

Write your name here

Surname

Other Names

# AS/A Level Mathematics

## Solving Trigonometric Equations

**Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.**

### Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled..
- Answer the questions in the spaces provided  
– there may be more space than you need.
- You should show sufficient working to make your methods clear.  
Answers without working may not gain full credit.
- Answers should be given to three significant figures unless otherwise stated.

### Information

- The marks for **each** question are shown in brackets  
– use this as a guide as to how much time to spend on each question.

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

1 Solve, for  $0 \leq x < 180^\circ$ , the equation,

$$\cos(2x + 15) = 0.3$$

Give your answers to one decimal place.

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(Total for question 1 is 5 marks)

2 Solve, for  $0 \leq \theta < 180^\circ$ , the equation,

$$\sin(3\theta - 15) = 0.7$$

Give your answers to two decimal places.

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(Total for question 2 is 5 marks)

3 Solve, for  $-180 \leq \theta < 180^\circ$ , the equation,

$$\tan(\theta + 30) = -2.5$$

Give your answers to one decimal place.

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(Total for question 3 is 4 marks)

4 Solve, for  $0 \leq x < 360^\circ$ , the equation,

$$5\cos(x - 40) = 2$$

Give your answers to two decimal places.

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(Total for question 4 is 4 marks)

5 Solve, for  $0 \leq x < 360^\circ$ , the equation,

$$\tan^2(x) = 3$$

Give your answers to one decimal place.

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(Total for question 5 is 5 marks)

6 (a) Show that the equation

$$2\sin^2 x = 7\cos x + 5$$

Can be written in the form

$$2\cos^2 x + 7\cos x + 3 = 0 \quad (3)$$

(b) Hence solve, for  $0 \leq x < 360^\circ$ , the equation,

$$2\sin^2 x = 7\cos x + 5 \quad (5)$$

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(Total for question 6 is 8 marks)

7 (a) Show that the equation

$$6\cos^2 x = 4 - \sin x$$

Can be written in the form

$$6\sin^2 x - \sin x - 2 = 0 \quad (3)$$

(b) Hence solve, for  $0 \leq x < 360^\circ$ , the equation,

$$6\cos^2 x = 4 - \sin x \quad (6)$$

Give your answers to one decimal place where appropriate.

**(Total for question 7 is 9 marks)**

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8 Find all values for  $x$  in the interval  $0 \leq x < 360^\circ$ , for which

$$2\cos^2 x - 3\sin^2 x = 14\cos x$$

Give your answers to one decimal place.

**(Total for question 8 is 8 marks)**

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9 (a) Sketch the graph of  $y = \sin(x - 30)$  for  $x$  in the interval  $0 \leq x < 360^\circ$  (2)

(b) Find all values for  $x$  in the interval  $0 \leq x < 360^\circ$ , for which

$$\sin(x - 30) = 0.3 \quad (4)$$

Give your answers to one decimal place.

**(Total for question 9 is 6 marks)**

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10 Find all values for  $x$  in the interval  $0 \leq x < 360^\circ$ , for which

$$3\tan x = 4\sin x$$

Give your answers to one decimal place where appropriate.

**(Total for question 10 is 7 marks)**

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11 (a) Show that the equation

$$3\sin 2x \tan 2x = \cos 2x + 2$$

Can be written in the form

$$4\cos^2 2x + 2\cos 2x - 3 = 0 \quad (4)$$

(b) Find all values for  $x$  in the interval  $0 \leq x < 180^\circ$ , for which

$$3\sin 2x \tan 2x = \cos 2x + 2$$

Give your answers to two decimal places.

(6)

**(Total for question 11 is 10 marks)**

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