INDIAN SCHOOL AL WADI AL KABIR
DEPARTMENT OF MATHEMATICS 2024 – 2025
Work Sheet – Class XI - Complex Numbers

1	Express $i^9 + i^{10} + i^{11} + i^{12}$ in the form $a + ib$.
2	Find the multiplicative inverse of $2 - 3i$.
3	Find the modulus of $\frac{1+i}{1-i}$.
4	Express i^{-35} in the form $a + ib$.
5	Find the multiplicative inverse of $4 - 3i$.
6	*Evaluate the following:* *(i)* i^{452} *(ii)* i^{-999} *(iii)* $\frac{1}{i^{58}}$ *(iv)* $i^{37} + \frac{1}{i^{57}}$ *(v)* $i^{30} + i^{40} + i^{50}$
7	*Find the value of* $\frac{i^{592} + i^{590} + i^{588} + i^{586} + i^{584}}{i^{582} + i^{580} + i^{578} + i^{576} + i^{574}}$.
8	*Express the complex number* $\frac{1}{3-4i}$ *in the form* $a + ib$
9	*Express* $\frac{2+3i}{2-3i}$ *in the form* $a + ib$.
10	*Express in the standard form* $a + ib$: $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$
11	*Write the following complex number* $\frac{(2+3i)^2}{2-i}$ *in the standard form.*
12	*Write* $\frac{1}{1-\cos\theta+2i\sin\theta}$ *in the standard form* $a + ib$.
13	*If* $z_1 = 6 + 7i$ *and* $z_2 = 1 - 3i$, *find* $\overline{\left(\frac{z_1}{z_1}\right)}$.

14	*If* $\frac{a+ib}{c+id} = x+iy$, *prove that* $x^2 + y^2 = \frac{a^2+b^2}{c^2+d^2}$
15	*Find the modulus of* $9+3i^7$.
16	*Separate into real and imaginary parts* $\frac{3+\sqrt{-1}}{2-\sqrt{-1}}$. *Also, find its modulus*
17	*Find the modulus of* $\frac{(3+4i)(4+5i)}{(4+3i)(6+7i)}$.
18	*Find the multiplicative inverse of the following:* $3+2i$
19	*Find the multiplicative inverse of the following:* $\left(2+\sqrt{3}i\right)^2$
20	*Find the multiplicative inverse of the following:* $\frac{3+4i}{4-5i}$
21	If $4x+i(3x-y) = 3+i(-6)$, where x and y are real numbers, find the value of x and y.
22	If $x + iy = \sqrt{\frac{a+ib}{c+id}}$, prove that $(x^2 + y^2)^2 = \frac{a^2+b^2}{c^2+d^2}$
23	If $a+ib = \frac{(x+i)^2}{2x^2+1}$, prove that $a^2+b^2 = \frac{(x^2+1)^2}{(2x^2+1)^2}$.
24	Express $\frac{5+\sqrt{2}i}{1-\sqrt{2}i}$ in the form $a + ib$
25	If z_1, z_2, are $1 - i$ and $-2 + 4i$, respectively then find $\text{Im}\left(\frac{z_1 \cdot z_2}{\bar{z}_1}\right)$

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Complex Numbers and Quadratic Equations (Answer Key)

1	0
2	$\frac{2}{13}+\frac{3}{13}i$
3	1
4	$0+\iota$
5	$\frac{4}{25}+\frac{3}{25}i$
6	(i) 1, (ii) i, (iii) -1, (iv) 0, (v) -1
7	-1
8	$\frac{3}{25}+\frac{4}{25}i.$
9	$-\frac{5}{13}+\frac{12}{13}i$
10	$\frac{63}{25}-\frac{16}{25}i.$
11	$\bar{z}=-\frac{22}{5}-\frac{19}{5}i.$
12	$\left(\frac{1-\cos\theta}{2-2\cos\theta+3\sin^2\theta}\right)+\left(\frac{-2\sin\theta}{2-2\cos\theta+3\sin^2\theta}\right)i$
13	$-\frac{3}{2}-\frac{5}{2}i.$
15	$\sqrt{90}.$
16	$\sqrt{2}$
17	$\sqrt{\frac{41}{85}}$
18	$\frac{3}{13}-\frac{2}{13}i.$
19	$\frac{1}{49}-\frac{4\sqrt{3}}{49}i$
20	$-\frac{8}{25}-\frac{31}{25}i.$
21	$x=\frac{3}{4}, y=\frac{33}{4}$