Question 1   [5 marks]
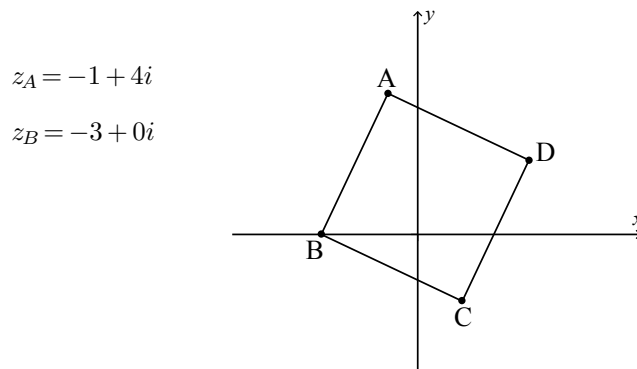
i) In the following Argand diagram the point A represents the complex number $-1 + 4i$ and the point B represents the complex number $-3 + 0i$. The shape of ABCD is a square. Determine the complex numbers represented by the points C and D.

$$z_A = -1 + 4i$$

$$z_B = -3 + 0i$$

ii) What complex number z_O represent the *center* of the square ?

iii) What is the product $(z_A - z_O) \cdot (z_A - z_O) \cdot (z_A - z_O) \cdot (z_D - z_O)$?

Question 2   [5 marks]

Consider the complex numbers $z_1 = \cos\dfrac{11\pi}{12} + i\sin\dfrac{11\pi}{12}$ and $z_2 = \cos\dfrac{\pi}{6} + i\sin\dfrac{\pi}{6}$.

(a) (i) Find $\dfrac{z_1}{z_2}$

   (ii) Find $\dfrac{z_2}{z_1}$ [3]

(b) 0, $\dfrac{z_1}{z_2}$ and $\dfrac{z_2}{z_1}$ are represented by three points O, A and B respectively on an Argand diagram. Determine the area of the triangle OAB.   [2]

Question 3   [5 marks]

Find $(\sqrt{3} + i)^{13}$ using De Moivre's Theorem