

- Express each one of the following in the standard form $a + ib$
 - $\frac{(1+i)^2}{3-i}$
 - $\frac{1}{-2+\sqrt{-3}}$
 - $\left(\frac{1}{1-2i} + \frac{3}{1+i}\right)\left(\frac{3+4i}{2-4i}\right)$
 - $\frac{1}{1-\cos\theta + 2i\sin\theta}$
- Perform the indicated operation and find the result in the form $a + ib$

$$\frac{2-\sqrt{-25}}{1-\sqrt{-16}}$$
- Find the real values of x and y , if
 - $(x + iy)(2 - 3i) = 4 + i$
 - $\frac{x-1}{3+i} + \frac{y-1}{3-i} = i$
- If $a + ib = \frac{c+i}{c-i}$, where c is real, prove that $a^2 + b^2 = 1$ and $\frac{b}{a} = \frac{2c}{c^2-1}$
- The sum and product of two complex numbers are real if and only if they are conjugate of each other.
- Find the multiplicative inverse of the following complex numbers.
 - $(2 + \sqrt{3}i)^2$
- If $a + ib = \frac{(x+i)^2}{2x^2+1}$, prove that $a^2 + b^2 = \frac{(x^2+1)^2}{(2x^2+1)^2}$
- If $(1+i)(1+2i)\dots\dots(1+ni) = (x+iy)$, show that $2.5.10\dots(1+n^2) = x^2 + y^2$
- If z_1, z_2 are complex numbers such that $\frac{2z_1}{3z_2}$ is purely imaginary number, then find $\left|\frac{z_1 - z_2}{z_1 + z_2}\right|$.
- Find the values of $x^3 + 7x^2 - x + 16$, where $x = 1 + 2i$.
- Find the least positive value of n , if $\left(\frac{1+i}{1-i}\right)^n = 1$
- If $z = 2 - 3i$, show that $z^2 - 4z + 13 = 0$ and hence find the value of $4z^3 - 3z^2 + 169$.
- If $iz^3 + z^2 - z + i = 0$, then show that $|z| = 1$.
- Write the value of $\frac{i^{592} + i^{590} + i^{588} + i^{586} + i^{584}}{i^{582} + i^{580} + i^{578} + i^{876} + i^{574}}$

Multiple Choice Questions

- If $i^2 = -1$, then the sum $i + i^2 + i^3 + \dots$ upto 1000 terms is equal to
 - 1
 - 1
 - i
 - 0
- The least positive integer n such that $\left(\frac{2i}{1+i}\right)^n$ is a positive integer, is
 - 16
 - 8
 - 4
 - 2
- If $(x + iy)^{1/3} = a + ib$, then $\frac{x}{a} + \frac{y}{b} =$
 - 0
 - 1
 - 1
 - None of these
- $(\sqrt{-2})(\sqrt{-3})$ is equal to

- (a) $\sqrt{6}$ (b) $-\sqrt{6}$ (c) $i\sqrt{6}$ (d) None of these
19. If $z = \left(\frac{1+i}{1-i}\right)$, then z^4 equals
 (a) 1 (b) -1 (c) 0 (d) None of these
20. If $z = \frac{1+2i}{1-(1-i)^2}$, then $\arg(z)$ equals
 (a) 0 (b) $\frac{\pi}{2}$ (c) π (d) None of these
21. If $z = \frac{1}{(1-i)(2+3i)}$, then $|z| =$
 (a) 1 (b) $1/\sqrt{26}$ (c) $5/\sqrt{26}$ (d) None of these
22. If $x+iy = \frac{3+5i}{7-6i}$, then $y =$
 (a) $9/85$ (b) $-9/85$ (c) $53/85$ (d) None of these
23. The value of $(1+i)^4 + (1-i)^4$ is
 (a) 8 (b) 4 (c) -8 (d) -4

Answers Key Complex Number

1. (i) $\frac{-1}{5} + \frac{3}{5}i$ (ii) $\frac{-2}{7} - \frac{\sqrt{3}}{7}i$ (iii) $\frac{1}{4} + \frac{9}{4}i$ (iv) $\left(\frac{1-\cos\theta}{2-2\cos\theta+3\sin^2\theta}\right) + i\left(\frac{-2\sin\theta}{2-2\cos\theta+3\sin^2\theta}\right)$
2. $\frac{22}{17} + \frac{3}{17}i$ 3. (i) $x = 5/13, y = 14/13$ (ii) $x = -4, y = 6$
6. $\frac{1}{49} - \frac{4\sqrt{3}}{49}i$ 9. 1 10. $-17 + 24i$
11. $n = 4$ 12. 0 14. -2 15. (d) 16. (b) 17. (d) 18. (b)
19. (a) 20. (a) 21. (b) 22. (c) 23. (c)