3CD Mathematics Specialist WACE Revision

**Complex Numbers**

Questions are taken from VCE Secondary Papers

**2009**

Machine generated alternative text: Question 1
Find all solutions to the equation : —6= 0, z  C.

Machine generated alternative text: Question 4
3 (3ir
Given that cos(20) = — where O  ---, nj find cis(O) m cartesian forni

**Answers**

Machine generated alternative text: 

1.

Machine generated alternative text: . -.17 1
cis(O)=— ,—-+- ,—,
2q2 2q2

4.

Machine generated alternative text: Question 2
i’i
Inthe complexplane.L sthe line with equation IzI z—--•
a. Veñfythatthepoint(O.O)liesonL.

Machine generated alternative text: b. Show that the cazlesiau equation of L is given by y =

Machine generated alternative text: The equation of the part of L in the third quackant of the complex plane can be wntten in the foniiArg(:) =
c. Wrne down the value of a.

Machine generated alternative text: d. Find. in caziesian form.. the point(s) of intersection of L and the graph ofI = 1

Machine generated alternative text: e. Sketch L and the graph of zI=2 on the aigand diagram below.
tm(:)
s t
/
t 1 t ——.—
4% - - -—. ‘ k,
t? %% ——t ..
t ‘ S t t’’ s
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• ,‘ ‘ jt_ , ,
I ‚ —‘t—— , ; Re—
—3 —2 —l .-O-_ : ‘2 3
‘/ \z ,:
t —‘ — ,_t  ,
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- - t , 5 t ——
—— s t s t 
t4_%
— — — —
t 5

Machine generated alternative text: f. Fin4theazaithefittqua&ntthatisenc1osedbyLandthegzaphsofzj2,  = 1 andArg(:)=

**Answers**

Machine generated alternative text: When (O. O) is substituted. left side of the equation = H1 =1. right side of the equation =  = -2- =1

2. a.

Machine generated alternative text: (x1)2 32 (_J +() 2 —2x+1+y2 =x2_x++2 —+!, —x=—i’ which gives the
required result. y = x.
I3

b.

Machine generated alternative text: 5.ii•
6

c.

Machine generated alternative text: , , , 1 .
x + v = 2 , y = —x, solves to give (q’i i). (—Ji. _i) as the coordinates of the points of intersectioa

d.

e. Machine generated alternative text: ,
,
X

Machine generated alternative text: .. 1 / , Jr
.krea—xlìrx2—Jrxr)
12’ ‘4

f.

**2008**

Machine generated alternative text: Question 10
Let w 1—ai wherealsarealconstant
a. Showthat i = (i+a2)&.

Machine generated alternative text: b. Find the values of a for which w3 = 8.

Machine generated alternative text: c. Let p(z)—:3—b-’+c:—d  reb.c Ådarenon-zeroralconstants.Ifp(z)=O foi :w andall
roots of p(:) = O satisfy I z3 =8. find the values of b. e and d and show that these are the only posstble
values.

**Answers**

Machine generated alternative text: 

10. b.

Machine generated alternative text: b=—4,c=8.d=—8orp(z)=z3—4c2÷8:—8

c.

Machine generated alternative text: Question S
a. Vezify that is one root oftl equation:3 =

Machine generated alternative text: b. Plot the three roots of i ou the argand diagram below.
2
• • /t  _
: ‘_ SS 
jE %•1

Machine generated alternative text: e. Find the points of inteisection of the cuzves given by
and

Machine generated alternative text: d. Sketch the curves given by the relations I:—iI=1 and Re(:) = ---=Im(:) on the argand diagram
Im(:)
2 ,
Ft • .. SS
‘SS 1  SSS
:‘  -
-3 -2 \, -:1 ::si ) 2 3  Ret:)
, ,,.  :—  —‘
F
—2

Machine generated alternative text: e. On the argand diagzam above shade the region given by
{z :1= —  i} {z: O  Arg( z) 
f. Find the area of the shaded region in part e.. correct to two decimal places

Machine generated alternative text: r / \ / ,
‘b43 1 .j,rl ¡ 12tH •f32t
—+—i=c1sI — I, I cisI — II =cisI — =1
2 2 . k6))**Answers**

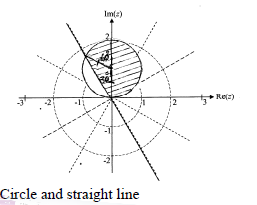
5. a.

Machine generated alternative text: ¡—-I
S... / -- - --
‘)4. --‘

b.

Machine generated alternative text: (0.0). i —,— i or equivalent complex numbers.
I’.’  ?)

c.



d.

Machine generated alternative text: Shaded region on the diagram abovee.

Machine generated alternative text:  f.

**2007**

Machine generated alternative text: Question 1
+ ‘j
Expts  _ in polar fonu

Machine generated alternative text: Question 2
a. Showthat T5—i isasolutionoftheequatiou z3—(5—í)z2+4z—4q5+4i=O.

Machine generated alternative text: b. Finda1Iothero1ntionsoftheequation z3—(4J—i)2+4z—4J5÷4i=O.

**Answers**

Machine generated alternative text: (
2ctsi —
,

Machine generated alternative text: = 2i1. 2. b.

**2006**

Machine generated alternative text: Question S
a. î. i.et zi=cis(!!). Plot and label careflully the points  and-j ontheAzanddiagiambelow.
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ii. Write down the coniplex equation of the straight line which passes through the points  and in
tenus of j.
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—— .. , /—1
) I
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- •5l
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‘ ‘ —2
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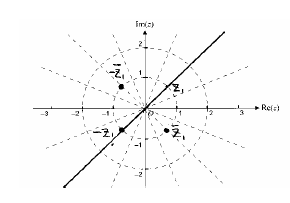
Machine generated alternative text: (Æ\ _____
b. Useadob1eag1efomuIatoshowthattheexactva1ueofcosj=
Expu yva1ies are rejected. “ ‘

Machine generated alternative text: .(.ir\ J2—/
e. Hence show that the exact value of sm —
8) 2

Machine generated alternative text: J2÷J J2-Ji
d. Evaluate , + , ¡ . giving yout answeí in polat form.

Machine generated alternative text: e. Fot what values of n is (2 ÷  + ¡ j a real nunibei?

Machine generated alternative text: f. P1ottherootsof 1 ontheArgauddiagrambelow.
Im(z)
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**Answers**

Machine generated alternative text: z—I=z+ii

5. a. i. ii.

Machine generated alternative text: So1vin the equationcosÍÌ = 2cos2  forcosI-.’1 2ave the stated result.
4) 8)

b.



c.

Machine generated alternative text: . 1m.
cisi

d.

Machine generated alternative text: n = 8k. k  Z (the set of integers)

e.

Machine generated alternative text: (nW;I
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—3 -Z’, -Is
Jr_ W,
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_—‘tt %

f.