

Course	SpecialistYear12
Student name:	Teacher name:
Task type:	Response
Time allowed for this task:40 mins	
Number of questions:	7
Materials required:	Calculator with CAS capability (to be provided by the student)
Standard items:	Pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters
Special items:	Drawing instruments, templates, notes on one unfolded sheet of A4 paper, and up to three calculators approved for use in the WACE examinations
Marks available:	38 marks
Task weighting:	_10%
Formula sheet provided: Yes	
Note: All part questions worth more than 2 marks require working to obtain full marks.	

Q1 (2, 2 & 3 = 7 marks) (3.1.1 to 3.1.3) If z = 3 - 4i & w = -1 + 2i determine the following. a) $w\overline{z}$

b)
$$\frac{z}{w}$$

c)
$$\frac{1}{z} - \frac{1}{w}$$

Q2 (3 marks) (3.1.2)

Determine all possible pairs of real numbers a & b such that $\frac{19 - 33i}{a + 2i} = 1 + bi$

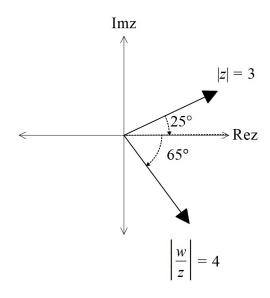
Q3 (2 & 3 = 5 marks) (3.1.13-3.1.15)

Consider the function $f(x) = x^3 - 5x^2 + 9x - 45$.

- a) Determine the remainder of f(x) when divided by x 5.
- b) Show that x 3i is a factor of f(x) and hence determine all linear factors.

Q4 (3 marks) (3.1.9)

Determine the complex number W in the form $^{rcis\theta}$ with $^{r\geq0}$ & - 180 < $^{\theta}\leq180$.



Q5 (2, 2, 3 & 3 = 10 marks) (3.1.10)

Consider the following set of complex numbers z such that |z-5-3i|=4. Determine the following.

- a) Minimum value of |z|. (exact)
- b) Maximum value of $\left|\overline{Z}\right|$. (exact)
- c) Maximum value of $Arg^{(z)}$ in radians to two decimal places.
- d) Maximum value of |z+3| (exact)

Q6 (3 & 3 = 6 marks) (3.1.6)

Let p,q&s be complex numbers such that

$$|p| = 5$$
 Arg $(p) = \frac{\pi}{6}$ $\overline{q} = 1 - i$

$$s = \frac{p^5}{(3+3i)q}$$

- a) Determine the exact value of Arg(s) in principal form (i.e $^{-}\pi < Arg(s) \le \pi$)
- b) Determine the exact value of |S|

Q7 (4 marks) (3.1.10)

Sketch the locus of complex numbers that satisfy **both** of the following $|z+2i|=|z-3|+\sqrt{13}$ **AND** $|z+2i|\leq \sqrt{13}+5$ in the Argand diagram below.

