MATHS

BOOKS - KC SINHA MATHS (HINGLISH)

COMPLEX NUMBERS - FOR BOARDS

Solved Examples

1. Write the complex number: $5-7\sqrt{-21}$

Watch Video Solution

2. Write the complex number: $\frac{\sqrt{3}}{2}\frac{\sqrt{-2}}{7}$

Watch Video Solution

3. Write the complex number: $\sqrt{x}$, $(x > 0)$

Watch Video Solution

4. Write the complex number: $-b + \sqrt{-4ac}$, $(a, c > 0)$

Watch Video Solution

5. Write the real and imaginary part of the complex number: $\frac{\sqrt{17}}{2} + i\frac{2}{\sqrt{70}}$

Watch Video Solution

6. Write the real and imaginary part of the complex number: $\sqrt{37} + \sqrt{-19}$

Watch Video Solution

7. Find a and b such theat $2a + i4b$ and $2i$ represent the same complex number.

Watch Video Solution

8. Find the multiplicative inverse of the following complex number: $3 + 2i$

Watch Video Solution

9. Inverse of $\frac{3 + 4i}{4 - 5i}$

Watch Video Solution

10. Find the sum and product of the complex numbers $-\sqrt{3} + \sqrt{-2}$ and $2\sqrt{3} - i$

Watch Video Solution

11. Explain the fallacy in the following: $-1 = i.\, i = \sqrt{-1}.\, \sqrt{-1} = \sqrt{(-1)(-1)} = \sqrt{1} = 1$

Watch Video Solution

12. Evaluate: i^{80}

Watch Video Solution

13. Evaluate: $\frac{1}{i}$

Watch Video Solution

14. Evaluate: $\left(-\sqrt{-1}\right)^{31}$

Watch Video Solution

15. Evaluate: $\frac{i^2+i^4+i^6+i^7}{1+i^2+i^3}$

Watch Video Solution

16. simplify : $i^{n+100}+i^{n+50}+i^{n+48}+i^{n+46}$

Watch Video Solution

17. Simplify: $\left(\frac{1+i}{1-i}\right)^{200}$

Watch Video Solution

18. Evaluate: $\left[i^{19}+\left(\frac{1}{i}\right)^{25}\right]^2$

Watch Video Solution

19. Write the complex number: $z = \frac{2+i}{(1+i)(1-i2)}$

Watch Video Solution

20. Express: $\frac{(1+i)^3}{4+3i}$ in the form $a+ib$

Watch Video Solution

21. Express each one of the following in the standard form $a+ib$: $\left(\frac{1}{1-2i}+\frac{3}{1+i}\right)\left(\frac{3+4i}{2-4i}\right)$

Watch Video Solution

22. Express each one of the following in the standard form $a+ib$: $\frac{1}{1-\cos\theta+2is\int h\eta}$

Watch Video Solution

23. if z_1 and z_2 are $1-i, \ -2+4i$ respectively find $Im\left(\frac{z_1 z_2}{\bar{z}_1}\right)$

Watch Video Solution

24. If Z = $x^2 - 7x - 9yi$ such that $\overline{Z} = y^2 i + 20i - 12$ then the number of order pair (x,y) is :

Watch Video Solution

25. Find the real values of $x \ and \ y, \quad \text{if} \ : \frac{(1+i)x - 2i}{3+i} + \frac{(2-3i)y + i}{3-i} = i$

Watch Video Solution

26. solve $z + 2 = \frac{1}{4-3i}$, where z is a complex number

Watch Video Solution

27. Find real θ such that $\frac{3+2i\ s\int h\eta}{1-2i\ s\int h\eta}$ is purely real.

Watch Video Solution

28. If $x=\frac{1}{2}(5-3i)$, then find the value of $x^4-x^3-12x^2+23x+12$

Watch Video Solution

29. Find the square root of $7\backslash\quad 24i$

Watch Video Solution

30. Find the square root of $4+4\sqrt{3}i$

Watch Video Solution

31. Find square root of $8-15i$

Watch Video Solution

32. Find the square root of $7-30\sqrt{-2}$

Watch Video Solution

33. Find all possible values of $\sqrt{i}+\sqrt{-i}$.

Watch Video Solution

34. Find the square root of the following: $\frac{x^2}{y^2}+\frac{y^2}{x^2}-\frac{1}{i}\left(\frac{x}{y}-\frac{y}{x}\right)-\frac{9}{4}$

Watch Video Solution

35. If ω, ω^2 be imaginary cube root of unity then $\left(3+3\omega+5\omega^2\right)^6-\left(2+6\omega+2\omega^2\right)^3$ is equal to

Watch Video Solution

36. If, omega,omega^2 be the imaginary cube roots of unity, then prove that $(2-\omega)(2-\omega^2)(2-\omega^{10})(2-\omega^{11}) = 49$

Watch Video Solution

37. If ω is an imainary cube root of unity, then show that $(1-\omega)(1-\omega^2)(1-\omega^4)(1-\omega^5) = 9$

Watch Video Solution

38. If ω is an imainary cube root of unity, then show that $(1-\omega+\omega^2)^5 + (1+\omega-\omega^2)^5 = 32$

Watch Video Solution

39. Show that $\left(\frac{-1+\sqrt{3}i}{2}\right)^n + \left(\frac{-1-\sqrt{3i}}{2}\right)^n$ is equal to 2 when n is a multiple of 3 and 3 is equal to -1 when n is any other positive integer.

Watch Video Solution

40. If $1; w; w^2$ are cube root of unity and n is a positive integer;then $1 + w^n + w^{2n}$ = {3; When n is multiple of 3; 0; when n is not a multiple of 3

Watch Video Solution

41. If ω be an imaginary cube root of unity, show that $1 + \omega^n + \omega^I 2n = 0$, for $n = 2, 4$.

Watch Video Solution

42. (i) If α,β be the imaginary cube root of unity, then show that $\alpha^4+\beta^4+\alpha^{-1}\beta^{-1}=0$

Watch Video Solution

43. Prove that $x=\sqrt{-1-\sqrt{-1-\sqrt{-1-\ldots\to\infty}}}=\omega \text{ or } \omega^2$

Watch Video Solution

44. Prove that $x^{3p}+x^{3q+1}+x^{3r+2}$ is exactly divisible by x^2+x+1, if p,q,r is integer.

Watch Video Solution

45. Prove that $\left(\frac{i-\sqrt{3}}{-i+\sqrt{3}}\right)^{200}+\left(\frac{i-\sqrt{3}}{i+\sqrt{3}}\right)^{200}=-1$

Watch Video Solution

46. $x + \frac{1}{x} = 1$ then find the value of $x^{2000} + \frac{1}{x^{2000}}$

Watch Video Solution

47. If the cube roots of unity are $1, \omega, \omega^2$, then the roots of the equation $(x-1)^3 + 8 = 0$, arte

Watch Video Solution

48. If α , β , γ are cube roots of of, $p < 0$ then for any real x,y,z ; $\frac{x\alpha + y\beta + z\gamma}{x\beta + y\gamma + z\alpha}$=

Watch Video Solution

49. The value of $\frac{a + b\omega + c\omega^2}{b + c\omega + a\omega^2} + \frac{a + b\omega + c\omega^2}{c + a\omega + b\omega^2}$ (where $'\omega'$ is the imaginary cube root of unity), is $-\omega$ b. ω^2 c. 1 d. -1

Watch Video Solution

50. If $x^2 + x + 1 = 0$ then the value of $\left(x + \frac{1}{x}\right)^2 + \left(x^2 + \frac{1}{x^2}\right)^2 + \ldots + \left(x^{27} + \frac{1}{x^{27}}\right)^2$ is

Watch Video Solution

51. If $= a + b, y = a\omega + b\omega^2$ and $z = a\omega^2 + b\omega$, prove tht `xyz=a^3+b^3

Watch Video Solution

52. If $x = a + b, y = a\omega + b\omega^2, z = a\omega^2 + b\omega,$ prove that $x^3 + y^3 + z^3 = 3(a^3 + b^3)$

Watch Video Solution

53. ω is an imaginary root of unity. Prove that $(a + b\omega + c\omega^2)^3 + (a + b\omega^2 + c\omega^{\square})^3$

$= (2a - b - c)(2b - a - c)(2c - a - b)$.

Watch Video Solution

54. Resolve into linear factors $a^2 + b^2 + c^2 - ab - bc - ca$

Watch Video Solution

55. Find the complex conjugates of $2 + i5, \ -6 - i7 \text{ and } \sqrt{3}$

Watch Video Solution

56. Find the conjugate, modulus and argumetn of $\sqrt{2} - \sqrt{2i}$

Watch Video Solution

57. Find the conjuagate and modulus of the following complex number

$(3 - 2i)(3 + 2i)(1 + i)$

Watch Video Solution

58. Find the argument and the principal value of the argument of the complex number $z = \frac{2+i}{4i+(1+i)^2}$ where $i = \sqrt{-1}$

Watch Video Solution

59. Find the modulus and principal argument of the following complex number: $\frac{5}{2}(\cos 30^0 + i\sin 30^0)$

Watch Video Solution

60. Find the modulus and principal argument of the following complex number: $\cos 70^0 + i\cos 20^0$

Watch Video Solution

61. Show that if $iz^3 + z^2 - z + i = 0$, then $|z| = 1$

Watch Video Solution

62. For any two complex numbers z_1 and z_2 prove that: $|z_1 + z_2|^2 + |z_1 - z_2|^2 = 2\left[|z_1|^2 + |z_2|^2\right]$

Watch Video Solution

63. For any two complex numbers z_1 and z_2 prove that: $|z_1 + z_2|^2 = |z_1|^2 + |z_2|^2 + 2Re\bar{z}_1 z_2$

Watch Video Solution

64. If $|z_1| = |z_2| = \cdots |z_n| = 1$, prove that $|z_1 + z_2 + z_3 + \cdots + z_n| = \frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3} + \cdots + \frac{1}{z_n}$.

Watch Video Solution

65. If z is a complex number such that $|z| = 1$, prove that $\frac{z-1}{z+1}$ is purely imaginary, what will by your conclusion if $z = 1$?

Watch Video Solution

66. If $z_1 = 2 - i$, $z_2 = 1 + i$, find $\left|\frac{z_1 + z_2 + 1}{z_1 - z_2 + i}\right|$

Watch Video Solution

67. Find the number of non-zero integral solutions of the equation $|1 - i|^x = 2^x$.

Watch Video Solution

68. If α and β are different complex numbers with $|\beta| = 1$, then find $\left|\frac{\beta - \alpha}{1 - \overline{\alpha}\beta}\right|$.

Watch Video Solution

69. If $z = x + iy$ prove that $|x| + |y| \leq \sqrt{2}|z|$

Watch Video Solution

70. If $z = 2 - 3i$ show that $z^2 = 4z + 13 = 0$ and hence find the value of $4z^3 - 3z^2 + 169.$

Watch Video Solution

71. If z_1 and z_2 are two compled numbers such that $|z_1| = |z_2| + |z_1 - z_2|$ show that Im $\left(\frac{z_1}{z_2}\right) = 0$

Watch Video Solution

72. Show that for $z \varepsilon C$, $|z| = 0$ if and only if $z = 0$

Watch Video Solution

Watch Video Solution

73. Solve the equation $2z = |z| + 2i$, where z is a complex number.

Watch Video Solution

74. Express $\sin 30^0 + i\cos 30^0$ in polar form

Watch Video Solution

75. Write down the following complex number in polar form: Product of $2(\cos 30^0 + i\sin 30^0)$ and $3(\cos 90^0 + i\sin 90^0)$

Watch Video Solution

76. Write down the following complex number in polar form: Quotient of $12(\cos 150^0 + i\sin 150^0)$ and $3(\cos 60^0 + i\sin 60^0)$

Watch Video Solution

Watch Video Solution

77. Express the following complex number in the polar form: (i) $\frac{1+7i}{(2-i)^2}$ (ii) $\frac{1+3i}{1-2i}$

Watch Video Solution

78. If $\sqrt{a}+ib=x+iy$ prove that $\sqrt{a}-ib=x-iy$

Watch Video Solution

79. $(x+iy)^{\frac{1}{3}}=(a+ib)$ then prove that $\left(\frac{x}{a}+\frac{y}{b}\right)=4(a^2-b^2)$

Watch Video Solution

80. If $(x+iy)=\sqrt{\frac{a+ib}{c+id}}$ then prove that $(x^2+y^2)^2=\frac{a^2+b^2}{c^2+d^2}$

Watch Video Solution

81. if $\frac{3}{2+\cos\theta+i\sin\theta}=a+ib$ then prove that $a^2+b^2=4a-3$

Watch Video Solution

82. Show that:

$$\left(x^2+y^2\right)^5=\left(x^5-10x^3y^2+5xy^4\right)^2+\left(5x^4-10x^2y^3+y^5\right)^2$$

Watch Video Solution

83. Express $\left(1+a^2\right)\left(1+b^2\right)\left(1+c^2\right)$ as the sum of two squares.

Watch Video Solution

84. If $(1+x)^n=a_0+a_1x+a_2x^2+\ldots.+a_nx^n,$ then $(a_0-a_2+\ldots..)^2+(a_1-a_3+\ldots..)^2$ is equal to (A)3^n (B) 2^n (C) $\left(\frac{1-2^n}{1+2^n}\right)$ (D) none of these

Watch Video Solution

85. Show that the points representing the compled numbers $(3+2i), (2-i)$ and $-7i$ are collinear

Watch Video Solution

86. Show that ehpohnts representing the fcomplex numbers $3+2i, 5i, -3+2i$ and $i-$ form a square

Watch Video Solution

87. If z_1, z_2, z_3 are three complex numbers such that there exists a complex number z with $|z_1 - z| = |z_2 - z| = |z_3 - z|$ show that z_1, z_2, z_3 lie on a circle in the Argand diagram.

Watch Video Solution

88. Show that the area of the triangle on the Argand diagram formed by the complex number $z, izandz + iz$ is $\frac{1}{2}|z|^2$

Watch Video Solution

89. Complex numbers z_1, z_2, z_3 are the vertices A, B, C respectively of an isosceles right angled trianglewith right angle at C and $(z_1 - z_2)^2 = k(z_1 - z_3)(z_3 - z_2)$, then find k.

Watch Video Solution

90. If z_1, z_2, z_3 are the vertices of an isosceles triangle right angled at z_2, then prove that $(z_1)^2 + 2(z_2)^2 + (z_3)^2 =$

Watch Video Solution

Exercise

1. write the following as complex numbers : $\sqrt{-27}$

Watch Video Solution

2. Write the complex number: $\sqrt{-16}$

Watch Video Solution

3. Write the complex number: $4+\sqrt{-5}$

Watch Video Solution

4. Write the complex number: $-1-\sqrt{-5}$

Watch Video Solution

5. Write the complex number: $1+\sqrt{-1}$

Watch Video Solution

6. Write the real and imaginary parts of the complex number: $2 - i\sqrt{2}$

Watch Video Solution

7. Write the real and imaginary parts of the complex number: $-\frac{\frac{1}{5} + i}{i}$

Watch Video Solution

8. Write the real and imaginary parts of the complex number: $\frac{\sqrt{5}}{7}i$

Watch Video Solution

9. Write the real and imaginary part of the complex number: $\sqrt{37} + \sqrt{-19}$

Watch Video Solution

10. Write the real and imaginary parts of the complex number: $\frac{\sqrt{37}}{3} + \frac{3}{\sqrt{70}}i$

Watch Video Solution

11. Find the additive inverse of the following: $-5 + 7i$

Watch Video Solution

12. Find the additive inverse of the following: $4 - 3i$

Watch Video Solution

13. Find the additive inverse of the following: 10

Watch Video Solution

14. Find the sum of the following numbers $\frac{2}{3}+\frac{5}{3}i, -\frac{2}{3}i$ and $-\frac{5}{4}-i$

Watch Video Solution

15. Find the difference of the following complex number, $-3+2i$ and $13-i$

Watch Video Solution

16. Fidnthe difference of the complex numbers: $1-i$ and $-1+6i$

Watch Video Solution

17. Find the product and quotient of the complex numbers $1+i$ and $3+i$. Find multiplicative inverse of the following.

Watch Video Solution

18. Find multiplicative inverse of the following: $2+\sqrt{3}i$

Watch Video Solution

19. Find multiplicative inverse of the following: $-3+4i$

Watch Video Solution

20. Find multiplicative inverse of the following: $-i$

Watch Video Solution

21. Find the multiplicative inverse of the complex number $4 \quad 3i$

Watch Video Solution

22. Find multiplicative inverse of the following: $(\sqrt{5}+i3)$

Watch Video Solution

23. Find multiplicative inverse of the following: $2-4i$

Watch Video Solution

24. Prove that $Re(z_1z_2) = Rez_1Rez_2 - Imz_1Imz_2$,

Watch Video Solution

25. Let $z_1 = 2-i, z_2 = -2+i$. Find (i) Re $\left(\frac{z_1z_2}{\bar{z}_1}\right)$ (ii) Im $\left(\frac{1}{z_1\bar{z}_1}\right)$

Watch Video Solution

26. Let $z_1 = 2-i, z_2 = -2+i$. Find (i) Re $\left(\frac{z_1z_2}{\bar{z}_1}\right)$ (ii) Im $\left(\frac{1}{z_1\bar{z}_1}\right)$

Watch Video Solution

27. Express the following in the form a+ib: $(3+2i)(3-2i)$

Watch Video Solution

28. Express the following in the form a+ib: $(i-2)^2$

Watch Video Solution

29. Express the following in the form a+ib: $\frac{2-i}{4+3i}$

Watch Video Solution

30. Express the following in the form a+ib: $\frac{1+2i+3i^2}{1-2i+3i^2}$

Watch Video Solution

31. Express the following in the form a+ib: $\left(\frac{1+i}{1-i}\right)^2$

Watch Video Solution

32. Express the following in the form a+ib: $\left(\frac{1+2i}{2+i}\right)^2$

Watch Video Solution

33. Express the following in the form a+ib: $\frac{6+3i}{2-i}$

Watch Video Solution

34. Express the following complex numbers in the standard form $a+ib$: $\frac{5+\sqrt{2}i}{1-\sqrt{2}i}$

Watch Video Solution

35. simplify the following $2i^2 + 6i^3 + 3i^{16} - 6i^{19} + 4i^{25}$

Watch Video Solution

36. $1 + i^{10} + i^{110} + i^{1000}$

Watch Video Solution

37. Find the value of $i^n + i^{n+1} + i^{n+2} + i^{n+3}$ for all $n \in N$.

Watch Video Solution

38. $\left\{ i^{17} - \left(\frac{1}{i} \right)^{34} \right\}^2$

Watch Video Solution

39. $(-i)^{4n+3}$, where n Is a positive integer.

Watch Video Solution

40. $\left(\frac{1+i}{1-i}\right)^{4n+1}$ where n is a positive integer.

Watch Video Solution

41. Simplify the following: $(2i)^3$

Watch Video Solution

42. Simplify the following: $(8i)\left(-\frac{1}{8}i\right)$

Watch Video Solution

43. Simplify the following: $(5i)\left(-\frac{3}{5}i\right)$

Watch Video Solution

44. Simplify the following: $(-5i)\left(\frac{1}{8}i\right)$

Watch Video Solution

45. Simplify the following: $(-i)(2i)\left(-\frac{1}{8}i\right)^3$

Watch Video Solution

46. Simplify the following: i^{-35}

Watch Video Solution

47. Simplify the following: i^{-39}

Watch Video Solution

48. $i^9 + i^{19}$

Watch Video Solution

49. Evaluate : $\left[i^{18}+\left(\frac{1}{i}\right)^{25}\right]^{3}$

Watch Video Solution

50. Simplify the following: $i^{6}+i^{8}$

Watch Video Solution

51. $i+i^{2}+i^{3}+i^{4}$

Watch Video Solution

52. $i^{12}+i^{13}+i^{14}+i^{15}$

Watch Video Solution

53. Simplify the following: $i^4 + i^8 + i^{12} + i^{16}$

Watch Video Solution

54. Write the following in the form $a + ib$: $\frac{1}{(2+i)^2} - \frac{1}{(2-i)^2}$.

Watch Video Solution

55. Express of the complex number in the form $a + ib$. $\left(\frac{1}{5} + i\frac{2}{5}\right) - \left(4 + i\frac{5}{2}\right)$

Watch Video Solution

56. The from $a + ib$: $(7 - i2) - (4 + i) + (-3 + i5)$

Watch Video Solution

57. Express the following in the form a+ib: $\left[\left(\frac{1}{3}+i\frac{7}{3}\right)+\left(4+i\frac{1}{3}\right)\right]-\left(-\frac{4}{3}+i\right)$

Watch Video Solution

58. $\int(iv)i^3+(6+i3)-(20+i5)+(14+i3)$ +i (iv) 3+(6+ i3)- (20+i5)+ (14+i3)

Watch Video Solution

59. $(7+i5)(7-i5)$

Watch Video Solution

60. Express the following in the form a+ib: $3i^3\left(15i^6\right)$

Watch Video Solution

61. Express the following in the form a+ib: $\sqrt{3}+(3-i2)-(3-i2)$

Watch Video Solution

62. Express the following in the form a+ib: $(1+i)^4$

Watch Video Solution

63. Express the following in the form a+ib: $\left(\frac{1}{2}+i2\right)^3$

Watch Video Solution

64. Express the following in the form a+ib: $\left(-2-i\frac{1}{3}\right)^3$

Watch Video Solution

65. Express each of the following in the form $a + ib$: $3(7 + 7i) + i(7 + 7i)$

Watch Video Solution

66. Express the following in the form a+ib: $(3 + 5i)(2 + 6i)$

Watch Video Solution

67. Express the following in the form a+ib: $\left(\frac{1}{3} + 3i\right)^3$

Watch Video Solution

68. Express the following in the form a+ib: $(5 - 3i)^3$

Watch Video Solution

69. Express the following in the form a+ib: $(1-i)^4$

Watch Video Solution

70. Find the following as a single complex number $x+iy$

$(\sqrt{6}+i5)\left(\sqrt{6}-i\frac{1}{5}\right)$

Watch Video Solution

71. 3. Find the following as a single complex number x+ iy

$(5+i9)(-3+i4)$

Watch Video Solution

72. $\left[\left(\sqrt{5}+\frac{i}{2}\right)(\sqrt{5}-i2)\right] \div (6+i5)$

Watch Video Solution

73. $\dfrac{\left[\left(\sqrt{2}+i\sqrt{3}\right)+\left(\sqrt{2}-i\sqrt{3}\right)\right]}{\left[\left(\sqrt{3}+1\sqrt{2}\right)+\left(\sqrt{3}-1\sqrt{2}\right)\right]}$

Watch Video Solution

74. Express each one of the following in the standard form $a+ib$: $\dfrac{\left(3+i\sqrt{5}\right)\left(3-i\sqrt{5}\right)}{\left(\sqrt{3}+\sqrt{2}i\right)-\left(\sqrt{3}-i\sqrt{2}\right)}$.

Watch Video Solution

75. Express the following complex numbers in the standard form $a+ib$: $\left(\dfrac{1}{1-4i}-\dfrac{2}{1+i}\right)\left(\dfrac{3-4i}{5+i}\right)$

Watch Video Solution

76. If $\left(\dfrac{1+i}{1-i}\right)^m=1$, then find the least positive integral value of m.

Watch Video Solution

77. Find x and y if: (i)$(x+iy)+(7-5i)=9+4i$

Watch Video Solution

78. Find x and y if: $(x+iy)(2+3i)=4+i$

Watch Video Solution

79. Find x and y if: $\left(\frac{3}{\sqrt{5}}x-5\right)+i2\sqrt{5}y=\sqrt{2}$

Watch Video Solution

80. $4x+i(3x-y)=3-i6$

Watch Video Solution

81. Find x and y if: $(3y-2)+i(7-2x)=0$

Watch Video Solution

82. If $a=\frac{1+i}{\sqrt{2}}$ find the value of $a^6+a^4+a^2+1$

Watch Video Solution

83. If $x=\sqrt{-2}-1$ find he value of $x^4+4x^3+6x^2+4x+9$

Watch Video Solution

84. If $x=3+4i$ find the value of $x^4-12x^3-70x^2-204x+225$

Watch Video Solution

85. If $x=3+2i$ find the value of $x^4-4x^3+4x^2+8x+39$

Watch Video Solution

86. Find the square root of $7\backslash \quad 24i$

Watch Video Solution

87. Find the square roots of the following: $15\backslash \quad 8i$

Watch Video Solution

88. Find the square root of the following: i

Watch Video Solution

89. Find the square root of the following: $1+i$

Watch Video Solution

90. Find the square root of the following complex number: $1 - i$

Watch Video Solution

91. Find the square root of the following complex number: $-11 - 60\sqrt{-1}$

Watch Video Solution

92. Find the square root of the following complex number: $-8 - 6i$

Watch Video Solution

93. Find square root of the following complex numbers (1) -5+12i

Watch Video Solution

94. Find the square root of $12 + 4\sqrt{5}$

Watch Video Solution

95. find the square roots of following : $\left(6\sqrt{-2} - 7\right)$

Watch Video Solution

96. The square root of $4ab - 2i\left(a^2 - b^2\right)$

Watch Video Solution

97. Find the square root of the following: $\frac{x^2}{y^2} + \frac{y^2}{x^2} - \frac{1}{i}\left(\frac{x}{y} - \frac{y}{x}\right) - \frac{9}{4}$

Watch Video Solution

98. Square root of $\left(x^2+\frac{1}{x^2}\right)-\frac{4}{i}\left(x-\frac{1}{x}\right)-6$ is

Watch Video Solution

99. Find the square root of the following: $a^2-1+2a\sqrt{-1}$

Watch Video Solution

100. Find the square root of the following: $a^2-1+2a\sqrt{-1}$

Watch Video Solution

101. Find $\sqrt{2+3\sqrt{-5}}+\sqrt{2-3\sqrt{-5}}$

Watch Video Solution

102. Find the value of$(i)\omega^{21}(ii)\omega^{18}$

Watch Video Solution

103. Find the value of: ω^{768}

Watch Video Solution

104. Find the value of: ω^{-105}

Watch Video Solution

105. Find the value of: ω^{-105}

Watch Video Solution

106. Find the value of: ω^{-364}

Watch Video Solution

107. Find the value of: ω^{-30}

Watch Video Solution

108. if $\alpha = \frac{-1+\sqrt{-3}}{2}, \beta = \frac{-1-\sqrt{-3}}{2}$ then prove that $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} + 1 = 0$

Watch Video Solution

109. If ω be an imaginary cube root of unity, show that $(1+\omega-\omega^2)(1-\omega+\omega^2) = 4$

Watch Video Solution

110. If $1, \omega, \omega^2$ be three roots of 1, show that: $(3+\omega+3\omega^2)^6 = 64$

Watch Video Solution

111. If ω be an imaginary cube root of unity, show that $(1+\omega-\omega^2)(1-\omega+\omega^2)=4$

Watch Video Solution

112. If $1, \omega, \omega^2$ be three roots of 1, show that: $(1-\omega+\omega^2)^2+(1+\omega-\omega^2)^2=-4$

Watch Video Solution

113. If $1, \omega, \omega^2$ be three roots of 1, show that: $(1+\omega)^3-(1+\omega^2)^3=0$

Watch Video Solution

114. evaluate $\sqrt{-2+2\sqrt{-2+2\sqrt{-2+\ldots\ldots\ldots\ldots\infty}}}$

Watch Video Solution

115. show that $\left(\frac{\sqrt{3}+i}{2}\right)^6 + \left(\frac{i-\sqrt{3}}{2}\right)^6 = -2$

Watch Video Solution

116. If $1, \omega, \omega^2$ be the three cube roots of 1, then show that: $(1+\omega)(1+\omega^2)(1+\omega^4)(1+\omega^5) = 1$

Watch Video Solution

117. If $1, \omega, \omega^2$ be the three cube roots of 1, then show that: $(1+\omega)(1+\omega^2)(1+\omega^4)(1+\omega^8) = 1$

Watch Video Solution

118. $(2+\omega+\omega^2)^3 + (1+\omega-\omega^2)^3 = (1-3\omega+\omega^2)^4 = 1$

Watch Video Solution

119. If ω is complex cube root of unity $(1-\omega+\omega^2)(1-\omega^2+\omega^4)(1-\omega^4+\omega^8)(1-\omega^8+\omega^{16})$

Watch Video Solution

120. If $a+b+c=0$ and ω, ω^2 are imaginary cube roots of unity, then $(a+b\omega+c\omega^2)^2+(a+b\omega^2+c\omega)^3=$ 3abc (b) 6abc (c) 9 abc (d) 27 abc

Watch Video Solution

121. If ω be an imaginary cube root of unity, show that $\frac{a+b\omega+c\omega^2}{a\omega+b\omega^2+c}=\omega^2$

Watch Video Solution

122. If ω be an imaginary cube root of unity, show that $1+\omega^n+\omega^{2n}=0$, for $n=2, 4$.

Watch Video Solution

123. Resolve into linear factors:$a^2 - ab + b^2$

Watch Video Solution

124. Resolve into the linear factor: $a^2 + ab + b^2$

Watch Video Solution

125. Resolve into the linear factor: $a^3 + b^3$

Watch Video Solution

126. Resolve into linear factors:$a^3 - b^3$

Watch Video Solution

127. Resolve into the linear factor: $a^3 + b^3 + c^3 - 3abc$

Watch Video Solution

128. If $x = a + b, y = a\omega + b\omega^2$ and $z = a\omega^2 + b\omega$ where ω is an imaginary cube root of unity, prove that $x^2 + y^2 + z^2 = 6ab$.

Watch Video Solution

129. If ω be an imaginary cube root of unity, show that: $\frac{1}{1+2\omega} + \frac{1}{2+\omega} - \frac{1}{1+\omega} = 0.$

Watch Video Solution

130. Find the cube roots of following:8 and -8

Watch Video Solution

131. Find the cube roots of following:8 and -8

Watch Video Solution

132. Find the modulus of the following : $\frac{1-i\sqrt{3}}{2+2i}$

Watch Video Solution

133. Find the modulus of following: $\frac{2+i}{4i+(1+i)^2}$

Watch Video Solution

134. Find the modulus of $\frac{1+i}{1-i}-\frac{1-i}{1+i}$.

Watch Video Solution

135. Find the modulus and argument of each of the following complex number: $-\sqrt{3}-i$

Watch Video Solution

136. Find the argument of the following: $\frac{1+i}{-\sqrt{3}i}$

Watch Video Solution

137. Find the modulus and the arguments of the complex number $z = 1 \quad i\sqrt{}$

Watch Video Solution

138. Find the modulus and argument of the following complex number: $z = -\sqrt{3}+i$

Watch Video Solution

139. Find the modulus and argument of the following complex number:

$$z = \frac{(1+i)^{13}}{(1-i)^{7}}$$

Watch Video Solution

140. Find the modulus and argument of the following complex number:

$$\frac{1}{1+i}$$

Watch Video Solution

141. Find the modulus and argument of the following complex number:

$$\frac{1+i}{1-i}$$

Watch Video Solution

142. Find the modulus and argument of the complex number $\frac{1+2i}{1-3i}$.

Watch Video Solution

143. Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$.

Watch Video Solution

144. Find the real numbers x and y if $(x-iy)(3+5i)$ is the conjugate of $-6-24i$.

Watch Video Solution

145. If $|2z-1| = |z-2|$ prove that $|z| = 1$ where z is a complex

Watch Video Solution

146. If $z = x + iyandw = \frac{1-iz}{z-i}$, show that $|w| = 1z$ is purely real.

Watch Video Solution

147. If $|z-5i| = |z+5i$, then the locus of z.

Watch Video Solution

148. If $|z| \leq 4$ then find the maximum value of $|iz+3-4i|$

Watch Video Solution

149. If $|z| \leq 4$ then find the maximum value of $|iz+3-4i|$

Watch Video Solution

150. $z_1 8 z z_2, \left|1-z_1(\&z)_2\right|^2 - \left|z_1-z_2\right|^2 = \left(1-\left|z_1\right|^2\right)\left(1-\left|z_2\right|^2\right)$

Watch Video Solution

151. If z_1and z_2 are any two complex numbers show that $|z_1 + z_2|^2 + |z_1 - z_2|^2 = 2|z_1|^2 + 2|z_2|^2$

Watch Video Solution

152. Solve the equation $|z| + z = 2 + i$

Watch Video Solution

153. Change the following complex numbers to Cartesiasn form: $2(\cos 0^0 + i\sin 0^0)$

Watch Video Solution

154. Change the following complex numbers to Cartesiasn form: $5(\cos 270^0 + i\sin 270^0)$

Watch Video Solution

155. Change the following complex numbers to Cartesiasn form: $4(\cos 300^0 + i\sin 300^0)$

Watch Video Solution

156. Write the number $z = \left(i - \sqrt{3}\right)^{13}$ in algebraic form.

Watch Video Solution

157. Write the following complex numbers in the polar form: $1 + i$

Watch Video Solution

158. Put the following numbers in the polar form: $-1 - \sqrt{3}i$

Watch Video Solution

159. Write the following complex numbers in the polar form: $1 - i$

Watch Video Solution

160. Put the following numbers in the polar form: -3

Watch Video Solution

161. Put the following numbers in the polar form: $-1 + i$

Watch Video Solution

162. Write the following complex numbers in the polar form: $-1 - i$

Watch Video Solution

163. Convert of the complex number in the polar form: $\sqrt{} + i$

Watch Video Solution

164. Put the following numbers in the polar form: $-4+i4\sqrt{3}$

Watch Video Solution

165. Put the following numbers in the polar form: i

Watch Video Solution

166. Put the following numbers in the polar form: $\left(\frac{2+i}{3-i}\right)^2$

Watch Video Solution

167. Represent the complex number $z = 1 + i\sqrt{3}$ in the polar form.

Watch Video Solution

168. Convert $\frac{1+3i}{1-2i}$ into the polar form.

Watch Video Solution

169. Put the following numbers in the polar form: $\frac{-16}{1+i\sqrt{3}}$

Watch Video Solution

170. Give the following products in polar form: $[2(\cos 0^0 + i\sin 0^0][4(\cos 90^0 + i\sin 90^0)]$

Watch Video Solution

171. Give the following products in polar form: $[3(\cos 225^0 + i\sin 225^0)][6(\cos 45^0 + i\sin 45^0)]$

Watch Video Solution

172. Give the following products in polar form:

$$\left[2\left(\cos 210^0 + i\sin 210^0\right)\right]\left[4\left(\cos 120^0 + i\sin 120^0\right)\right]$$

Watch Video Solution

173. अग्रलिखित को ध्रुवीय रूप में प्रदर्शित कीजिए:

$$\frac{7(\cos 135^\circ + i\sin 135^\circ)}{14(\cos 90^\circ + i\sin 90^\circ)}.$$

Watch Video Solution

174. Give the following quotients in polar form: $\dfrac{9\left(\cos 90^0 + i\sin 90^0\right)}{3\left(\cos 45^0 + i\sin 45^0\right)}$

Watch Video Solution

175. Write the complex number $z = \dfrac{i-1}{\frac{\cos\pi}{3} + i\frac{\sin\pi}{3}}$ in polar form.

Watch Video Solution

176. If $\frac{a+ib}{c+id} = x+iy,$ prove that(i) $\frac{a-ib}{c-id} = (x-iy)$ (ii) $\frac{a^2+b^2}{c^2+d^2} = (x^2+y^2)$

Watch Video Solution

177. If $\frac{a+ib}{c+id} = x+iy,$ prove that(i) $\frac{a-ib}{c-id} = (x-iy)$ (ii) $\frac{a^2+b^2}{c^2+d^2} = (x^2+y^2)$

Watch Video Solution

178. If x is real and $\frac{1-ix}{1+ix} = m+in,$ show that $m^2+n^2=1.$

Watch Video Solution

179. If $x+iy = \frac{a+ib}{a-ib}$ prove that $x^2+y^2=1$

Watch Video Solution

180. If $(a+ib)(c+id)(e+\text{if})(g+ih)=A$, then show that $(a^2+b^2)(c^2+d^2)(e^2+f^2)(g^2+h^2)=A^2+B^2$

Watch Video Solution

181. If $a+ib=\frac{(x+i)^2}{2x^2+1}$, prove that $a^2+b^2=\frac{(x^2+1)^2}{(2x^2+1)^2}$

Watch Video Solution

182. If $\frac{1}{m+in}-\frac{x-iy}{x+iy}=0, where x, y, m, n$ are real and $x+iy\neq 0$ and $m+in\neq 0$, prove that $m^2+n^2=1$.

Watch Video Solution

183. if $\left(1+i\frac{x}{a}\right)\left(1+i\frac{x}{b}\right)\left(1+i\frac{x}{c}\right)\ldots=A+iB$ then prove that $\left(1+\frac{x^2}{a^2}\right)\left(1+\frac{x^2}{b^2}\right)\left(1+\frac{x^2}{c^2}\right)\ldots=A^2+B^2$

Watch Video Solution

184. If $\frac{a-ib}{a+ib}=\frac{1+i}{1-i}$, then show that $a+b=0$

Watch Video Solution

185. Express $\left(1+a^2\right)\left(1+b^2\right)$ as the sum of two squares.

Watch Video Solution

186. Express $\left(1+a^2\right)\left(1+b^2\right)\left(1+c^2\right)$ as the sum of two squares.

Watch Video Solution

187. Show that $\left(x^2+y^2\right)^4=\left(x^4-6x^2y^2+y^4\right)^2+\left(4x^3y-4xy^3\right)^2.$

Watch Video Solution

188. Plot the following numbers nd their complex conjugates on a complex number plane $4-3i$

Watch Video Solution

189. Plot the following numbers nd their complex conjugates on a complex number plane : 1

Watch Video Solution

190. Plot the following numbers nd their complex conjugates on a complex number plane : i

Watch Video Solution

191. Plot the following numbers nd their complex conjugates on a complex number plane $-\frac{4}{3}i$

Watch Video Solution

192. Plot the following numbers nd their complex conjugates on a complex number plane : $\sqrt{-3}$

Watch Video Solution

193. Plot the following numbers nd their complex conjugates on a complex number plane : $\frac{\sqrt{-3}}{2}+\frac{i}{2}$

Watch Video Solution

194. Plot all the complex numbers in the complex number plane whose asbsolute value is 5.

Watch Video Solution

195. show that the points representing the complex numbers $3+4i, 8-6i \text{ and } 13+9i$ are the vertices of a right angled triangle.

Watch Video Solution

196. Prove that the points representing the complex numbers $4+3i, 6+4i, 5+6i, 3+5i$ are the vertices of a square.

Watch Video Solution

197. Prove that the points $(4,\ 5),\ (7,\ 6),\ (6,\ 3),\ (3,\ 2)$ are the vertices of a parallelogram. Is it a rectangle.

Watch Video Solution

198. A variable complex number $z = x + iy$ is such that arg $\frac{z-1}{z+1} = \frac{\pi}{2}$. Show that $x^2 + y^2 - 1 = 0$.

Watch Video Solution

199. Find the locus of point z in the Argand plane if $\frac{z-1}{z+1}$ is purely imaginary.

Watch Video Solution

200. If the points $(2, 1)$ and $(1, -2)$ are equidistant from the point (x, y) , show that $x + 3y = 0$.

Watch Video Solution

201. The complex numbers $z = x + iy$ which satisfy the equation $\left|\frac{z-5i}{z+5i}\right| = 1$ lie on (a) The x-axis (b) The straight line $y = 5$ (c) A circle passing through the origin (d) Non of these

Watch Video Solution