Bridging week – Further Mathematics complex number summer task

1. Solve the following equations in the form a + ib
   a) $x^2 – 6x + 58 = 0$
   b) $x^2 + 16 = 0$
   c) $x^2 + 29 = 4x$
   d) $x^2 + 7 = 0$
   e) $x^2 + 2x + 3 = 0$

2. Find z*, given that z=
   a) 2 + 3i
   b) 4 – 6i
   c) -1 + 7i
   d) -2 – 5i
   e) 3i

3. Simplify the following complex numbers:
   a) (2 + 3i) + (4 – 7i)
   b) (3 – i) – (2 + 5i)
   c) (6 + 5i) + (7 + 11i)
   d) (4 – 3i) – (8 – 2i)
   e) (1 + 3i) – 2(4 – 6i)

4. Express in the form a + ib
   a) (2 + i)(3 + 2i)
   b) $(3 + i)^3$
   c) $(1 – 4i)^2$
   d) (4 – 3i)(5 + 2i)
   e) (1 – i)(2 + 3i)(4 – 5i)

5. Express in the form a + ib
   a) $\frac{2-3i}{4+i}$
   b) $\frac{3+i}{3-i}$
   c) $\frac{4+3i}{2+3i}$
   d) $\frac{5-2i}{3-4i}$
   e) $\frac{2(3+2i)}{5-6i}$

6. Sketch the following on an Argand diagram
   a) 5i
   b) 7
   c) 2 + 3i
   d) 4 – 7i
   e) -5 + 2i
   f) -1 – 4i

7. Find the modulus and argument of the following:
   a) z = 3 + 2i
   b) z = 4 – 3i
   c) z = -2 + 5i
   d) z = -1 – 4i
   e) z = 2(4 – 3i)

8. Given that $z_1 = 3 – 7i$ and $z_2 = 4 + 3i$, find:
   a) $z_1 + z_2$
   b) z_1z_2
   c) $z_1 \div z_2$
   d) $3z_1 + 4z_2$
   e) $5z_1 – 2z_2$
   f) Arg z_1
   g) Arg z_2
   h) Arg(z_1z_2)
   i) $|z_1 + z_2|$
   j) $|z_1 \div z_2|$