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| EGC_Black | **MATHEMATICS:SPECIALIST 1 & 2**  **SEMESTER 2 2015**  **TEST 6 - Calculator Free** |

Time Allowed: 20 minutes Total Marks: 18

**1.** [1, 1, 2, 3 marks]

Given that and determine

(a) (b)

(c) (d)

**2.** [3 marks]

Show that a reflection about the line followed by a reflection about the line is the same as a rotation of about the origin.

**3.** [1, 3, 4 marks]

(a) One factor of is . State the second factor.

(b) Solve for , leaving your answer in exact form:

(c) Determine the complex number , given that .

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| EGC_Black | **MATHEMATICS:SPECIALIST 1 & 2**  **SEMESTER 2 2015**  **TEST 6 – Calculator Assumed** |

Time Allowed: 35 minutes Total Marks: 36

**4.** [4 marks]

Consider the complex numbers and , where .

Determine and given that .

**5.** [3 marks]

4

4

-4

-4

Label the diagram to right with and given that

**6.** [3, 1 marks]

A set of points are transformed to the points by the following transformations:

* a dilation of scale factor parallel to the y-axis, followed by
* a reflection in the line

(a) Determine the single matrix that would transform the points directly to .

(b) Determine the single matrix that would return the points back to .

**7.** [3, 3 marks]

(a) Show that the transformation matrix maps all the points in the plane to a line, and determine the equation of this line.

(b) Show that the transformation matrix maps all the points in the line to a single point in the plane, and determine this point.

**8.** [1, 1, 3, 2 marks]

The quadrilateral with vertices , , and is transformed by the matrix on to the quadrilateral .

(a) Determine the coordinates of .

(b) The area of quadrilateral is square units. What is the area of quadrilateral ?

(c) Matrix represents the combination of transformation followed by transformation . If the matrix for transformation , determine the matrix for transformation and describe the geometric transformation represents.

(d) The quadrilateral is then transformed by the matrix such that the image of lies on the y-axis. Determine the value of .

**9.** [5 marks]

By considering a rotation of angle followed by another rotation of angle , prove that

and

**10.** [1, 2, 2, 2 marks]

Consider the point in the Argand plane.

(a) Determine the value of .

The matrix is a transformation matrix in the complex plane such that .

NOTE: is a rotation of combined with a dilation of scale factor about the origin.

(b) Determine the coordinates in the Argand plane of the point after it has been transformed by .

The point has a distance of units from the origin and makes an angle of with the positive real axis. Hence it can be written as

=

=

Similarly, can be written as

(c) Write your answer to (b) in form.

(d) Using what you have learned from (a), (b) and (c), or otherwise, determine in form the position of the point where

and