Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Trigonometric identities and equations

Time allowed: 1 hour 50 minutes

Subject code **0606**

Additional Mathematics

Questions from Paper 1 and Paper 2

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.
Questions 1-3, 5-8 (Paper 1): no calculator.
Questions 4, 9-10 (Paper 2): calculator allowed.

Total marks

/ 72

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.
- Unless a question says otherwise, give answers that are not exact to 3 significant figures, and angles in degrees to 1 decimal place.

Information

- This paper has 10 questions worth 72 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 Show that $\dfrac{1}{\tan\theta + \cot\theta} = \sin\theta\cos\theta.$ [3]

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2 Show that $\tan^2\theta - \sin^2\theta = \sin^4\theta\sec^2\theta$. [4]

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3 Solve the equation $3\,\text{cosec}^2\left(\frac{2x}{3}-\frac{\pi}{3}\right)=4$, for $0<x\leqslant 3\pi$. Give your answers in terms of π. [5]

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4 Solve the equation $\sec^2 3x + \tan 3x - 3 = 0$ for $0° \leqslant x \leqslant 120°$. [6]

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5 **(a)** Solve $3\operatorname{cosec} 2x - 4\sin 2x = 0$ for $0° \leqslant x \leqslant 180°$. [4]

(b) Solve $3\tan\left(y - \frac{\pi}{4}\right) = \sqrt{3}$ for $0 \leqslant y \leqslant 2\pi$ radians, giving your answers in terms of π. [4]

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6 **(a)** Solve $2\cos 3x = \cot 3x$ for $0° \leqslant x \leqslant 90°$. [5]

(b) Solve $\sec\left(y + \frac{\pi}{2}\right) = -2$ for $0 \leqslant y \leqslant \pi$ radians. [4]

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7 **(a)** **(i)** Show that $\dfrac{\operatorname{cosec}\theta}{\operatorname{cosec}\theta - \sin\theta} = \sec^2\theta$. [3]

(ii) Hence solve $\dfrac{\operatorname{cosec}\theta}{\operatorname{cosec}\theta - \sin\theta} = 4$ for $0° < \theta < 360°$. [3]

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(b) Solve $\sqrt{3}\tan\left(x+\frac{\pi}{4}\right)=1$ for $0<x<2\pi$, giving your answers in terms of π. [3]

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8 **(a)** Show that $\dfrac{1}{\operatorname{cosec}\theta - 1} + \dfrac{1}{\operatorname{cosec}\theta + 1} = 2\sin\theta\sec^2\theta$. [3]

(b) Hence solve the equation $\dfrac{1}{\operatorname{cosec} 2\phi - 1} + \dfrac{1}{\operatorname{cosec} 2\phi + 1} = 4\sin 2\phi$, for $-90° \leqslant \phi \leqslant 90°$. [6]

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9 **(i)** Show that $\dfrac{\tan x}{1+\sec x}+\dfrac{1+\sec x}{\tan x}=\dfrac{2}{\sin x}$. [5]

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(ii) Hence solve the equation $\frac{\tan x}{1+\sec x}+\frac{1+\sec x}{\tan x}=1+3\sin x$ for $0^\circ \leqslant x \leqslant 180^\circ$. [4]

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10 **(a)** Solve the equation $\tan^2 2x - 4\tan 2x = 0$ for $0° \leqslant x \leqslant 180°$. [4]

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(b) Solve the equation $\operatorname{cosec}(y+1.2)=4$, where y is in radians and $-5<y<2$. [6]

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