



# BAAP OF ALL FORMULA LISTS










FOR IIT JEE

COMPLEX NUMBERS

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SL#	FORMULA												
1	<table border="1"><tr><td><math>i^1 = i</math></td><td><math>i^5 = i</math></td><td><math>i^{4n+1} = i</math></td></tr><tr><td><math>i^2 = -1</math></td><td><math>i^6 = -1</math></td><td><math>i^{4n+2} = -1</math></td></tr><tr><td><math>i^3 = -i</math></td><td><math>i^7 = -i</math></td><td><math>i^{4n+3} = -i</math></td></tr><tr><td><math>i^4 = 1</math></td><td><math>i^8 = 1</math></td><td><math>i^{4n} = 1</math></td></tr></table>	$i^1 = i$	$i^5 = i$	$i^{4n+1} = i$	$i^2 = -1$	$i^6 = -1$	$i^{4n+2} = -1$	$i^3 = -i$	$i^7 = -i$	$i^{4n+3} = -i$	$i^4 = 1$	$i^8 = 1$	$i^{4n} = 1$
	$i^1 = i$	$i^5 = i$	$i^{4n+1} = i$										
	$i^2 = -1$	$i^6 = -1$	$i^{4n+2} = -1$										
	$i^3 = -i$	$i^7 = -i$	$i^{4n+3} = -i$										
$i^4 = 1$	$i^8 = 1$	$i^{4n} = 1$											
2	$z = a + bi$												
3	$(a + bi) + (c + di) = (a + c) + (b + d)i$												
4	$(a + bi) - (c + di) = (a - c) + (b - d)i$												
5	$(a + bi)(c + di) = (ac - bd) + (ad + bc)i$												
6	$\frac{a + bi}{c + di} = \frac{ac + bd}{c^2 + d^2} + i \cdot \frac{bc - ad}{c^2 + d^2}$												
7	<b>Conjugate Complex Numbers</b> $\overline{a + bi} = a - bi$												
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8	$a = r \cos \varphi, b = r \sin \varphi$												
9	<b>Polar Presentation of Complex Numbers</b> $a + bi = r(\cos \varphi + i \sin \varphi)$												
10	<b>Modulus and Argument of a Complex Number:</b> If $a + bi$ is a complex number, then $r = \sqrt{a^2 + b^2}$ (modulus), $\varphi = \tan^{-1}\left(\frac{b}{a}\right)$ (argument).												

11	<p><b>Product in Polar Representation</b></p> $z_1 \cdot z_2 = r_1(\cos \varphi_1 + i \sin \varphi_1) \cdot r_2(\cos \varphi_2 + i \sin \varphi_2) = r_1 r_2 [\cos(\varphi_1 + \varphi_2) + i \sin(\varphi_1 + \varphi_2)]$
12	<p><b>Conjugate Numbers in Polar Representation</b></p> $\overline{r(\cos \varphi + i \sin \varphi)} = r[\cos(-\varphi) + i \sin(-\varphi)]$
13	<p><b>Inverse of a Complex Number in Polar Representation</b></p> $\frac{1}{r(\cos \varphi + i \sin \varphi)} = \frac{1}{r} [\cos(-\varphi) + i \sin(-\varphi)]$
14	<p><b>Quotient in Polar Representation</b></p> $\frac{z_1}{z_2} = \frac{r_1(\cos \varphi_1 + i \sin \varphi_1)}{r_2(\cos \varphi_2 + i \sin \varphi_2)} = \frac{r_1}{r_2} [\cos(\varphi_1 - \varphi_2) + i \sin(\varphi_1 - \varphi_2)]$
15	<p><b>Power of a Complex Number</b></p> $z^n = [r(\cos \varphi + i \sin \varphi)]^n = r^n [\cos(n\varphi) + i \sin(n\varphi)]$
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16	<p><b>De Moivre</b></p> $(\cos \varphi + i \sin \varphi)^n = \cos(n\varphi) + i \sin(n\varphi)$
17	<p><b>nth Root of a Complex Number</b></p> $\sqrt[n]{z} = \sqrt[n]{r(\cos \varphi + i \sin \varphi)} = \sqrt[n]{r} \left( \frac{\cos(\varphi + 2\pi k)}{n} + i \sin \left( \frac{\varphi + 2\pi k}{n} \right) \right),$
18	<p><b>Euler's Formula</b></p> $e^{ix} = \cos x + i \sin x$
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