**Chapter 3: Vectors in the plane Test A** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Simple familiar*

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|  | Using the vectors shown, sketch the result of: a.  b.  c.  c. |  |  |
|  | The hexagon ABCDEF at right can be defined by the four vectors , and . Describe in terms of these four vectors:   1. the vector from A to F 2. the vector from A to E 3. the vector from F to D. |  |  |
|  | A boat sails 15 km north and 8 km east.   1. Sketch a vector drawing of the path of the boat. On the same grid, sketch the vector that represents the net displacement of the boat. 2. Determine the magnitude of the net displacement. 3. Calculate the bearing (clockwise from true north) of this net displacement vector. |  |  |
|  | A student rides their bicycle 5 km south-east and then 12 km north-east.   1. Determine how far the student is from their starting point. 2. Determine how far east the student is from their starting point. 3. Determine how far north the student is from their starting point. 4. Calculate the bearing (clockwise from true north) of the net displacement vector. Give your answers to two decimal places where appropriate. |  |  |
|  | Consider the following relationships between  and :  .   1. Determine the scalar  so that . 2. Determine the scalar  so that . |  |  |
|  | Determine the direction and magnitude of a vector joining point A to point B, where B is 12 m south and 7 m east of A. Give your answers to one decimal place. |  |  |
|  | An ant walks the following route: 40 cm south east — 20 cm north east — 30 cm west.  Determine the magnitude and direction of the net displacement vector. Give your answers to one decimal place. |  |  |
|  | Determine the magnitude and direction of the following vectors. Give your answers to two decimal places where appropriate. |  |  |
|  | Express the following vectors in polar form. Give your answers to two decimal places where appropriate. |  |  |
|  | Express  in Cartesian form for the following cases. Give your answers to two decimal places where appropriate.   1. has a bearing of  from N and a magnitude of 12. 2. has a bearing of from N and a magnitude of 4. 3. has a bearing of from N and a magnitude of 8. |  |  |
|  | Determine a unit vector in the direction of each the following vectors. Give your answers in exact form. |  |  |
|  | For each of the following pairs of points A and B, express  in polar form. Give your answers to two decimal places where appropriate.   1. and 2. and 3. and |  |  |

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*Complex familiar*

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|  | Given that the distancebetween two vectors  and  is , calculate the distance between this pair of vectors:  and . Give your answer to two decimal places. |  |  |
|  | Let  and  where  is a scalar.  Determine the coordinates of  such that  is a square. |  |  |
|  | Let  and  where  is a positive scalar. Determine  such that the distance between vectors  and  , , is .Give your answer to two decimal places. |  |  |
|  | Let  and the middle of segment . Let  be the point such that  Show that the points  and D are aligned. |  |  |

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*Complex unfamiliar*

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|  | Let  and . Determine the linear relationship between  and  such that the lines  and  are parallel. |  |  |
|  | A boat travels west at 12 km/h, while another boat travels north at 35 km/h. Determine the bearing of the difference vector. Give your answer to two decimal places. |  |  |
|  | Two bushwalkers starts their hike from the same starting point. The first one walks south-west and then  north-east while the second one walks north-west and then  east.  Given that the distancebetween two vectors  and  is , and that the final distance between the two bushwalkers is , determine the value of to two decimal places |  |  |
|  | If  and ,  and , determine the values of  and . |  |  |