

**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)
2. (1 mark)
3. Matrix given that (2 marks)
4. An expression for matrix in terms of other matrices given that (2 marks)

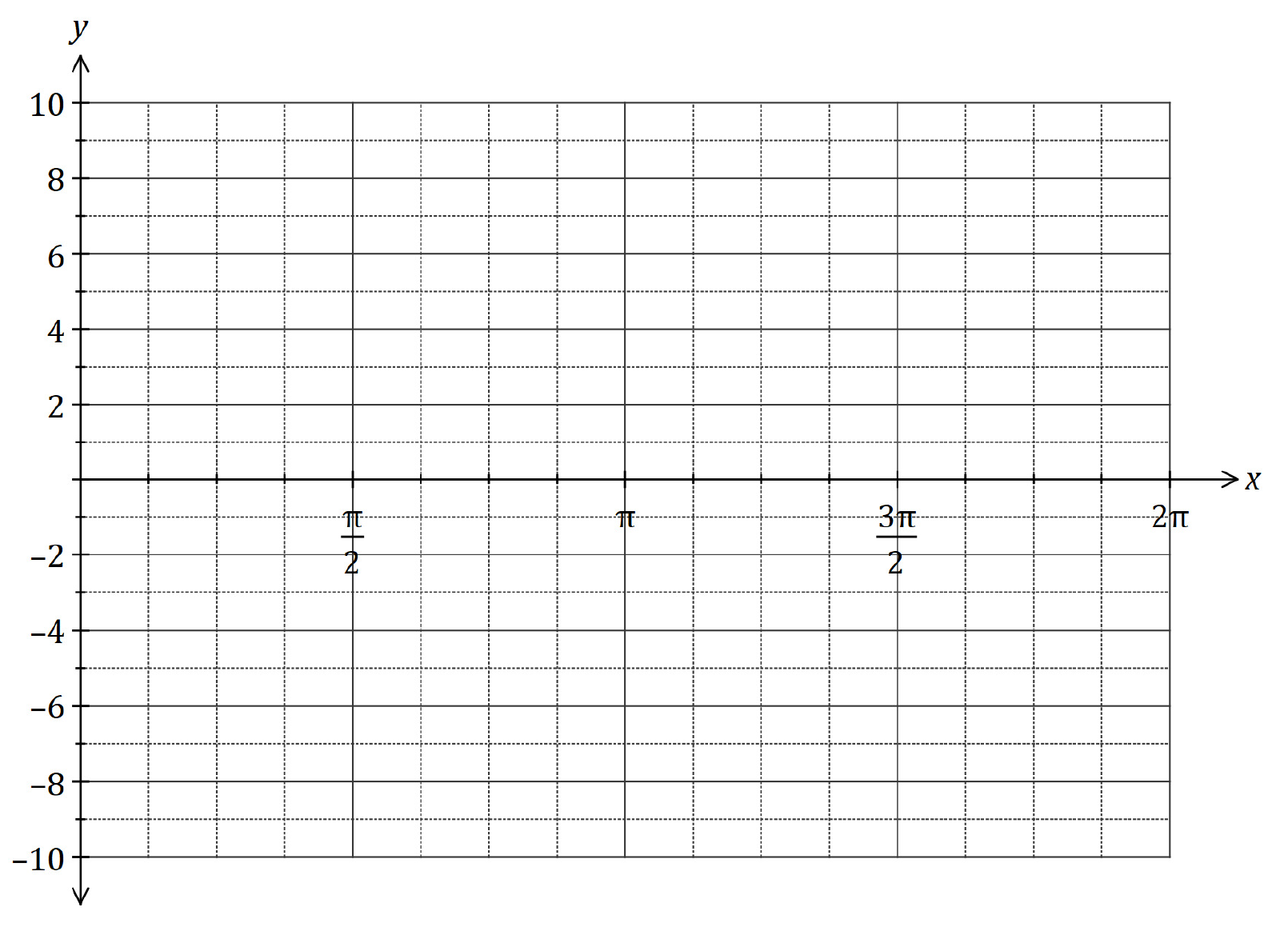
**Question 2 (2.2.3, 2.2.11) (5 marks)**

1. For what values of a is the matrix singular? (2 marks)
2. 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)
3. A rotation clockwise about the origin by (2 mark)
4. 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)
2. 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

Additional working space Question \_\_\_\_\_\_\_\_

Additional working space Question \_\_\_\_\_\_\_\_

Additional working space Question \_\_\_\_\_\_\_\_