

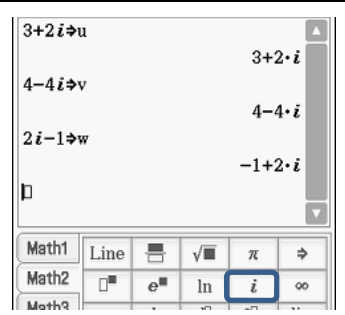
Activity 38 Operating with complex numbers

Aim: Calculate with complex numbers.

1. For the complex numbers $u = 3 + 2i$, $v = 4 - 4i$ and $w = 2i - 1$

Enter and store u , v and w

- Check ClassPad is in Complex mode (Cplx)
- Use the i button from **Keyboard** **Math2** menu to enter i . Do not use the variable or alphabet menus.



- a) Complete the table

Complex number	Real part [Action Complex re]	Imaginary part [Action Complex im]
u		
v		
w		

- b) Calculate

- (i) $u + v$
- (ii) $u + w$
- (iii) $u + v + w$
- (iv) Describe how to add complex numbers without ClassPad.

- c) Calculate:

- (i) $3u$
- (ii) $7w$
- (iii) Describe how to multiply complex numbers by a real number without ClassPad.

2. Multiplication of complex numbers

a)

(i) Expand $I(4 - 4I)$

(ii) Write vi in the form $a + bi$

(iii) Compare your answer to (ii) with the expansion in (i) and explain the difference.

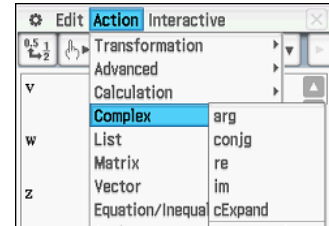
b)

(i) Expand $(3 + 2I)(4 - 4I)$

(ii) In Main calculate $u \times v$ in the form $a + bi$

(iii) Compare the answer to (ii) with the expansion in (i) and explain the difference.

3. The conjugate of a complex number has the same real part and opposite imaginary part.
 (On ClassPad select [Action | Complex | conjg])
 \bar{z} represents the conjugate of z .



Complete the table:

Expression	Number in Real/Imaginary form	Conjugate
u	$3 + 2i$	$3 - 2i$
vi		
uv		
v^2		
$(2i + 1)w$		
i^2		
i^3		
	$a + ib$	
$w\bar{w}$		
$w + \bar{w}$		
$u - \bar{u}$		

4. Calculate $(a + bi)(a - bi)$
 Complete the statement “When a complex number is multiplied by its conjugate the result is a _____ number.”
5. Express in real/imaginary form.
- a) $\frac{u}{w}$
- b) Verify the answer with a “by-hand” method.
 Hint: Multiply $\frac{u}{w}$ by $\frac{\bar{w}}{\bar{w}}$ i.e. the conjugate over the conjugate.

Learning notes

This is intended to be done early in the study of complex numbers and could easily be used as an introduction to the topic.

The real part of $a+bi$ is a and the imaginary part is b (not bi).