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|  | Year 11 Mathematics-Specialist  Unit 2 Test 2 - Matrices |  |

Unit 2 Test 2 – Part One

Time Allowed : 25 minutes

Student Name : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

This task comprises two sections

Part One – Resource Free

Part One contains 5 questions worth 27 marks

**Question 1 (**Question 3 2014 WATP CF) **4 marks**

(a) If  determine

(i) 2**PQ** (2)

(ii) **QP** – **P** (2)

**Question 2 6 marks**

Let A,B and C be 2 arbitrary matrices, and 

Write T (True) and F (FALSE) for each of the following equations:

a) **AB**-**BA**=0 b) **AI** –**IA** = 0

c) (**A**+**B**)2 = **A**2 + **B**2 d) **AO** = **O**

e) (**AB**)-1 = **A**-1**B**-1 f) (**AB**)**C** = **A**(**BC**)

**Question 3 9 marks**

Square matrices **X**, **Y** and **Z** are such that **XY**=**Z**.

a) Express matrix **Y** in terms of matrices **X** and **Z**. (1)

b) Hence or otherwise, determine a 2x2 matrix **Y** if matrices **X** and **Z** are as shown below.

(3)



c) Show that the determinant of **XZ** is equal to the product of the determinant **X** and determinant **Z** i.e. det **XZ** = det **X** . det **Z** (5)

**Question 4** (Q1 APPLICABLE 2007 – from 3AB Doc SCSA **6 marks**

Let **A** = , **B** = , **C** = 

(a) In the product matrices below, fill in the missing entries [ ] with the correct values.

(i) **AC** =  (2)

(ii) **CB**=  (2)

(b) Is it possible to find two matrices **X** and **Y** such that **XY** is defined but **YX** is undefined? Justify your answer*.* (2)

**Question 5 2 marks**

By considering the geometrical effects the following transformations have on the points (1,0) and (0,1), state the matrix representing

a) reflection about the y-axis b) rotation of 180° about the origin.

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|  | Year 11 Mathematics-Specialist  Unit 2 Test 2 - Matrices |  |

Unit 2 Test 2 – Part Two

Time Allowed : 35 minutes

Student Name : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Part Two – Calculator & Notes Allowed

Part Two contains 6 questions worth 38 marks

**Question 6 7 marks**

a) Find the greatest value of λ that makes the matrix  singular. (4)

b) If  find  in the form p**M**+q**I** (3)

**Question 7 4 marks**

Consider the simultaneous equations 

a) Write this system as a matrix equation. (1)

b) Solve the system using matrix methods. (3)

**Question 8 8 marks**

Find the coordinates of the image of A(0,0) B(3,0) C(3,1) D(0,1) when ABCD is transformed by the matrix A, where  (2)

b) Describe with the aid of a diagram, the geometric effect of matrix A on the rectangle ABCD. (2)

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c) Find **A**4. (1)

d) Explain, geometrically, the result of (c). (1)

e) Find a 2x2 matrix which maps rectangle which maps ABCD to WXYZ with W(0,0) X(6,0) Y(6,3) and Z(0,3). (2)

**Question 9 8 marks**

A triangle with vertices at ,  and  is to be reflected in the *x*-axis and then rotated  anticlockwise about the origin.

a) Find the matrix that will combine these two transformations in the order given. (2)

b) Find the coordinates of C’, C after transformation by . (1)

c) Another transformation matrix is given by .

Determine the area of triangle A’’B’’C’’ after transformation by  and then by . (3)

d) Find the matrix which will transform A’’B’’C’’ to ABC. (2)

**Question 10 8 marks**

On a normal Monday’s trading, BRASH’S Melville store sell, on average, 8 televisions, 12 music systems and 6 digital video recorders. In comparison, the Cannington store sells, on average, 4 televisions, 9 music systems and 5 digital recorders.

a) Represent this information as the matrix **S**. (2)

b) The profits ($) on each item can be represented by matrix **P**, where **P** =  (2)

Calculate SP.

What do the entries tell you?

For their MAD MONDAY SALE, profits were reduced by 40% and the following quantities sold.

Melville : 4 televisions, 6 music systems and 10 digital video recorders

Cannington : 5 televisions, 5 music systems and 6 digital video recorders

c) Use matrix operations to determine the overall increase or decrease in profit for the two stores on MAD MONDAY over a normal Monday. (4)

**Question 11 3 marks**

Find the image of the line  after it is reflected in the line .