Calculator model	

Class	Full Name	Index Number

bowen
SECONDARY
I believe, therefore I

MID YEAR EXAMINATION
2016

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4047

ADDITIONAL MATHEMATICS **2 hours**

Secondary 3 Exp
12th May 2016

Additional Materials : Writing Papers

INSTRUCTIONS TO CANDIDATES:

1. Write your name, index number, class in the spaces provided at the top of this page and on all the work you hand in.
2. Answer **ALL** the questions on the writing papers provided.
3. 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 in the question.
4. The use of a scientific calculator is expected, where appropriate.
5. You are reminded of the need for clear presentation in your answers.
6. At the end of the test, fasten all your work securely together.
7. The number of marks is given in brackets [ ] at the end of each question or part question.
8. The total number of marks for this paper is 80.

DO NOT OPEN THIS PAPER UNTIL YOU ARE TOLD TO DO SO.

For Examiner's use
80

Setter: Mrs Li Seow Koon

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Mathematical Formula :

Quadratic Equation
For the equation $ax^2 + bx + c = 0$, $$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

1 The curve $\frac{5}{x} - \frac{2}{y} = 2$ and the line $x + 2y = 1$ intersect at points A and B.
Calculate the coordinates of A and of B. [4]

2 It is given that $4x^3 - 9x = Ax(x^2 - 1) + B(x + 1) + C - 3$ for all real values of x.
Find the values of A, B and C. [3]

3 The polynomial $2x^4 - 18x^2 + 5x - 17$ can be expressed as $(x^2 - 3x - 2)Q(x) + R(x)$.
Determine $Q(x)$ and $R(x)$. [4]

4 The function f is defined by $f(x) = 2x^3 + ax^2 + bx - 12$.
Given $f(x)$ has a factor of $(x - 3)$ and leaves a remainder of -14 when divided by $(2x + 1)$,

(i) find the value of a and of b [4]

(ii) find the remainder when $f(x)$ is divided by x. [1]

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5 (a) (i) Factorise $x^3 - 3x^2 + x + 2$. [2]

(ii) Hence, solve the equation $x^3 - 3x^2 + x = -2$. Leave your answers in surd form where necessary. [3]

(b) Factorize completely $16x^3 - 250y^6$ [3]

6 Given that the roots of the equation $2x^2 - 3 = 6x$ are α and β ,

(i) find the values of

(a) $\alpha^2 + \beta^2$ [2]

(b) $(\alpha + 1)(\beta + 1)$ [2]

(ii) form an equation whose roots are $\frac{\alpha}{\beta + 1}$ and $\frac{\beta}{\alpha + 1}$. [3]

7 (a) Given that the equation $kx^2 - kx - 1 = 3x - 5$ has equal real roots, find the values of k . [3]

(b) Find the range of values of m for which $2mx^2 + 1 = 4x - m$ has no real roots. [3]

(c) Find the range of values of x for which $(2x - 1)^2 \leq 25$. [3]

(d) Show that the equation $x^2 + px = 4 - 2p$ has real roots for all real values of p. [3]

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8 Solve the following equations.

(a) $4\sqrt{2x-3} = \sqrt{24}$ [3]

(b) $x - \sqrt{2x+2} = 3$ [3]

(c) $27\left(\sqrt{3}\right)^{x} = \frac{3^{x}}{\sqrt[3]{9}}$ [3]

9 (a) Given that $2^{2x-4} \times 40 = 5^{2-x}$, evaluate 20^{x}. [3]

(b) By using the substitution $u = 5^{x}$, solve $5^{x-1} + 5^{2-x} = 6$. [4]

10 (a) The mass, m grams, of a radioactive substance, present at time t days after first being observed, is given by the formula $m = 38(2.5)^{-0.04t}$.
Find

(i) the initial mass of the radioactive substance. [1]

(ii) the mass of the radioactive substance after 4 weeks. [2]

(iii) the mass of the radioactive substance that has decayed after 10 days. [2]

(b) Sketch the graph of $y = 4\left(6.3\right)^{x}$, indicating the y – intercept on the graph. [2]

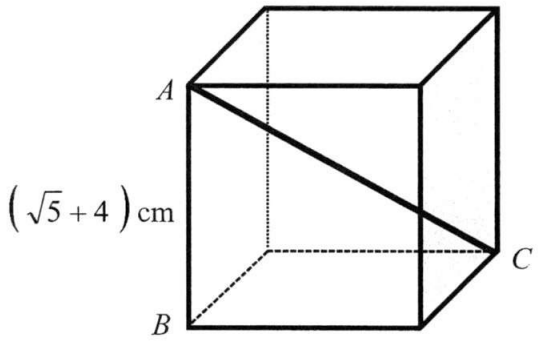
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11 (a) Express $\frac{5-7x}{x^2-4}$ in partial fractions. [3]

(b) Given $\frac{2x^3-4x^2+19x+4}{x\left(x^2+4\right)} = A+\frac{B}{x}+\frac{Cx+D}{x^2+4}$, find the values of A, B, C and D. [4]

12 (i) Express $\frac{41\sqrt{5}}{3\sqrt{5}+2}$ in the form $a+b\sqrt{5}$, where a and b are integers. [2]

(ii) The diagram below shows a cuboid with a square base. The height AB of the cuboid is $\left(\sqrt{5}+4\right)$ cm. Given that the length of the diagonal AC is $\frac{41\sqrt{5}}{3\sqrt{5}+2}$ cm,



(a) find an expression for BC^2 in the form $c+d\sqrt{5}$, where c and d are integers. [3]

(b) hence, find the area of the square base in the exact form. [2]

~ End of Paper ~

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Answer key for Bowen Sec Sch Sec 3 Exp A Maths MYE 2016

1	$(5,-2)$ and $\left(\frac{1}{2},\frac{1}{4}\right)$		8a	$\frac{9}{4}$
2	$A=4$, $B=-5$, $C=8$		8b	$x=7$, $x=-1$ (rej)
3	$Q(x)=2x^2+6x+4$, $R(x)=29x-9$		8c	$\frac{22}{3}$
4i, ii	$a=-5$, $b=1$, remainder $=-12$		9a	10
5ai	$(x-2)(x^2-x-1)$		9b	1 , 2
5aii	$x=2$, $x=\frac{1\pm\sqrt{5}}{2}$		10ai	38
5b	$2(2x-5y^2)(4x^2+10xy^2+25y^4)$,		10aii	13.6
6ia	12		10aiii	11.7
6ib	$\frac{5}{2}$		11a	$\frac{-19}{4(x+2)}-\frac{9}{4(x-2)}$
6ii	$5x^2-30x-3=0$		11b	$A=2, B=1, C=-5, D=11$
7a	$k=1$, 9		12i	$15-2\sqrt{5}$
7b	m <-2 or m >1		12iia	$(224-68\sqrt{5})cm^2$
7c	$-2\le x\le 3$		12iib	$(112-34\sqrt{5})cm^2$
7d	To prove $b^2-4ac\ge 0$			

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