Basic Complex Number Operations Exam Questions (From OCR 4725)

Q1, (Jun 2005, Q3)

The complex numbers $2 + 3i$ and $4 - i$ are denoted by z and w respectively. Express each of the following in the form $x + iy$, showing clearly how you obtain your answers.

(i) $z + 5w$, [2]

(ii) z^*w, where z^* is the complex conjugate of z, [3]

(iii) $\frac{1}{w}$. [2]

Q2, (Jun 2006, Q5)

The complex numbers $3 - 2i$ and $2 + i$ are denoted by z and w respectively. Find, giving your answers in the form $x + iy$ and showing clearly how you obtain these answers,

(i) $2z - 3w$, [2]

(ii) $(iz)^2$, [3]

(iii) $\frac{z}{w}$. [3]

Q3, (Jan 2009, Q1)

Express $\frac{2 + 3i}{5 - i}$ in the form $x + iy$, showing clearly how you obtain your answer. **[4]**

Q4, (Jan 2011, Q2)

The complex numbers z and w are given by $z = 4 + 3i$ and $w = 6 - i$. Giving your answers in the form $x + iy$ and showing clearly how you obtain them, find

(i) $3z - 4w$, **[2]**

(ii) $\frac{z^*}{w}$. **[4]**

Q5, (Jun 2011, Q9)

One root of the quadratic equation $x^2 + ax + b = 0$, where a and b are real, is $16 - 30i$.

(i) Write down the other root of the quadratic equation. **[1]**

(ii) Find the values of a and b. **[4]**

(iii) Use an algebraic method to solve the quartic equation $y^4 + ay^2 + b = 0$. **[7]**

Q6, (Jun 2013, Q1)

The complex number $3 + ai$, where a is real, is denoted by z. Given that $\arg z = \frac{1}{6}\pi$, find the value of a and hence find $|z|$ and $z^* - 3$. **[6]**

Q7, (Jun 2015, Q1)

The complex number $x + iy$ is denoted by z. Express $3zz^* - |z|^2$ in terms of x and y. **[3]**
