

Complex Numbers in Polar Form

Date _____ Period _____

Find the absolute value.

1) $\sqrt{14}\left(\cos \frac{5\pi}{3} + i\sin \frac{5\pi}{3}\right)$

2) $2 - 2i\sqrt{3}$

3) $6 - 6i$

4) $-4 - 6i$

Convert numbers in rectangular form to polar form and numbers in polar form to rectangular form.

5) $5\left(\cos \frac{7\pi}{6} + i\sin \frac{7\pi}{6}\right)$

6) $6\left(\cos \frac{5\pi}{3} + i\sin \frac{5\pi}{3}\right)$

7) $-\frac{3\sqrt{3}}{2} + \frac{3}{2}i$

8) $\sqrt{5}\left(\cos \frac{2\pi}{3} + i\sin \frac{2\pi}{3}\right)$

9) $3(\cos 300 + i\sin 300)$

10) $1 - i\sqrt{3}$

11) $-5i$

12) -2

Simplify. Write your answer in rectangular form.

$$13) 2\left(\cos \frac{3\pi}{2} + i\sin \frac{3\pi}{2}\right) \cdot 4\sqrt{2}\left(\cos \frac{\pi}{3} + i\sin \frac{\pi}{3}\right)$$

$$14) 4\left(\cos \frac{2\pi}{3} + i\sin \frac{2\pi}{3}\right) \cdot 3\left(\cos \frac{7\pi}{4} + i\sin \frac{7\pi}{4}\right)$$

$$15) 5(\cos 150 + i\sin 150) \cdot 4(\cos 300 + i\sin 300)$$

$$16) 6\left(\cos \frac{\pi}{6} + i\sin \frac{\pi}{6}\right) \cdot \sqrt{34}\left(\cos \frac{4\pi}{3} + i\sin \frac{4\pi}{3}\right)$$

$$17) \frac{2(\cos 225 + i\sin 225)}{2(\cos 240 + i\sin 240)}$$

$$18) \frac{3\left(\cos \frac{3\pi}{4} + i\sin \frac{3\pi}{4}\right)}{5\left(\cos \frac{5\pi}{4} + i\sin \frac{5\pi}{4}\right)}$$

$$19) \frac{5(\cos 120 + i\sin 120)}{6(\cos 300 + i\sin 300)}$$

$$20) \frac{4\left(\cos \frac{5\pi}{6} + i\sin \frac{5\pi}{6}\right)}{6\left(\cos \frac{\pi}{3} + i\sin \frac{\pi}{3}\right)}$$

$$21) (3(\cos 150 + i\sin 150))^4$$

$$22) \left(5\left(\cos \frac{2\pi}{3} + i\sin \frac{2\pi}{3}\right)\right)^4$$

$$23) (-3 - 3i)^5$$

$$24) \left(4\left(\cos \frac{5\pi}{4} + i\sin \frac{5\pi}{4}\right)\right)^2$$

Answers to Complex Numbers in Polar Form

- | | | | |
|--|--|--|-----------------|
| 1) $\sqrt{14}$ | 2) 4 | 3) $6\sqrt{2}$ | 4) $2\sqrt{13}$ |
| 5) $-\frac{5\sqrt{3}}{2} - \frac{5}{2}i$ | 6) $3 - 3i\sqrt{3}$ | 7) $3(\cos 150 + i\sin 150)$ | |
| 8) $-\frac{\sqrt{5}}{2} + \frac{\sqrt{15}}{2}i$ | 9) $\frac{3}{2} - \frac{3\sqrt{3}}{2}i$ | 10) $2\left(\cos \frac{5\pi}{3} + i\sin \frac{5\pi}{3}\right)$ | |
| 11) $5\left(\cos \frac{3\pi}{2} + i\sin \frac{3\pi}{2}\right)$ | 12) $2(\cos 180 + i\sin 180)$ | 13) $8\sqrt{2}\left(\cos \frac{11\pi}{6} + i\sin \frac{11\pi}{6}\right)$ | |
| 14) $12\left(\cos \frac{29\pi}{12} + i\sin \frac{29\pi}{12}\right)$ | 15) $20(\cos 450 + i\sin 450)$ | 16) $6\sqrt{34}\left(\cos \frac{3\pi}{2} + i\sin \frac{3\pi}{2}\right)$ | |
| 17) $\cos -15 + i\sin -15$ | 18) $\frac{3}{5}\left(\cos -\frac{\pi}{2} + i\sin -\frac{\pi}{2}\right)$ | 19) $\frac{5}{6}(\cos -180 + i\sin -180)$ | |
| 20) $\frac{2}{3}\left(\cos \frac{\pi}{2} + i\sin \frac{\pi}{2}\right)$ | 21) $81(\cos 600 + i\sin 600)$ | 22) $625\left(\cos \frac{8\pi}{3} + i\sin \frac{8\pi}{3}\right)$ | |
| 23) $972 + 972i$ | 24) $16\left(\cos \frac{5\pi}{2} + i\sin \frac{5\pi}{2}\right)$ | | |