

Name: _____

Teacher: _____



Stella Maris College

Mathematics Extension 1

Assessment 3 2005

Weighting: 10%

Time Allowed: 40 minutes

General Instructions:

- Answer on the paper provided.
- Put your name and teacher's name on each page.
- There are three sections. Begin Sections 2 and 3 on a new page.
- Write in blue or black pen.
- Board approved calculators may be used.
- Show all necessary working.

Section 1:	Trigonometry	13 marks
Section 2:	Trigonometry	13 marks
Section 3:	Straight Line Graphs	9 marks

Section 1. Trigonometry (13 marks)

Marks

1. Write down the expansion for $\tan(x+y)$. 1
2. Solve the equation $\tan 2\theta = -\sqrt{3}$ for $-180^\circ \leq \theta \leq 180^\circ$. 4
3. a) Prove that $\frac{\sin 2x}{1 + \cos 2x} = \tan x$ 2
- b) Hence show that the exact value of $\tan 15^\circ$ is $2 - \sqrt{3}$. 2
4. Prove that $\frac{1 - \cos \theta}{\sin \theta} = \frac{\sin \theta}{1 + \cos \theta}$ using the $t = \tan \frac{\theta}{2}$ results. 4

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Section 2. Trigonometry (13 marks) START A NEW PAGE.

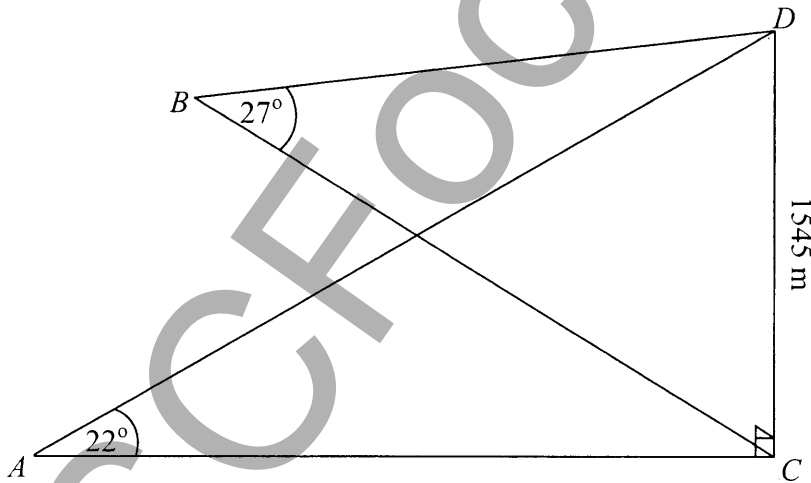
Marks

1. Solve $\cos 2x = \cos x$ for x where $0^\circ \leq x \leq 360^\circ$. 4

2. a) Express $\cos x - \sqrt{3} \sin x$ in the form $R \cos(x + \alpha)$. 1

 b) Hence solve $\cos x - \sqrt{3} \sin x = 1$ for $0^\circ \leq x \leq 360^\circ$. 3

3. Anne is lost in the bush and Beth is searching for her. They are in contact by mobile phone. Anne tells Beth that she can see the top of Cradle Mountain. From Anne's position the mountain has a bearing of 105° , and the angle of elevation to the top of the mountain is 22° . Beth can also see Cradle Mountain. From her position it has a bearing of 135° , and the top of the mountain has an angle of elevation of 27° . Cradle Mountain, CD , is 1545 m high.



- a) Show that the distance between Anne and Beth is 1932 m. 3

- b) Find the bearing of Anne from Beth. 2

Section 3. Straight Line Graphs (9 marks) START A NEW PAGE.

Marks

1. The interval AB has endpoints $A(-3,5)$ and $B(2,-1)$. Find the coordinates of the point P which divides the interval AB externally in the ratio $2 : 3$. **2**
2. The perpendicular distance of the point $(k,0)$ from the line $x+3y+2=0$ is $\frac{2\sqrt{10}}{5}$ units. Find the value(s) of k . **2**
3. Find the acute angle between the lines $2x-y+1=0$ and $x-3y+4=0$. **2**
4. Find the exact equation of the straight line through the midpoint of $(0,-3)$ and $(6,-1)$ that is perpendicular to the line that makes an angle of 60° with the positive direction of the x -axis. Write your answer in general form. **3**

END OF THE ASSESSMENT