MATHS

BOOKS - PSEB

COMPLEX NUMBERS AND QUADRATIC EQUATIONS

Exercise

1. Express the complex number given below in the form $a + ib$:- $(5i)\left(-\frac{3}{5}i\right)$

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2. Express the complex number given below in the form $a + ib$:- $i^9 + i^{19}$

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3. Express the complex number given below in the form $a + ib$:- i^{-39}

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4. Express the complex number given below in the form $a + ib$:- $3(7 + i7) + i(7 + i7)$

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5. Express the complex number given below in the form $a + ib$:- $(1 - i) - (-1 + i6)$

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

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

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8. Express the complex number given below in the form $a + ib$:- $(1 - i)^4$

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9. Express the complex number given below in the form $a + ib$:- $\left(\frac{1}{3} + 3i\right)^3$

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10. Express the complex number given below in the form $a + ib$:- $\left(-2 - \frac{1}{3}i \right)^3$

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11. Find the multiplicative inverse of the complex numbers given below:- $4 - 3i$

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12. Find the multiplicative inverse of the complex numbers given below:- $\sqrt{5}+3i$

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13. Find the multiplicative inverse of the complex numbers given below:- $-i$

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14. Express the following expression in the form of $a + ib$: $\frac{\left(3 + i\sqrt{5}\right)\left(3 - i\sqrt{5}\right)}{\left(\sqrt{3} + \sqrt{2}i\right) - \left(\sqrt{3} - i\sqrt{2}\right)}$

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15. Find the modulus and the arguments of the complex numbers given below:- $z = -1 - i\sqrt{3}$

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16. Find the modulus and the arguments of the complex numbers given below:- $z = -\sqrt{3} + i$

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17. Convert the complex numbers given below in the polar form: $1 - i$

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18. Convert the complex numbers given below in the polar form: $-1 + i$

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19. Convert the complex numbers given below in the polar form: $-1-i$

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20. Convert the complex numbers given below in the polar form: -3

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21. Convert the complex numbers given below in the polar form: $\sqrt{3} + i$

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22. Convert the complex numbers given below in the polar form: i

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23. Solve the following equation :- $x^2 + 3 = 0$

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24. Solve the following equation :-

$2x^2 + x + 1 = 0$

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25. Solve the following equation :-

$x^2 + 3x + 9 = 0$

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26. Solve the following equation :-

$-x^2 + x - 2 = 0$

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27. Solve the following equation :-

$x^2 + 3x + 5 = 0$

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28. Solve the following equation :-

$x^2 - x + 2 = 0$

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29. Solve the following equation :-

$\sqrt{2}x^2 + x + \sqrt{2} = 0$

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30. Solve the following equation :-

$\sqrt{3}x^2 - \sqrt{2}x + 3\sqrt{3} = 0$

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31. Solve the following equation :-

$$x^2 + x + \frac{1}{\sqrt{2}} = 0$$

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32. Solve the following equation :-

$$x^2 + \frac{x}{\sqrt{2}} + 1 = 0$$

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

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34. For any two complex numbers z_1 and z_2, prove that $Re(z_1 z_2) = Rez_1 Rez_2 - Imz_1 Imz_2$

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35. Reduce $\left(\frac{1}{1-4i} - \frac{2}{1+i}\right)\left(\frac{3-4i}{5+i}\right)$ to the standard form .

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

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37. Convert the following in the polar form:

$$\frac{1 + 7i}{(2 - i)^2}$$

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38. Convert the following in the polar form:

$$\frac{1+3i}{1-2i}$$

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39. Solve the equation given below:-

$$3x^2 - 4x + \frac{20}{3} = 0$$

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40. Solve the equation given below:-

$$x^2 - 2x + \frac{3}{2} = 0$$

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41. Solve the equation given below:-

$27x^2 - 10x + 1 = 0$

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42. Solve the equation given below:-

$21x^2 - 28x + 10 = 0$

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

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

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

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

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

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

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

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50. If $(x + iy)^3 = u + iv$, then show that $\frac{u}{x} + \frac{v}{y} = 4(x^2 - y^2)$

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

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

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

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

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