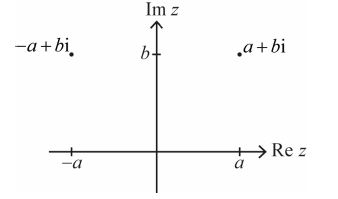
# 1.13 Polar and Euler form\_P\_1

**1a.** *[1 mark]*

## Markscheme

\* This question is from an exam for a previous syllabus, and may contain minor differences in marking or structure.

      A1

**Note:** Award ***A1*** for  in first quadrant and  its reflection in the -axis.

***[1 mark]***

**1b.** *[1 mark]*

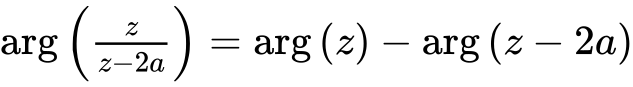
## Markscheme

 (or any equivalent)     ***A1***

***[1 mark]***

**1c.** *[2 marks]*

## Markscheme

     ***(M1)***

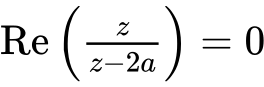
 (or any equivalent)       ***A1***

***[2 marks]***

**1d.** *[3 marks]*

## Markscheme

**METHOD 1**

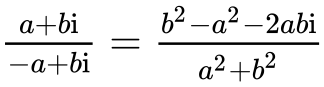
if  then , ( odd)     ***(M1)***

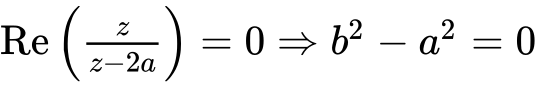


     ***(A1)***

       ***A1***

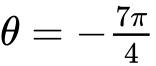
**METHOD 2**

      ***M1***



       ***A1***

       ***A1***

**Note:** Accept any equivalent, *eg*.

***[3 marks]***

**2a.** *[4 marks]*

## Markscheme

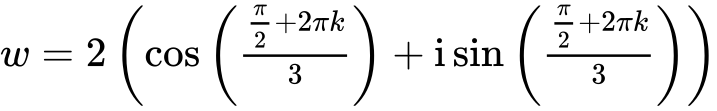
\* This question is from an exam for a previous syllabus, and may contain minor differences in marking or structure.

**METHOD 1**



writing               ***(M1)***

**Note:** Award ***M1*** for an attempt to find cube roots of  using modulus-argument form.

cube roots                ***(M1)***

i.e.          ***A2***

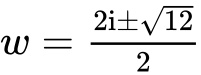
**Note:** Award ***A2***for all 3 correct, ***A1*** for 2 correct.

**Note:** Accept  and .

**METHOD 2**



              ***M1***

              ***M1***

         ***A2***

**Note:** Award ***A2***for all 3 correct, ***A1*** for 2 correct.

**Note:** Accept  and .

***[4 marks]***

**2b.** *[3 marks]*

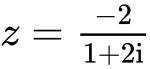
## Markscheme

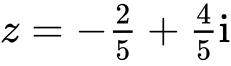


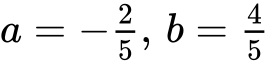
      ***M1***





     ***A1***

     ***A1***

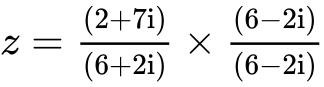
**Note:** Accept .

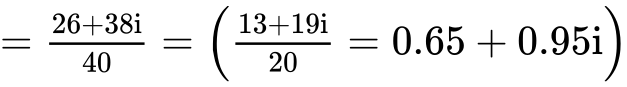
***[3 marks]***

**3a.** *[2 marks]*

## Markscheme

\* This question is from an exam for a previous syllabus, and may contain minor differences in marking or structure.

     ***(M1)***

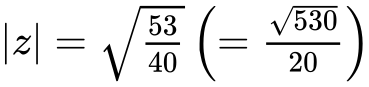
     ***A1***

***[2 marks]***

**3b.** *[2 marks]*

## Markscheme

attempt to use     ***(M1)***

 or equivalent      ***A1***

**Note: *A1*** is only awarded for the correct exact value.

***[2 marks]***

**3c.** *[2 marks]*

## Markscheme

**EITHER**

arg  = arg(2 + 7i) − arg(6 + 2i)      ***(M1)***

**OR**

arg  = arctan         ***(M1)***

**THEN**

arg  = 0.9707 (radians) (= 55.6197 degrees)     ***A1***

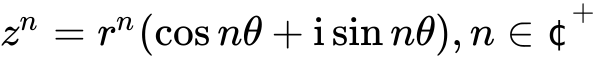
**Note:** Only award the last ***A1***if 4 decimal places are given.

***[2 marks]***

**4a.** *[7 marks]*

## Markscheme

\* This question is from an exam for a previous syllabus, and may contain minor differences in marking or structure.

let  be the proposition 

let 



 is true     ***R1***

assume true for      ***M1***

**Note:**Only award the ***M1*** if truth is assumed.

now show  true implies  also true

     ***M1***



     ***A1***

     ***A1***

 is true     ***A1***

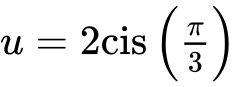
 true implies  true and  is true, therefore by mathematical induction statement is true for      ***R1***

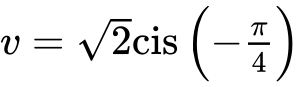
**Note:**     Only award the final ***R1*** if the first 4 marks have been awarded.

***[7 marks]***

**4b.** *[4 marks]*

## Markscheme

(i)          ***A1***

     ***A1***

**Notes:**     Accept 3 sf answers only. Accept equivalent forms.

     Accept  and .

(ii)     

     ***(M1)***

     ***A1***

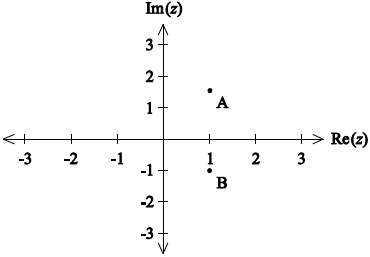
**Notes:**     Award ***(M1)*** for an attempt to find  and .

     Accept equivalent forms.

***[4 marks]***

**4c.** *[1 mark]*

## Markscheme

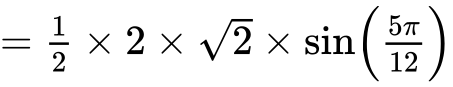
     ***A1***

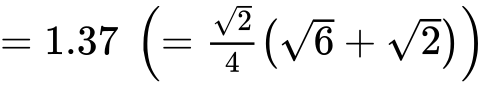
**Note:**     Award **A1** if A or  and B or  are in their correct quadrants, are aligned vertically and it is clear that .

***[1 mark]***

**4d.** *[3 marks]*

## Markscheme

Area      ***M1A1***

     ***A1***

**Notes:**     Award ***M1A0A0*** for using .

***[3 marks]***

**4e.** *[5 marks]*

## Markscheme

     ***M1A1***

**Note:**     Award ***M1*** for recognition that a complex conjugate is also a root.

     ***A1***

     ***M1A1***

**Note:**     Award ***M1*** for an attempt to expand two quadratics.

***[5 marks]***

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