

**Year 11 Mathematics Specialist
Test 4 2016**

Calculator Free
Trigonometry

STUDENT'S NAME _____

DATE:

TIME: 50 minutes

MARKS: 50

INSTRUCTIONS:

Standard Items: Pens, pencils, ruler, eraser.

Special Items: Notes on one side of a single A4 page (these notes to be handed in with this assessment)

Questions or parts of questions worth more than 2 marks require working to be shown to receive full marks.

1. (16 marks)

Prove the following identities

(a) $\frac{1 - \sin x}{1 + \sin x} = (\sec x - \tan x)^2$ [4]

(b) $\frac{\sin 2A + \cos 2A + 1}{\sin A + \cos A} = 2\cos A$ [4]

(c) $\sec^2 A = \frac{\operatorname{cosec} A}{\operatorname{cosec} A - \sin A}$ [4]

(d) $\frac{\sin 8A \cos A - \sin 6A \cos 3A}{\cos 2A \cos A - \sin 3A \sin 4A} = \tan 2A$ [4]

2. (4 marks)

Using a suitable addition formula, calculate the exact value of $\cos 75^\circ$

3. (4 marks)

Show that $8\cos 80^\circ\cos 40^\circ\cos 20^\circ = 1$

4. (11 marks)

Solve the following equations for the given domains

(a) $2\sin \theta + \cos 2\theta = 1$, $0^\circ \leq \theta \leq 180^\circ$ [4]

(b) $\sin 2\theta = \sin \frac{\pi}{6}$, $0 < \theta < 2\pi$ [3]

(c) $\tan \theta + 3\cot \theta = 5\sec \theta$, $0 < \theta < 2\pi$ [4]

5. (7 marks)

(a) Show that the equation $\cos 3x - \sin 2x = 0$ can be written as $\cos x(4\sin^2 x + 2\sin x - 1) = 0$

[4]

(c) Hence, by using the quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, give the exact value for $\sin \frac{\pi}{10}$, if $\frac{\pi}{10}$ is a solution of the given equation.

[3]

6. (8 marks)

If $A + B = \frac{\pi}{4}$ and $\tan A = \frac{n}{n+1}$, determine, in terms of n

(a) $\tan B$. (Hint: use the identity for $\tan(A + B)$) [4]

(b) $\tan(A - B)$ [4]