

**Mathematics Specialist Year 11**



Student name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Teacher name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: Friday 24 September 2021

**Task type: Response**

**Time allowed: 40 mins**

**Number of questions: 7**

**Materials required:** Notes on two unfolded sheets of paper (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 and up to three calculators approved for use in the WACE examinations

**Marks available: 40 marks**

**Task weighting: 10%**

**Formula sheet provided: Yes**

**Scientific Calculator and CAS: Not Permitted**

**Note: All part questions worth more than 2 marks require working to obtain full marks.**

**Question 1 (2.2.1, 2.2.2) (6 marks)**

Given that , and are matrices, , , and is the identity matrix, find the following where possible

1. (1 mark)



1. (1 mark)



1. Matrix given that (2 marks)



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1. An expression for matrix in terms of other matrices given that (2 marks)



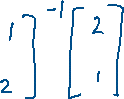
**Question 2 (2.2.3, 2.2.11) (5 marks)**

1. For what values of a is the matrix singular? (2 marks)



1. Use matrices to find the point of intersection of the lines given by the equations

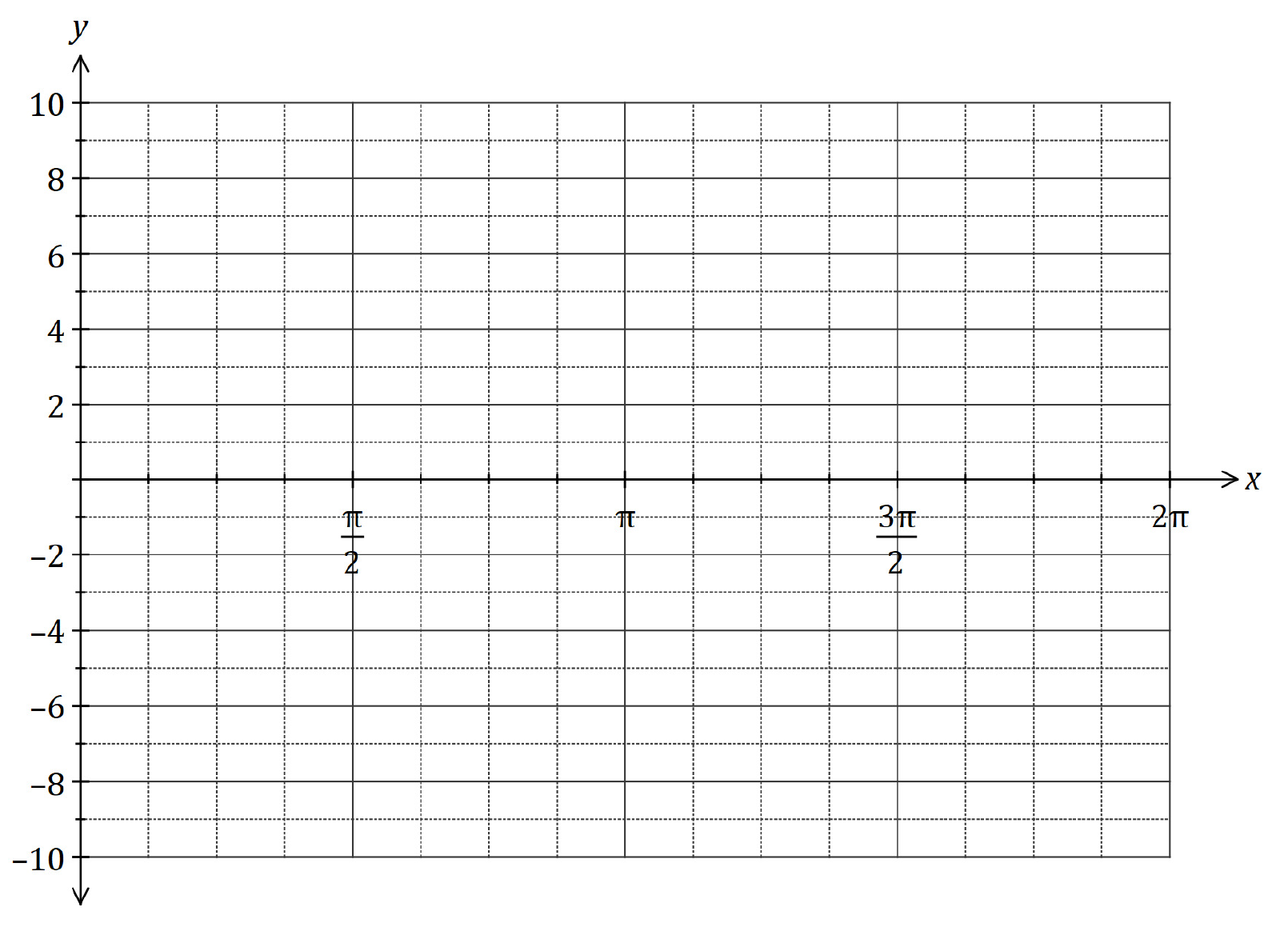
and . (3 marks)

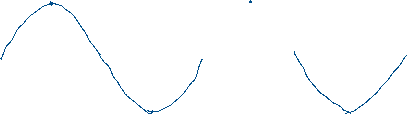
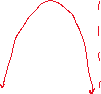
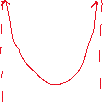
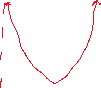


**Question 3 (2.1.4) (5 marks)**

Using the same scale, sketch the graphs of and on the grid below for

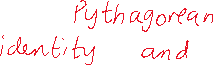






**Question 4 (2.1.5, 2.1.6, 2.1.8) (5 marks)**

Prove the identity below



**Question 5 (2.2.5, 2.2.7, 2.2.10) (5 marks)**

1. Find the matrices that produce each of the transformations described below
2. A reflection in the line (1 mark)



1. A rotation clockwise about the origin by (2 mark)

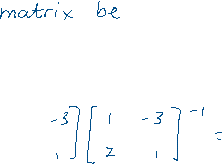
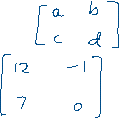


1. Find and describe a single transformation matrix T that is a result of a reflection in the line followed by a clockwise rotation about the origin. (2 marks)



**Question 6 (2.2.6, 2.2.9) (9 marks)**

1. Find the matrix of the linear transformation such that and (4 marks)



1. The matrix maps the unit square into a parallelogram of area 2 square units. Find the possible value(s) of (5 marks)



**Question 7 (2.1.7) (5 marks)**

Find the general solution of

