**West Coast Collaborative**

**Investigation 1 2016**

**Circles in the Complex Plane - Validation**

**Calculator but no notes allowed in the validation.**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

*Answer all questions in the spaces provided and provide full working to justify your answers.*

Time allowed : 50 minutes Maximum marks = 29

1. (2 marks)

From your work on the recent take home paper what two features are most relevant to the locus of points which are equidistant from two given points in a complex plane?

1. (1 mark)

Write the equation for a locus of points equidistant from two given points which is appropriate for a complex plane where the two points are A (a,b) and B (c,d).

1. (6 marks)

Given that A is the point (3, 6), and B is the point (-4,3), on the grid paper provided, use a compass and pencil to sketch the locus. Mark 4 well spaced points on the locus and verify that distance from A = twice the distance from B. What is the locus suggested by your diagram?

1. (7marks)

Using vector techniques and relevant diagrams, prove that the radius of the circle which is the locus of points that satisfy the equation , is given by the

expression 



5 (1, 4, 2, 3, 3 =13 marks)

For the situation described in question 3 above,

1. Determine the **exact** distance between A and B.

1. Use the equation for r above, and the value of AB to complete the table below, rounding to 3 significant figures.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0.01 | 0.1 | 0.25 | 0.5 | 0.75 | 0.95 | 0.999 | 0.9999 |
| r ( radius) |  |  |  |  |  |  |  |  |

1. What happens to the locus of the circle as  moves arbitrarily close to unity? In the limit, what is the shape of that locus?
2. What happens to the locus of the circle as  increases? In the limit (as n approaches infinity) where would that locus cross the line AB, and what form would it take*?*
3. What happens to the locus of the circle as  moves gradually close to zero? In the limit (as n approaches zero) where would that locus cross the line AB, and what form would it take?