

Polar \mathbb{C} WS

Name:

Example 1: Convert $3+4i$ into polar form:

- Step 1: find the radius $= \sqrt{3^2 + 4^2} = 5$
- Step 2: find the angle $= \tan^{-1} \frac{4}{3} \approx 53^\circ$
- Put it all together:
 $3 + 4i = 5(\cos 53 + i \sin 53)$
 or
 $3 + 4i = 5e^{53^\circ i}$

8. Find the rectangular form of $4e^{3\pi/4}$ —aka $4(\cos \frac{3\pi}{4} + i \sin \frac{3\pi}{4})$

9. $2e^{\pi/3}$ —aka $2(\cos \frac{\pi}{3} + i \sin \frac{\pi}{3})$

Example 2 Convert $4e^{\pi/4}$ —aka $4(\cos \frac{\pi}{4} + i \sin \frac{\pi}{4})$ into rectangular form.

- Step 1: find $x = 4 \cos \frac{\pi}{4} = 2\sqrt{2}$
- Step 2: find $y = 4 \sin \frac{\pi}{4} = 2\sqrt{2}$
- Put it together: $4e^{\pi/4} = 2\sqrt{2} + 2\sqrt{2}i$

10. $6e^{\pi/6}$ —aka $6(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6})$

1. Find the polar form of $3\sqrt{3} + 3i$

11. $2e^{4\pi/3}$ —aka $2(\cos \frac{4\pi}{3} + i \sin \frac{4\pi}{3})$

2. Find the polar form of $6\sqrt{3} + 6i$

3. Find the polar form of $2 + 2\sqrt{3}i$

12. $13e^{67.3^\circ}$ —aka $13(\cos 67.3 + i \sin 67.3)$

4. Find the polar form of $5 + 5i$

5. Find the polar form of $4 - 3i$

6. Find the polar form of $12 + 5i$

7. Find the polar form of $8 - 6i$

Answers

$4(\cos \frac{3\pi}{4} + i \sin \frac{3\pi}{4}) = -2\sqrt{2} + 2\sqrt{2}i$
 $2(\cos \frac{\pi}{3} + i \sin \frac{\pi}{3}) = 1 + i$
 $4e^{\pi/4} = 2\sqrt{2} + 2\sqrt{2}i$
 $6(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6}) = 3 + i$
 $2(\cos \frac{4\pi}{3} + i \sin \frac{4\pi}{3}) = -1 - i$
 $13e^{67.3^\circ} = 13(\cos 67.3 + i \sin 67.3)$
 $3\sqrt{3} + 3i = 6(\cos 30^\circ + i \sin 30^\circ)$
 $6\sqrt{3} + 6i = 12(\cos 30^\circ + i \sin 30^\circ)$
 $2 + 2\sqrt{3}i = 4(\cos 60^\circ + i \sin 60^\circ)$
 $5 + 5i = 5\sqrt{2}(\cos 45^\circ + i \sin 45^\circ)$
 $4 - 3i = 5(\cos 36.9^\circ - i \sin 36.9^\circ)$
 $12 + 5i = 13(\cos 22.6^\circ + i \sin 22.6^\circ)$
 $8 - 6i = 10(\cos 36.9^\circ - i \sin 36.9^\circ)$