Sinclair Lee Bamford Au Sing Webb Bartlett Hay

Name:	____________________
Class:	11MTX________
Teacher:	____________________

CHERRYBROOK TECHNOLOGY HIGH SCHOOL

2013

YEAR 11

AP1 EXAMINATION

MATHEMATICS EXTENSION 1

Time allowed - 1 HOUR
(Plus 5 minutes reading time)

DIRECTIONS TO CANDIDATES:

- Attempt all questions. Marks are indicated to the right of each question.
- Each question is to be commenced on a new page clearly marked Question 1, Question 2, etc on the top of the page. Each page should show your name and class.
- If you do not attempt a question, you must submit a blank page clearly indicating the question number, your name and class.
- All questions should be stapled together in order – Question 1 to 3.
- All necessary working should be shown in every question. Full marks may not be awarded for careless or badly arranged work.
- Approved calculators may be used.

MARKER's USE ONLY

Q1	Q2	Q3	TOTAL
/15	/15	/15	/45

Question 1 (15 Marks) **Marks**

a) Write down the expansion of $(x + 5)^4$. **1**

b) Solve these equations simultaneously **3**

$$\begin{aligned} x + y &= 3 \\ x - 2y + 3z &= -6 \\ 2x + 3y + z &= 7 \end{aligned}$$

c) By squaring both sides of $\sqrt{a} + \sqrt{b} = \sqrt{9 + \sqrt{56}}$, evaluate a and b. **2**

d) Solve the inequality $\frac{x-5}{x} \geq 6$. **3**

e) If $x = \frac{1}{\sqrt{2}+1}$, find in rational form,

i) $x + \frac{1}{x}$ **2**

ii) $x^2 + \frac{1}{x^2}$. **1**

f) i) Draw the graphs of $y = |2x - 1|$ and $y = |x + 1|$ on the same number plane, showing clearly the intersecting points between the two graphs. **2**

ii) Hence, solve $|2x - 1| > |x + 1|$. **1**

Question 2 (15 Marks) **Marks**

a) i) Prove that $\dfrac{\sin 2A}{1-\cos 2A} = \cot A$. **2**

ii) Hence find the exact value of $\cot 67.5°$. **2**

b) Using $t = \tan\frac{\theta}{2}$, find the exact value of $\dfrac{1-\tan^2 15°}{1+\tan^2 15°}$. **1**

c) Using $t = \tan\frac{\theta}{2}$, simplify $\sin\theta - 3\cos\theta$. **2**

d) The line $y = mx + b$ is inclined at $45°$ to $y = 3 - 2x$. Find two possible values of m. **3**

e) If $\sin A = \frac{2}{3}$, $90° < A < 180°$ and $\tan B = \frac{2}{3}$, $180° < B < 270°$, show that

$$\cos(A+B) = \frac{3\sqrt{5}+4}{3\sqrt{13}}$$ **2**

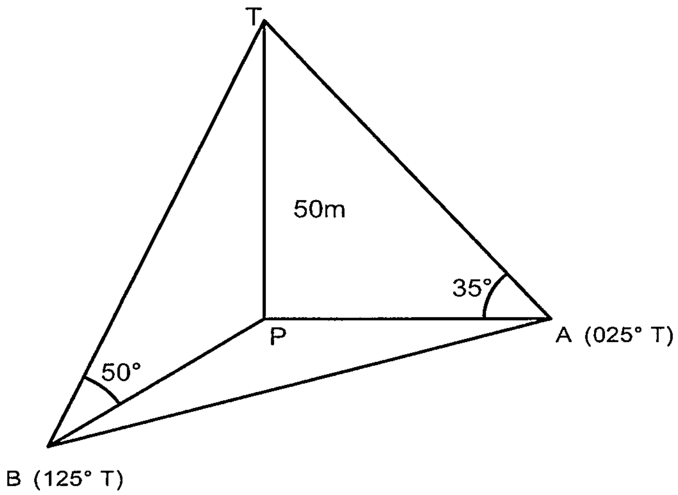
f) i) Sketch the graph $y = 2\sec 2x$ from $0° \le x \le 360°$. **2**

ii) Hence find the **number** of solutions for $2\sec 2x - 4 = 0$. (DO NOT SOLVE) **1**

Question 3 (15 Marks) **Marks**

a) Prove that $\dfrac{\sin 2\theta \cos\theta - \cos 2\theta \sin\theta}{\cos 2\theta \cos\theta + \sin 2\theta \sin\theta} = \tan\theta$ **2**

b) PT is an observation tower 50m high. The bearings of two points A and B from P are 025° T and 125° T respectively. The angles of elevation from these points to the top of the tower are 35° and 50° respectively.



i) Copy the diagram onto your writing paper and find $\angle$APB. **1**

ii) Express BP and AP in terms of $\cot\theta$. **1**

iii) Hence, show that $AB = 50\sqrt{\cot^2 35° + \cot^2 50° - 2\cot 35° \cot 50° \cos 100°}$ **2**

c) Solve $\cot x = \cot^2 x$ for $-180° \le x \le 180°$. **2**

d) Solve $2 + \cos 2x = 5\sin x$ for $0° \le x \le 360°$ **3**

e) i) Express $\sin A + \sqrt{3}\cos A$ in the form of $R\sin(A+\alpha)$, where R > 0 and 0° ≤ A ≤ 90°. **2**

ii) Hence, solve $\sin A + \sqrt{3}\cos A = -\sqrt{2}$ for 0° ≤ A ≤ 360°. **2**

End of Paper