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| **Year 11 Specialist Mathematics**  Semester 2, August 2020  **Test 5: Matrices and Matrix Transformations**  **Calculator Free Section Weighting: 6%**  **[Australian Curriculum Reference Numbers: 2.2.1 - 2.2.11]** |

**Total Time: 35min Total Marks =**

**Student Name:**

**Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**INSTRUCTIONS TO STUDENTS:**

* You **are not allowed** a calculator.
* A formula booklet will be provided.

You are required to attempt ALL questions.

Write answers in the spaces provided beneath each question.

Marks are shown with the questions.

**Show all working** clearly, in sufficient detail to allow your answers to be checked readily and for marks to be answered for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks.

1. Given that , , and   
   determine the following:

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* 1. The sum of all the elements in the matrix

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[1,1,2,2,4 = 10 marks]

1. Given that find the 2×2 matrix such that

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[7 marks]

1. State the linear transformations of the following matrices and the transformation equations.

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[2,2 = 4 marks]

1. A triangle undergoes a reflection in the , followed by a stretch along the by a factor of 2 to become .
   1. Show that the single transformation matrix that represents these transformations is

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* 1. Hence, determine the coordinates of the original triangle if the transformed triangle has coordinates .

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* 1. If the triangle had an area of 6, determine the area of triangle .

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**[6,6,2 = 14 Marks]**

\*\*\* End of Resource Free Section \*\*\*

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| **Year 11 Specialist Mathematics**  Semester 2, August 2020  **Test 5: Matrices and Matrix Transformations**  **Calculator Allowed Section Weighting: 6%**  **[Australian Curriculum Reference Numbers: 2.2.1 - 2.2.11]** |

**Total Time: 15min Total Marks =**

**Student Name:**

**Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**INSTRUCTIONS TO STUDENTS:**

* You **are allowed** a calculator.
* You are allowed ½ page of notes (one side)
* A formula booklet will be provided.

You are required to attempt ALL questions.

Write answers in the spaces provided beneath each question.

Marks are shown with the questions.

**Show all working** clearly, in sufficient detail to allow your answers to be checked readily and for marks to be answered for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks.

1. All points on the line are transformed by the matrix Determine the equation of the image line in the form .

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[5 marks]

1. Use exact values and transformation matrices to show that a rotation of anticlockwise, followed by a rotation anticlockwise about the origin is equivalent to an anticlockwise rotation of about the origin.

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[6 marks]

1. Batman is doing a 2020 cost analysis on the upkeep of his Batsuit, the Batmobile and the Batwing. Each of them require different amounts of materials for repairs, listed in the table below.

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| --- | --- | --- | --- |
|  | Tensile Kevlar | Carbon Fibre | Composite Titanium Alloy |
| Batsuit | 500g | 6kg | 3kg |
| Batmobile | 20kg | 16kg | 16kg |
| Batwing | 40kg | 22kg | 8kg |

Lucius Fox at Wayne Enterprises has informed Batman that the cost to upkeep the Batsuit, Batmobile and Batwing are $3 million, $18 million and $16 million respectively.

Use matrices to determine the cost per kilogram for each of the three different materials, to the nearest dollar.

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[4 marks]

\*\*\* End of Resource Rich Section \*\*\*