**1** The complex number *z* is defined by . Given that the real part   
of *z* is ,

**a** find the possible values of *p*. **(4 marks)**

**b** Write the possible values of *z* in the form *a* + *bi*, where *a* and *b* are real. **(1 mark)**

**c** Show your answer to part **b** on an Argand diagram. **(1 mark)**

**2** 

**a** Find *z* in the form *a* + *bi*, where *a* and *b* are real. **(2 marks)**

**b** Given that *z* is a complex root of the quadratic equation    
where *p*, *q* and *r* are integers find possible values of *p, q* and *r*. **(4 marks)**

**3** The complex numbers *w* and *z* are given by *w* = 2 + *k*i and *z* = –2*k* + 4i, where   
*k* is a real constant. Given that  find the exact value of *k*. **(4 marks)**

**4** 

**a** Express *z* in the form ,  **(3 marks)**

**b** Given that  and  express  in the form ,  **(3 marks)**

**5** 

**a** Find the Cartesian equation of this locus. **(4 marks)**

**b** Sketch the locus of *z*. Label the points of intersection with the real and imaginary axes. **(2 marks)**

**c** Find the exact least possible value of  Leave your answer in the form  where *a* is a rational number. **(3 marks)**

**6** A complex number z is represented by the point *Q* on the Argand diagram. Given that 

**a** sketch the locus of *Q*. **(2 marks)**

**b** Show that the minimum angle of  in the interval  is

 **(5 marks)**

**7** The region *R* in an Argand diagram is satisfied by the inequalities  and . Draw an Argand diagram and shade in the region *R*. **(6 marks)**

**8** Shade on an Argand diagram the set of points  **(6 marks)**