MATHS

BOOKS - JBD PUBLICATION

COMPLEX NUMBERS AND QUADRATIC EQUATIONS

Exercise

1. If Z=7+24i, them |Z| is equal to:

A. 31

B. 7

C. 24

D. 25

Answer:

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2. i^{-39} is equal to

A. $-i$

B. 1

C. -1

D. i

Answer:

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3. The modulus and argument of complex number $-1+\sqrt{3i}$ are:

A. $\left(2, \frac{\pi}{3}\right)$

B. $\left(-2, \frac{\pi}{3}\right)$

C. $\left(2, \frac{2\pi}{3}\right)$

D. $\left(2, -\frac{\pi}{3}\right)$

Answer:

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4. Which of the following is not applicable for a complex number?

A. addition

B. subtraction

C. division

D. Inequality

Answer:

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5. The conjugate of $\frac{1}{2+i}$ is

A. $\frac{2+i}{5}$

B. $\frac{2-i}{5}$

C. $\frac{i-2}{5}$

D. $-\frac{2+i}{5}$

Answer:

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6. If $\left[\frac{1-i}{1+i}\right]^{100} = a + ib$ then the possible values of a and b are:

A. a=0, b=1

B. a=1, b=0

C. a=2, b=-1

D. none of these

Answer:

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7. The real quadratic equation whose one root is, $2-\sqrt{3}$ is

A. $x^2-4x-1=0$

B. $x^2+4x-1=0$

C. $x^2-4x+1=0$

D. none of these

Answer:

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8. Root of the equation is $3^{x-1}+3^{1-x}=2$ is

A. 0

B. 1

C. 2

D. 3

Answer:

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9. If α, β are the roots of the equation $x^2 - 2x + 2 = 0$, then the value of $\alpha^2 + \beta^2$ is

A. -1

B. 1

C. 0

D. ± 1

Answer:

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10. The value of $(i)^{19}$ is:

A. i

B. -1

C. 0

D. 1

Answer:

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11. If $\left[\frac{1+i}{1-i}\right]^m = 1$ then the least value of m is:

A. 2

B. 6

C. 8

D. 4

Answer:

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12. If $z = 1 - \cos\theta + i\sin\theta$, then |z| is equal to:

A. $2\sin\left(\frac{\theta}{2}\right)$

B. $2\cos\left(\frac{\theta}{2}\right)$

C. $2\left|\sin\left(\frac{\theta}{2}\right)\right|$

D. none of these

Answer:

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13. If $z = \frac{1}{1 - \cos\theta - i\sin\theta}$, then Re(z) is equal to:

A. 0

B. $\frac{1}{2}$

C. $\cot\left(\frac{\theta}{2}\right)$

D. $\frac{1}{2}\cot\left(\frac{\theta}{2}\right)$

Answer:

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14. The value of $(1+i)^3-(1-i)^3$ is:

A. 4i

B. 4

C. $-4-2i$

D. 4

Answer:

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15. The value of $\left(2+\sqrt{3}\right)\left(2-\sqrt{3}\right)$ is:

A. 7

B. 3

C. -7

D. none of these

Answer:

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16. If $\frac{1-i}{1+i} = x + iy$, then $x^2 + y^2$ is equal to:

A. 1

B. -1

C. 0

D. none of these

Answer:

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17. The value of $(1+i)(1+i)^2(1+i)^3(1+i^4)$ is:

A. 2

B. 0

C. 1

D. i

Answer:

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18. If the conjugate of a complex numbers is $\frac{1}{i-1}$, where $i = \sqrt{-1}$. Then, the complex number is

A. $\frac{1}{i-1}$

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

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

D. none of these

Answer:

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19. The amplitude of $\frac{1}{i}$ is equal to:

A. π

B. $-\frac{\pi}{2}$

C. $\frac{\pi}{2}$

D. none of these

Answer:

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20. The value of $\frac{1-i}{1+i}$ is:

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21. The value of $\left(i^5+i^6+i^7+i^8+i^9\right)(1+i)$ is:

A. $\frac{1}{2}(1+i)$

B. $\frac{1}{2}(1-i)$

C. $\frac{1}{2}$

D. none of these

Answer:

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22. The value of $(1+i)^4+(1-i)^4$ is:

A. 8

B. 4

C. -8

D. none of these

Answer:

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23. The values of p for which the quadratic equation $px^2 + 2x + p = 0$ has real roots are:

A. $-1 \leq p \leq 1$

B. $p \leq 1$

C. $p \leq -1$

D. none of these

Answer:

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24. If α and β are the roots of the equations $x^2 - p(x+1) - c = 0$, then $(\alpha+1)(\beta+1)$ is equal to:

A. c

B. c-1

C. 1-c

D. none of these

Answer:

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25. The least value of p which makes the roots of the equations $x^2 + 5x + p = 0$ imaginary is:

A. 4

B. 5

C. 6

D. 7

Answer:

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26. If the roots of $x^2 - bx + c = 0$ are two consecutive integers, then $b^2 - 4c$ is

A. 1

B. 2

C. 3

D. none of these

Answer:

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27. If one root of the equation $x^2 + px + 12 = 0$ is 4, while the equation $x^2 + px + q = 0$ has equal roots, then the value of q is:

A. $\frac{39}{4}$

B. $\frac{49}{4}$

C. 12

D. none of these

Answer:

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28. Real roots of the equation

$x^{\frac{2}{3}} + x^{\frac{1}{3}} - 2 = 0$ are:

A. 1,-8

B. $-1, 8$

C. 1,8

D. none of these

Answer:

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29. If one root of the equation $x^2 + px + q = 0$ is $2 + \sqrt{3}$, then values of p and q is:

A. 4,1

B. 4,-1

C. $2, \sqrt{3}$

D. none of these

Answer:

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30. The value of k for which one of the roots a $x^2 - x + 3k = 0$ is double of one of the roots a $x^2 - x + k = 0$ is:

A. 0

B. -2

C. 2

D. none of these

Answer:

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Example

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

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

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3. Find the value of $\left[i^{19}+\left(\frac{1}{i}\right)^{25}\right]^{2}$

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4. Express each of the complex number in the form of a+ib.

$$\left(\frac{1}{5}+i\frac{2}{5}\right)$$

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5. Express each of the complex number in the form of a+ib.

$(i-4)^2$

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6. If z=-3x+2yi and $\bar{z}=6+4i$, find the values of x and y.

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7. $z_1 = (3x + 2y) + (x + 2y)i$ is additive inverse of $z_2 = 5 - i$, find the values of x and y.

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8. Write the following in the form a+ib

$$\frac{1}{3 + 4i}$$

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9. Write the following in the form a+ib

$$\frac{(1+i)^2}{3-i}$$

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10. Find the multiplicative inverse of each of the following complex numbers:

$4-\sqrt{-9}$ or $4-3i$

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11. Find the multiplicative inverse of each of the following complex numbers:

$\sqrt{5} + 3i$

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12. Find the multiplicative inverse of: $z = \cos\theta - i\sin\theta.$

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13. Verify that $\overline{(2+3i)(1-2i)}=\overline{(2+3i)}\,\overline{(1-2i)}$

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14. Find the modulus of the following complex numbers:

$$\frac{3-4i}{4-31}$$

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15. Find the modulus of the following complex numbers:

$$\frac{(2+3i)^2}{1-3i}$$

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

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17. If z=x+iy and |z+a|=3|z-a|, show that $2(x^2+y^2)=5ax-2a^2.$

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18. Solve $2x^2+x+1=0$

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19. Solve the following equation : $2x^2-(3+7i)x+(9i-3)=0.$

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

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

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22. 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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23. If (a+ib)(c+id)(e+if)(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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24. Find the square root of i.

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25. Find the square root of $1 + i$.

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26. Find the squre root of $1 + 2\sqrt{6}i$.

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27. Convert each of the complex numbers given below in the polar form.

Also find their modulus and arguments. $1 - i$.

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28. Convert each of the complex numbers given below in the polar form.

Also find their modulus and arguments. $1 - i$.

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29. Convert each of the complex number $-\frac{16}{1+i\sqrt{3}}$ into polar form. Also find the modulus and arguments.

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30. If $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3 = x + iy,$ then find (x,y)

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31. If $(x+iy)^{\frac{1}{3}} = a+ib$, where a,b,x, y in R, show that $\frac{x}{a} - \frac{y}{b} = -2(a^2+b^2)$.

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32. If z=x+iy and |z|=1, show that the complex number $z_1 = \frac{z-1}{z+1}$ is purely imagine.

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33. Convert $z = \frac{i-1}{\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}}$ in polar form.

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34. If the imaginary part of $\frac{2z+1}{iz+1}$ is -2, then the locus of the point representing z in the complex plane is :

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35. If the complex number z_1 and $z_2$be such that $arg(z_1) - arg(z_2) = 0,$ then show that $|z_1 - z_2| = |z_1| - |z_2|.$

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36. Solve the system of equations $Re\left(z^2\right) = 0, |z| = 2.$

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