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The Personal Exam Coach

Mathematics

PV-DPS-MTH-188

Daily Practice Sheet

Class XI | Chapter 4: Complex Numbers and Quadratic Equations

Released: 07 July 2026

15 Questions · **45 minutes** · **60 Marks**

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Mathematics | Class XI | Chapter 4: Complex Numbers and Quadratic Equations

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Total Questions	**15**	**Time Allowed**	**45 minutes**
Maximum Marks	**60**	**Difficulty**	**Easy / Medium / Hard**

Instructions

1. All questions are compulsory.
2. Each question carries **4 marks**.
3. There is **no negative marking**.
4. Write the final answer in the space provided or mark the correct option.
5. Time: **45 minutes**.

Questions

1. Express the following complex numbers in the form $a + ib$:

(i) $(3 + 2i) + (4 - 5i)$

(ii) $(2 + 3i)(1 - 4i)$

(iii) $\frac{5+2i}{3-4i}$

(iv) $i^{37} + i^{42}$

2. Find the modulus and argument of the complex number $z = -1 + i\sqrt{3}$.

(i) Find $|z|$

(ii) Find $\arg(z)$

(iii) Write z in polar form

3. If $z = 2 + 3i$, find $z + \bar{z}$, $z - \bar{z}$, and $z \cdot \bar{z}$.

(i) Find $\bar{z}$

(ii) Find $z + \bar{z}$ and $z - \bar{z}$

(iii) Find $z \cdot \bar{z}$

4. Find the square root of $7 + 24i$.

(i) Let $\sqrt{7 + 24i} = x + iy$ and square both sides

(ii) Equate real and imaginary parts

(iii) Solve for x and y

5. Solve the quadratic equation: $x^2 + 2x + 5 = 0$ in the complex number system.

(i) Find discriminant $D = b^2 - 4ac$

(ii) Apply quadratic formula with $\sqrt{D}$

(iii) Write the two roots in $a + ib$ form

6. If $z_1 = 1 + i$ and $z_2 = 2 - i$, find $\left|\frac{z_1}{z_2}\right|$ and $\arg\left(\frac{z_1}{z_2}\right)$.

(i) Find $|z_1/z_2| = |z_1|/|z_2|$

(ii) Find $\arg(z_1/z_2) = \arg(z_1) - \arg(z_2)$

(iii) Express the result

7. Find the multiplicative inverse of $2 - 3i$.

(i) Use formula $z^{-1} = \bar{z}/|z|^2$

(ii) Compute $\bar{z}$ and $|z|^2$

(iii) Write the inverse in $a + ib$ form

8. If $|z| = 1$, prove that $\frac{z-1}{z+1}$ is purely imaginary.

(i) Let $z = \cos\theta + i\sin\theta$

(ii) Substitute and simplify

(iii) Show the result has no real part

9. Find all complex numbers z such that $z^2 = \bar{z}$.

(i) Let $z = x + iy$, then $\bar{z} = x - iy$

(ii) Equate $z^2 = (x + iy)^2$ to $x - iy$

(iii) Solve the system for x and y

10. If α and β are the roots of $x^2 - 3x + 5 = 0$, find $\alpha^2 + \beta^2$ and $\alpha^3 + \beta^3$.

(i) Find $\alpha + \beta$ and $\alpha\beta$ using Vieta

(ii) Use $\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$

(iii) Use $\alpha^3 + \beta^3 = (\alpha + \beta)^3 - 3\alpha\beta(\alpha + \beta)$

11. Find the value of $\left(\frac{1+i}{1-i}\right)^{100}$.

(i) Simplify $\frac{1+i}{1-i}$ to i

(ii) Compute i^{100}

(iii) State the final answer

12. If $z = x + iy$ satisfies $|z - 1| = |z + 1|$, prove that $x = 0$.

(i) Write $|x + iy - 1| = |x + iy + 1|$

(ii) Square both sides and simplify

(iii) Conclude $x = 0$

13. Find the condition for which the quadratic equation $x^2 + px + q = 0$ has one root equal to the square of the other.

(i) Let roots be α and α^2

(ii) Use sum $\alpha + \alpha^2 = -p$ and product $\alpha^3 = q$

(iii) Eliminate α to get condition in p, q

14. If $z = \cos\theta + i\sin\theta$, find $z + \frac{1}{z}$ and $z - \frac{1}{z}$ in simplified form.

(i) Find $1/z = \cos\theta - i\sin\theta$

(ii) Add: $z + 1/z = 2\cos\theta$

(iii) Subtract: $z - 1/z = 2i\sin\theta$

15. Solve for x and y: $(x+iy)(2-3i) = 4+i$.

(i) Expand LHS: $(2x+3y) + i(-3x+2y)$

(ii) Equate real and imaginary parts

(iii) Solve the system of linear equations

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Answer Key

Q. No.	Answer
1	(i) $7-3i$, (ii) $14-5i$, (iii) $-\frac{1}{5}+\frac{22}{25}i$, (iv) $i-1$
2	$\lvert z\rvert=\sqrt{(-1)^2+(\sqrt{3})^2}=2$; $\arg(z)=2\pi/3$; Polar form: $z=2(\cos 2\pi/3+i\sin 2\pi/3)$
3	$\bar{z}=2-3i$; $z+\bar{z}=4$; $z-\bar{z}=6i$; $z\cdot\bar{z}=13$
4	$\sqrt{7+24i}=\pm(4+3i)$ (since $(4+3i)^2=16+24i-9=7+24i$)
5	$D=4-20=-16$; $x=\frac{-2\pm\sqrt{-16}}{2}=\frac{-2\pm4i}{2}=-1\pm2i$; Roots: $-1+2i,-1-2i$
6	$\lvert z_1\rvert=\sqrt{2}$, $\lvert z_2\rvert=\sqrt{5}$; $\lvert z_1/z_2\rvert=\sqrt{2/5}$; $\arg(z_1)=\pi/4$, $\arg(z_2)=-\tan^{-1}(1/2)$; $\arg(z_1/z_2)=\pi/4+\tan^{-1}(1/2)$
7	$\bar{z}=2+3i$, $\lvert z\rvert^2=13$; $z^{-1}=\frac{2+3i}{13}=\frac{2}{13}+\frac{3}{13}i$
8	$\frac{z-1}{z+1}=\frac{\cos\theta-1+i\sin\theta}{\cos\theta+1+i\sin\theta}=\frac{-2\sin^2(\theta/2)+2i\sin(\theta/2)\cos(\theta/2)}{2\cos^2(\theta/2)+2i\sin(\theta/2)\cos(\theta/2)}=i\tan(\theta/2)$, purely imaginary
9	$x^2-y^2+2ixy=x-iy$; Equating: $x^2-y^2=x$ and $2xy=-y$; Solutions: $(0,0),(1,0),(-1/2,\pm\sqrt{3}/2)$; $z=0,1,-\frac{1}{2}\pm i\frac{\sqrt{3}}{2}$
10	$\alpha+\beta=3$, $\alpha\beta=5$; $\alpha^2+\beta^2=9-10=-1$; $\alpha^3+\beta^3=27-3(5)(3)=27-45=-18$
11	$\frac{1+i}{1-i}=\frac{(1+i)^2}{1+1}=\frac{1+2i-1}{2}=i$; $i^{100}=(i^4)^{25}=1^{25}=1$
12	$\lvert x+iy-1\rvert^2=\lvert x+iy+1\rvert^2\Rightarrow(x-1)^2+y^2=(x+1)^2+y^2\Rightarrow x^2-2x+1=x^2+2x+1\Rightarrow-2x=2x\Rightarrow4x=0\Rightarrow x=0$
13	$\alpha+\alpha^2=-p$, $\alpha^3=q$; From $\alpha^3=q$, $\alpha=q^{1/3}$; Substituting: $q^{1/3}+q^{2/3}=-p$;

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