

1. A quaternion $q = x + iy + jz + kw \in \mathbb{H}$ can be expressed in terms of a pair of complex numbers $a, b \in \mathbb{C}$ as

$$q = a + bj.$$

Find explicit expressions for the real and imaginary parts of both a and b .

2. Working with a partner, each of you should represent one of a and b using your left arm, as in the Arms activity. Your instructor will ask the pair of you to represent various quaternions.
3. Fix a quaternion q and represent it with your partner. Now represent the quaternion iq . How has the position of your arms changed?
4. Repeat the previous step, using the same quaternion q , but this time represent qi . How does your result compare with your previous result?