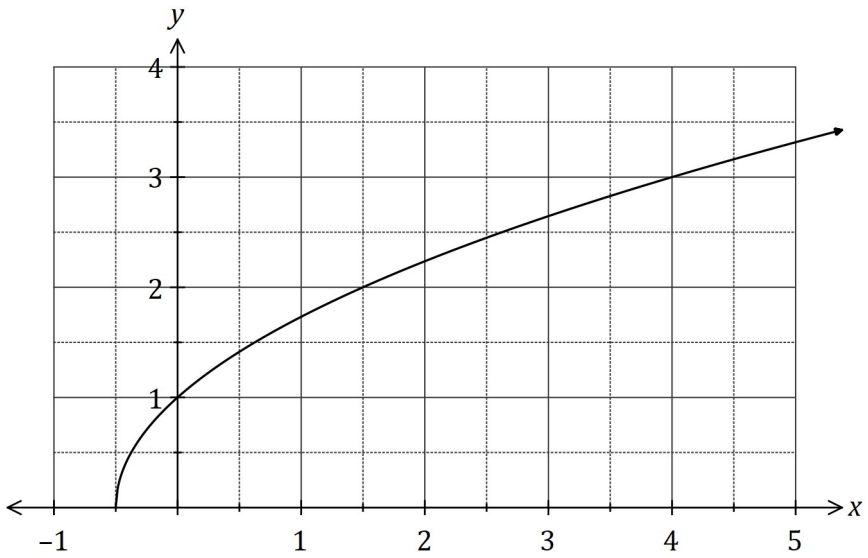
(b) Solve the following for x:

(i) $4^{2x-1} = \frac{1}{8}$. (3 marks)

(ii) $x^3 - x^2 - 17x - 15 = 0$. (4 marks)

Question 8 **(5 marks)**

The graph of $y = f(x)$ is shown below, where $f(x) = \sqrt{2x + 1}$.



The difference quotient is shown here:

$$\frac{f(x + h) - f(x)}{h}$$

(a) Add to the graph a secant whose slope represents the difference quotient when $x = 0$ and $h = 4$, and state the value of this slope. (2 marks)

(b) Evaluate the difference quotient as $h \to 0$ to determine the slope of $f(x)$ when $x = 0$. (3 marks)