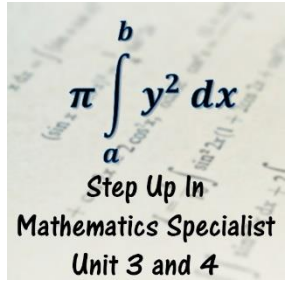


1.1 Cartesian Form

Problems Worksheet



1. Consider the complex numbers $z = 1 - \sqrt{3}i$ and $w = -3 + 2i$. Determine:

a. $Re(z) + Im(w)$.

b. $2w - z$.

c. zw .

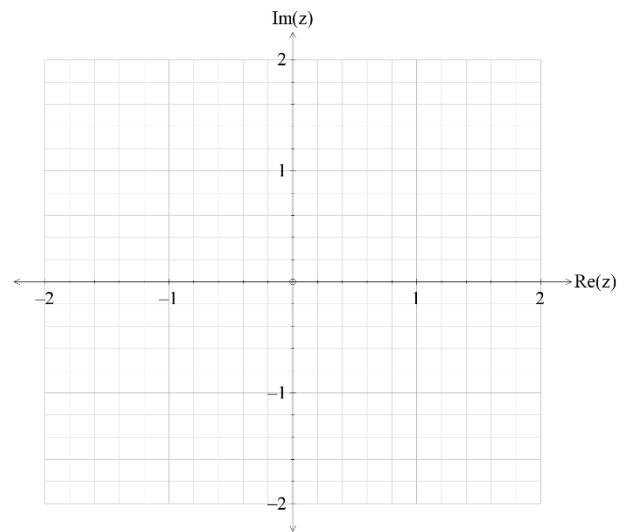
d. $\frac{3w}{z}$, in the form $a + bi$.

2. Show that for the general complex numbers $w = a + bi$ and $z = x + yi$, then $\frac{w}{z} = \frac{ac+bd}{c^2+d^2} + \left(\frac{bc-ad}{c^2+d^2}\right)i$.

3. The solutions of the quadratic equation $z^2 + mz + n = 0$ are $z = -4 \pm 2i$. Find m and n .

4. Find the values of the real numbers c and d if $\frac{c}{4+i} + \frac{di}{-2-i} = \frac{3}{2+2i}$.

5. If $z = -\frac{1}{2} + \frac{\sqrt{3}}{2}i$, determine z^2 , z^3 , and z^4 and plot these four points on the Argand Plane provided.



6. Given the complex numbers $w = 3 + mi$ and $z = 2 + i$, determine the value(s) of m such that:

a. $Im(wz) = Re(w^2)$

b. $\frac{10z}{w} = 7 + i$

7. Let z_1 and z_2 be the solutions to $z^2 - 4z + 20 = 0$, and let $w = -8$. Show clearly that the triangle formed by the points w , z_1 and z_2 on the Argand Plane is isosceles. A simple sketch may be helpful but is not required.

8. The points w_1 , w_2 and w_3 are given by $-4 + 2i$, $-1 + (3\sqrt{3} + 2)i$ and $2 + 2i$ respectively. Show that this triangle is equilateral.