



1. Write  $\sqrt{-49}$  in terms of  $i$ . (1)

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2. Express each of the following in terms  $a + bi$ ,

a)  $(3 + 5i) + (2 + 3i)$ , (1)

b)  $\frac{10-8i}{2}$ . (1)

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3. Solve the equation  $z^2 + 16 = 0$ . (2)

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4. The solutions to the quadratic equation,

$$z^2 - 10z + 28 = 0,$$

are  $z_1$  and  $z_2$ .

Find  $z_1$  and  $z_2$ , giving your answers in the form  $p \pm i\sqrt{q}$ , where  $p$  and  $q$  are integers. (3)

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1. Simplify  $(2 + i\sqrt{5})(\sqrt{5} - i)$  in terms  $a + bi$ , (2)

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2. If  $z = 5 - 3i$ ,  $w = 2 + 2i$ , express the following in the form of  $a + bi$ , where  $a$  and  $b$  are real constants,  
a.  $z^2$ , (2)

b.  $\frac{z}{w}$ , (3)

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3. Given that  $z_1 = 3 + 2i$  and  $z_2 = \frac{12-5i}{z_1}$ ,  
find  $z_2$  in the form  $a + bi$ , where  $a$  and  $b$  are real. (2)

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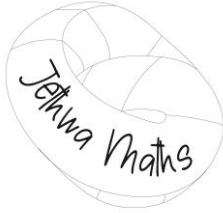
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1. The complex number  $3 - 4i$  is denoted by  $z$ .

Giving your answers in the form  $x + iy$ , find  $2z + 5z^*$ . (2)

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2. Solve the following equations, giving each root in the form  $a + bi$ :

a.  $x^2 + 25 = 0$  (2)

b.  $x^2 - 2x + 17 = 0$  (2)

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3. If  $z = 2 + 3i$  and  $w = 4 - i$ , express  $z^*w$  in the form  $x + iy$ , clearly showing how you obtained your answer. (3)

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1.  $x^3 - 27 = 0$

Show that two of the roots of the above equation satisfy the quadratic equation  $x^2 + 3x + 9 = 0$ , by using factorisation.

(2)

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2.  $f(z) = z^4 - 12z^3 + 31z^2 + 108z - 360$

Write  $f(z)$  in the form  $(z^2 - 9)(z^2 + bz + c)$ , where  $b$  and  $c$  are real constants to be found

(2)

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3.  $f(x) = (x^2 + 4)(x^2 + 8x + 25)$

Find the four roots of  $f(x) = 0$ .

(5)

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