

Complex Numbers in Polar Form

Use exact modulus and standard angles. For roots, list every distinct root around one complete turn.

1. Divide $12[\cos(0) + i \sin(0)]$ and $4[\cos(0) + i \sin(0)]$.

Assumptions: Arguments are coterminal modulo one full turn. Trigonometric-form arguments use the selected angle unit. Divisors are nonzero, powers are at most 6, and every requested root is listed.

2. Convert $\sqrt{2}e^{i \pi/4}$ to $a+bi$ form.

Assumptions: Arguments are coterminal modulo one full turn. The exponent uses the radian argument; when degrees are selected, the equivalent degree argument is shown in brackets. Divisors are nonzero, powers are at most 6, and every requested root is listed.

Complex Numbers in Polar Form

Use exact modulus and standard angles. For roots, list every distinct root around one complete turn.

3. Convert $z = 0 + 6i$ to trigonometric polar form.

Assumptions: Arguments are coterminal modulo one full turn. Trigonometric-form arguments use the selected angle unit. Divisors are nonzero, powers are at most 6, and every requested root is listed.

4. Use De Moivre's theorem to find $[9e^{(i\,5\pi/3)}]^4$.

Assumptions: Arguments are coterminal modulo one full turn. The exponent uses the radian argument; when degrees are selected, the equivalent degree argument is shown in brackets. Divisors are nonzero, powers are at most 6, and every requested root is listed.

Complex Numbers in Polar Form

Use exact modulus and standard angles. For roots, list every distinct root around one complete turn.

5. Find all 4th roots of $4096[\cos(5\pi/6) + i \sin(5\pi/6)]$.

Assumptions: Arguments are coterminal modulo one full turn. Trigonometric-form arguments use the selected angle unit. Divisors are nonzero, powers are at most 6, and every requested root is listed.

6. Multiply $7e^{i \pi}$ and $5e^{i \pi}$.

Assumptions: Arguments are coterminal modulo one full turn. The exponent uses the radian argument; when degrees are selected, the equivalent degree argument is shown in brackets. Divisors are nonzero, powers are at most 6, and every requested root is listed.

Math Sheet

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Complex Numbers in Polar Form

Use exact modulus and standard angles. For roots, list every distinct root around one complete turn.

7. Use De Moivre's theorem to find $[11[\cos(3\pi/2) + i \sin(3\pi/2)]]^6$.

Assumptions: Arguments are coterminal modulo one full turn. Trigonometric-form arguments use the selected angle unit. Divisors are nonzero, powers are at most 6, and every requested root is listed.

8. Divide $10e^{(i 3\pi/2)}$ and $4e^{(i 3\pi/2)}$.

Assumptions: Arguments are coterminal modulo one full turn. The exponent uses the radian argument; when degrees are selected, the equivalent degree argument is shown in brackets. Divisors are nonzero, powers are at most 6, and every requested root is listed.

Complex Numbers in Polar Form

Worked Answer Key

Use exact modulus and standard angles. For roots, list every distinct root around one complete turn.

1. Divide $12[\cos(0) + i \sin(0)]$ and $4[\cos(0) + i \sin(0)]$.

Answer: $3[\cos(0) + i \sin(0)]$

1. Divide moduli and subtract arguments.
2. Result: radius 3, angle 0.

2. Convert $\sqrt{2}e^{i\pi/4}$ to $a+bi$ form.

Answer: $1 + 1i$

1. Use $a=r \cos(\theta)$ and $b=r \sin(\theta)$.
2. The standard angle gives $a=1$ and $b=1$.

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Complex Numbers in Polar Form

Worked Answer Key

Use exact modulus and standard angles. For roots, list every distinct root around one complete turn.

3. Convert $z = 0 + 6i$ to trigonometric polar form.

Answer: $6[\cos(\pi/2) + i \sin(\pi/2)]$

1. $r = \sqrt{0^2 + 6^2} = 6$.
2. The quadrant gives $\theta = \pi/2$.

4. Use De Moivre's theorem to find $[9e^{i 5\pi/3}]^4$.

Answer: $6561e^{i 20\pi/3}$

1. Raise the modulus: $9^4 = 6561$.
2. Multiply the argument by 4: $20\pi/3$.

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Complex Numbers in Polar Form

Worked Answer Key

Use exact modulus and standard angles. For roots, list every distinct root around one complete turn.

5. Find all 4th roots of $4096[\cos(5\pi/6) + i \sin(5\pi/6)]$.

Answer: $8[\cos(5\pi/24) + i \sin(5\pi/24)]$; $8[\cos(17\pi/24) + i \sin(17\pi/24)]$; $8[\cos(29\pi/24) + i \sin(29\pi/24)]$; $8[\cos(41\pi/24) + i \sin(41\pi/24)]$

1. Root modulus = $\sqrt[4]{4096} = 8$.
2. Arguments are $(\theta + k \text{ full turns})/4$ for $k=0, \dots, 3$.
3. List all 4 distinct roots before angles repeat.

6. Multiply $7e^{(i \pi)}$ and $5e^{(i \pi)}$.

Answer: $35e^{(i 2\pi)}$

1. Multiply moduli and add arguments.
2. Result: radius 35, angle 2π .

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Complex Numbers in Polar Form

Worked Answer Key

Use exact modulus and standard angles. For roots, list every distinct root around one complete turn.

7. Use De Moivre's theorem to find $[11[\cos(3\pi/2) + i \sin(3\pi/2)]]^6$.

Answer: $1771561[\cos(9\pi) + i \sin(9\pi)]$

1. Raise the modulus: $11^6=1771561$.
2. Multiply the argument by 6: 9π .

8. Divide $10e^{(i 3\pi/2)}$ and $4e^{(i 3\pi/2)}$.

Answer: $5/2e^{(i 0)}$

1. Divide moduli and subtract arguments.
2. Result: radius $5/2$, angle 0.