**

**MATHEMATICS:**

**SPECIALIST 1 & 2**

**SEMESTER 2 2019**

**TEST 6 - Calculator Free**

Reading Time: 2 minutes

Time Allowed: 25 minutes Total Marks: 24

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

Given that and determine the following.

(a)

(b)

(c)

(d)

**2.** [3 marks]

The transformation matrix makes the area of any shape that it transforms 11 times bigger.

Determine the value(s) of .

**3.** [3, 3, 5 marks]

(a) Solve the following quadratic equation:

(b) One complex solution to the equation is .

Find the values of m and n.

(c) Determine the complex number , given that .

**4.** [3 marks]

The transformation matrix maps points on the line to a single point. Find the coordinates of this point.

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**MATHEMATICS:**

**SPECIALIST 1 & 2**

**SEMESTER 2 2019**

**TEST 6 - Calculator Assumed**

Reading Time: 2 minutes

Time Allowed: 30 minutes Total Marks: 27

**5.** [3, 3 marks]

(a) Matrix M represents the combination of transformation P followed by transformation Q. If the matrix for transformation P = , determine the matrix for transformation Q and describe the geometric transformation Q represents.

(b) The quadrilateral with vertices and is transformed by the matrix such that the image of lies on the y-axis. Determine the value of k.

**6.** [4, 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.** [5 marks]

Show that for all real values of m, n and p the equation does not have any complex roots.

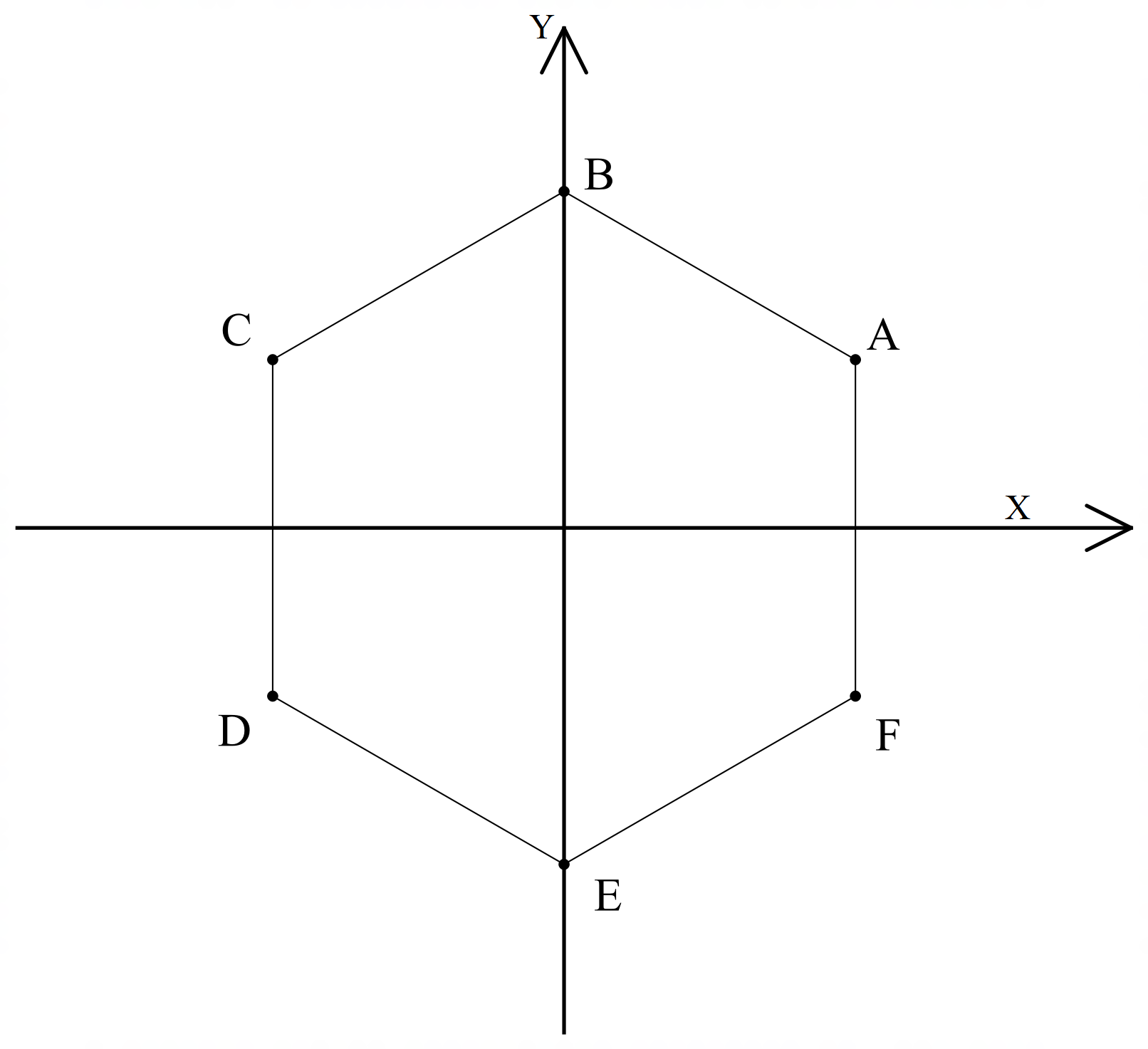
**8.** [3, 2 marks]

(a) The points and are transformed to the points and by the matrix T. Determine T.

(b) A shape is transformed by the matrix . Before the transformation the shape has an area of 5 units2. What is the area of the shape after the transformation?

**9.** [3, 2, 4 marks]

The diagram below shows a regular hexagon ABCDEF placed with its centre of rotation at the origin of a set of axes. Since the definition of a regular hexagon includes 6-point rotational symmetry, all other vertices can be calculated using point and an appropriate rotation matrix.



(a) State the rotation that maps A onto E and define its transformation matrix in exact value form.

(b) Show using a transformation matrix that C is also a reflection of A in the y-axis

(c) Considering the points A, B, C, D, E, and F show that the hexagon is symmetrical about the line 