

The complex numbers u and v are defined by $u = -4 + 2i$ and $v = 3 + i$.

(a) Find $\frac{u}{v}$ in the form $x + iy$, where x and y are real. [3]

(b) Hence express $\frac{u}{v}$ in the form $re^{i\theta}$, where r and θ are exact. [2]

In an Argand diagram, with origin O , the points A , B and C represent the complex numbers u , v and $2u + v$ respectively.

(c) State fully the geometrical relationship between OA and BC . [2]

(d) Prove that angle $AOB = \frac{3}{4}\pi$. [2]