**

**Mathematics Specialist Unit 2 2021**

# Test 4

**Trigonometric Identities and Matrices**

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| **Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Total Marks:\_\_\_\_\_\_\_\_\_\_** |
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|  |

**Task type: Response**

**Time allowed for this task: 60** minutes, in-class, under test conditions

Section One: Calculator-free 42 minutes ( 39 marks)

(3 Minutes Reading – 40 Minutes Working)

Section Two: Calculator-assumed 16 minutes ( 15 marks)

(2 minutes Reading - 15 minutes working)

**Materials required:** Calculator with CAS capability (to be provided by the student)

**Standard items:** Pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

**Special items:**  Drawing instruments, templates, notes on one unfolded sheet of   
A4 paper, and up to three calculators approved for use in the WACE examinations

Formula sheet

**Marks available: 54 marks**

**Task weighting: 6%**

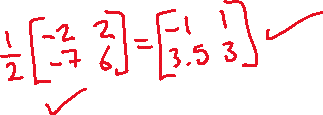
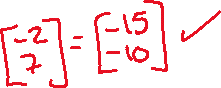
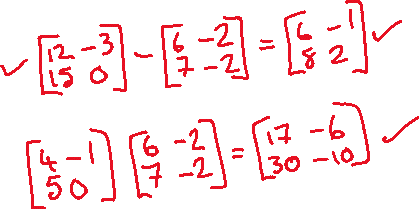
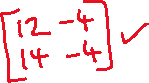
**Section One : Calculator Free 39 Marks**

**Time Allowed 30 minutes**

Question 1 (8 marks)

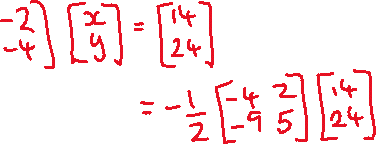
For the following matrices

Determine the following, if not possible explain why.



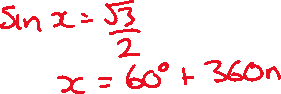
Question 2 (3 marks)

Use a matrix method to solve the system of equations and .



Question 3 (6 marks)

Find all the solutions to the following equations



Question 4 (8 marks)

Let and , where is a constant.

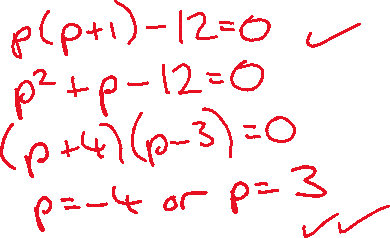
1. Determine matrix B if

(2 marks)

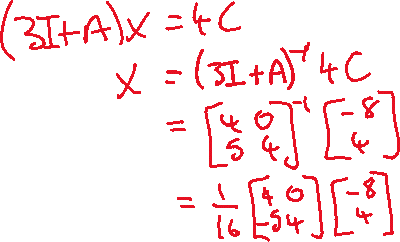


* 1. is singular

(3 marks)



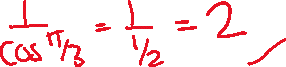
1. Use a matrix method to determine if . (3 marks)



Question 5 (7 marks)

1. State the exact value of

(2 marks)



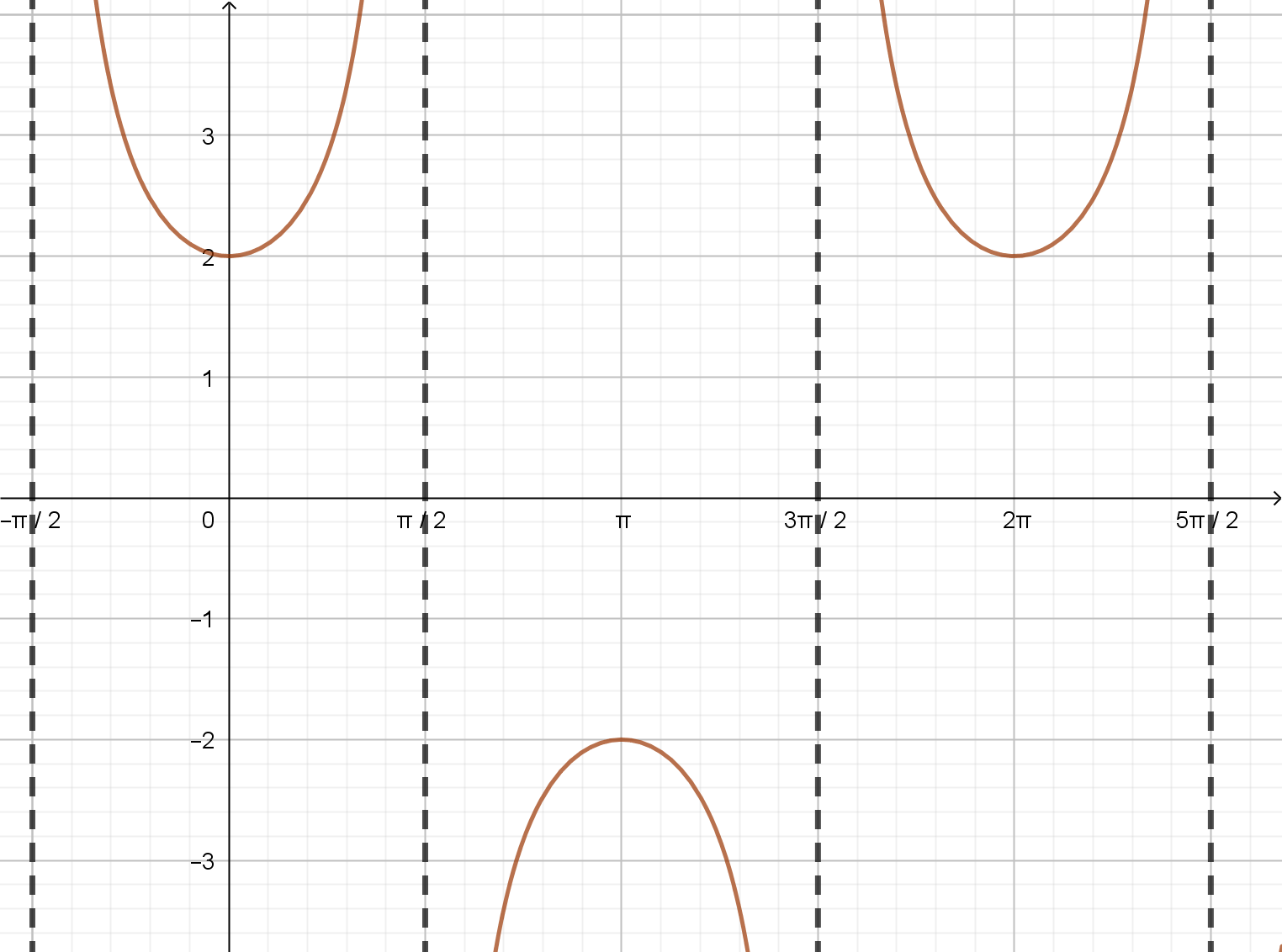
1. Given that and , state the exact value of

(3 marks)



1. Sketch the graph of on the grid below.

(3 marks)



Question 6 (7 marks)

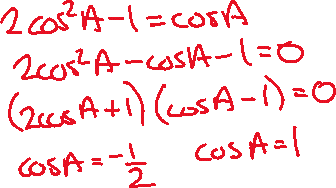
1. Use the identity to prove

(3 marks)



1. Hence solve , for .

(4 marks)



**Section Two : Calculator Assumed 15 Marks**

**Time Allowed 30 minutes Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Question 7

(5 marks)

The function is graphed below.



1. Determine the values of the constants and .



1. Find the general solution for



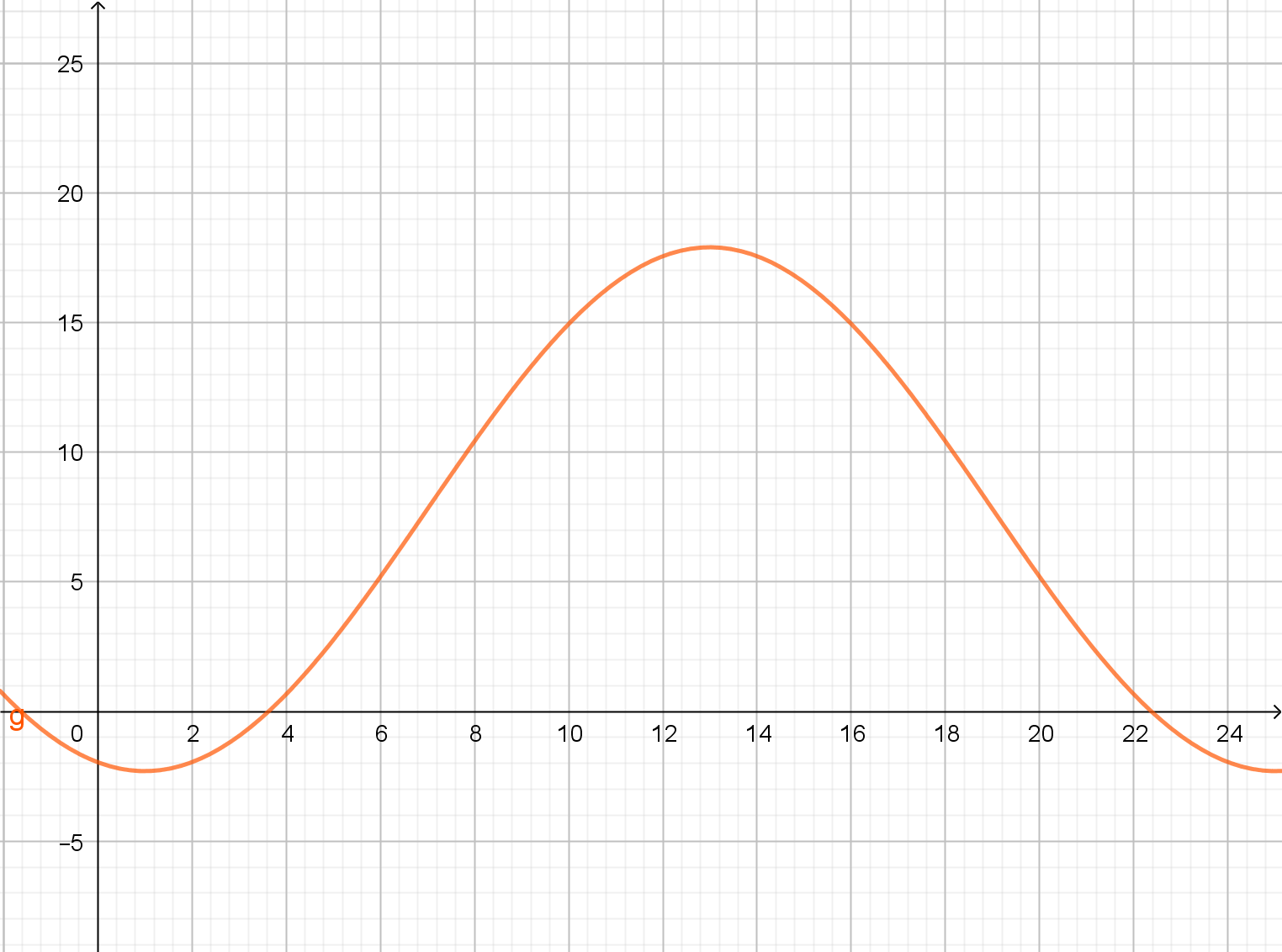
Question 8

(10 marks)

Starting at midnight (), the temperature at a campsite was observed to vary sinusoidally over the course of the day, reaching a high of C at pm after a low of C at am. Let be the time in hours from midnight.

1. Use the above information to sketch a graph showing how varies with during the day.

(3 marks)



1. Determine an algebraic model for as a function of . (4 marks)

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| --- |
| **Solution** (Using cos) |
| Model with  Using period:  Amplitude:  Mean temp:  Phase shift: |
| **Specific behaviours** |
| ✓ indicates period, value of  ü amplitude and mean  ü phase shift  ü correct model |

|  |
| --- |
| **Solution** (Using sin) |
|  |
| Model with  Using period:  Amplitude:  Mean temp:  Phase shift: |
| **Specific behaviours** |
| ✓ indicates period, value of  ü amplitude and mean  ü phase shift  ü correct model |

1. Use your model to determine the time of the day that the temperature at the campsite falls below C. (3 marks)

