

CHAPTER 5

COMPLEX NUMBERS AND QUADRATIC EQUATIONS

DECEMBER 2020

1. Write the complex number $z = \frac{1+i}{1-i}$ in $a + ib$ form how that
 $(a^2 + b^2)(c^2 + d^2)(e^2 + f^2) = A^2 + B^2$. (2)
2. i. Find the square root of the complex number $1 + i$. (2)
 ii. Write z in polar form. (2)

MARCH 2020

3. a) Modulus of a complex number Z is 2 and $\arg(Z) = \frac{\pi}{3}$. Write the complex number in the form $a + ib$. (1)
 b) Find the square root of the above complex number. (3)

IMPROVEMENT 2019

4. a) If $(a + ib)(c + id)(e + if) = A + iB$, show that
 $(a^2 + b^2)(c^2 + d^2)(e^2 + f^2) = A^2 + B^2$. (2)
 b) Find the square root of the complex number $1 + i$. (2)

MARCH 2019

5. Find the square root of the complex number $3 - 4i$. (3)
6. If z is a complex number with $|z| = 2$ and $\arg(z) = \frac{4\pi}{3}$, then
 a) Express z in $a + ib$ form (2)
 b) Find \bar{z} . (1)
 c) Verify that $(\bar{z})^2 = 2z$. (1)

IMPROVEMENT 2018

7. Find the polar form of the complex number $\frac{1+i}{1-i}$. (3)
8. Find the square roots of the complex number $3 + 4i$. (2)

MARCH 2018

9. Consider the quadratic equation $x^2 + x + 1 = 0$
 a) Solve the quadratic equation. (2)
 b) Write the polar form of the roots. (2)
 c) If the two roots of the given quadratic are α and β , show that $\alpha^2 = \beta$. (1)

IMPROVEMENT 2107

10. a) The multiplicative inverse of the complex number $3 + 4i = \dots$. (1)
 b) Express in the Polar form: $z = 1 + i\sqrt{3}$. (2)
 c) Solve the equation $x^2 + 3x + 5 = 0$. (2)

MARCH 2017

11. a) $i^{18} = \dots$
 i) 1 ii) 0 iii) -1 iv) i (1)
 b) Represent the complex number $\sqrt{3} + i$ in polar form. (2)
 c) Find the square root of the complex number $-8 - 6i$. (3)

IMPROVEMENT 2016

12. a) Write the real and imaginary parts of the complex number $-3 + \sqrt{-7}$. (1)
 b) Find the modulus and argument of the complex number $1 + i\sqrt{3}$. (2)
 c) Solve: $x^2 - 2x + 3 = 0$. (3)

MARCH 2016

13. a) Which one of the following is the real part and imaginary parts of the complex number:
 $\left(\frac{1+i}{1-i}\right) - \left(\frac{1-i}{1+i}\right)$?
- i) 0 and 1 ii) 0 and 2
 iii) 3 and 2 iv) 0 and 4 (1)
- b) Express the complex number i in the Polar form. (2)
- c) Solve: $\sqrt{5}x^2 + x + \sqrt{5} = 0$ (3)

IMPROVEMENT 2015

14. a) What is i^{-35} ? (1)
- b) Represent the complex number $\sqrt{3} + i$ in the polar form. (2)
- c) Solve: $\sqrt{5}x^2 + x + \sqrt{5} = 0$. (3)

MARCH 2015

15. a) Represent the complex number $1 + i\sqrt{3}$ in the polar form. (2)
- b) Find the square root of the complex number $-7 - 24i$. (4)

IMPROVEMENT 2014

16. a) Solve the quadratic equation:
 $-x^2 + x - 2 = 0$ (2)
- b) Express i in the polar form .
 $r(\cos \theta + i \sin \theta)$. (3)

MARCH 2014

17. a) Solve $\sqrt{3}x^2 + x + \sqrt{3} = 0$ (2)
- b) Represent the complex number $z = 1 + i\sqrt{3}$ in the polar form. (3)

SEPTEMBER 2013

18. a) Express $\frac{1+i}{1-i}$ in the form $a+ib$. (2)
- b) Represent $\frac{1+i}{1-i}$ in polar form. (3)

MARCH 2013

19. a) Represent the complex number $\sqrt{3} + i$ in the polar form. (2)
- b) Solve: $\sqrt{5}x^2 + x + \sqrt{5} = 0$ (3)

SEPTEMBER 2012

20. i) Represent the complex number $1 + i\sqrt{3}$ in the polar form. (2)
- ii) Express $\frac{2+i}{2-i}$ in the form $a + ib$. (3)

MARCH 2012

21. Consider the complex number, $Z = \frac{5 - \sqrt{3}i}{4 + 2\sqrt{3}i}$
- a) Express Z in the form $a + ib$. (2)
- b) Express Z in the polar form. (3)

IMPROVEMENT 2011

22. Consider the equation $z^2 - 2z + 4 = 0$.
- i) Find two complex numbers satisfying this equation. (2)
- ii) Simplify $\frac{z_1}{z_2} + \frac{z_2}{z_1}$ (3)

MARCH 2011

23. Consider the complex number $Z = \frac{2+i}{(1+i)(1-2i)}$
- a) Express Z in the form $a + ib$. (2)
- b) Represent Z in the polar form. (3)

MARCH 2010

24. i) Express the complex number $z = \frac{5+i}{2+3i}$

- in the form $a + ib$ (2)
ii) Represent z in the polar form. (3)

AUGUST 2009

25. i) Express the complex number $\frac{3 - \sqrt{-16}}{1 - \sqrt{-9}}$ in
the form $a + ib$. (2)
ii) Represent the complex number
 $z = 1 + i\sqrt{3}$ in the polar form. (2)
iii) Solve the equation $ix^2 - x + 12i = 0$ (2)

MARCH 2009

26. a) Express the complex number
 $\frac{2 - i}{(1 - i)(1 + 2i)}$ in the form $a + ib$. (2)
b) Find the polar form of the complex number
 $\sqrt{3} + i$ (2)
c) Solve the quadratic equation:
 $27x^2 - 10x + 1 = 0$ (2)

