Precalculus

7.3 Trigonometric Form of Complex Numbers

Name_____ Date_____ Per_____

Graph each complex number and find its absolute value.

1. $2-6i$
2. $-1-i$
3. $-2+2i\sqrt{3}$

4. $8i$
5. -9
6. $\frac{\sqrt{3}}{2}+\frac{i}{2}$

Write each complex number in trigonometric form, using degree measure for the argument. Where necessary, round to the nearest tenth of a degree.

7. $-3+3i$
8. -8
9. $10-10i\sqrt{3}$

10. $3+4i$
11. $-2-4i$

Write each complex number in trigonometric form, using radian measure for the argument.

12. $6i$

13. $18-18i$

14. $4\sqrt{2}+4i\sqrt{2}$

15. $-7\sqrt{3}-7i$

Write each complex number in the form $a+bi$.

16. $\sqrt{2}\left(\cos 45^\circ + i\sin 45^\circ\right)$

17. $6\left(\cos 30^\circ + i\sin 30^\circ\right)$

18. $12\left(\cos 120^\circ + i\sin 120^\circ\right)$

19. $4\left(\cos\left(3\pi/2\right) + i\sin\left(3\pi/2\right)\right)$

20. $6\,\mathrm{cis}\left(5\pi/4\right)$

21. $3\sqrt{3}\,\mathrm{cis}\left(11\pi/6\right)$

22. $\mathrm{cis}\,180^\circ$

Perform the indicated operations. Write answers in the form $a+bi$.

23. $2\left(\cos\left(5\pi/6\right)+i\sin\left(5\pi/6\right)\right)\cdot 3\left(\cos\left(5\pi/3\right)+i\sin\left(5\pi/3\right)\right)$

24. $\sqrt{3}\,\text{cis}\,10^\circ\cdot\sqrt{2}\,\text{cis}\,20^\circ$

25. $8\,\text{cis}\,100^\circ\cdot 3\,\text{cis}\,35^\circ$

26. $\left[\sqrt{5}\left(\cos\left(\pi/12\right)+i\sin\left(\pi/12\right)\right)\right]^2$

27. $\dfrac{4\,\text{cis}\,60^\circ}{2\,\text{cis}\,30^\circ}$

28. $\dfrac{9\left(\cos\left(\pi/4\right)+i\sin\left(\pi/4\right)\right)}{3\left(\cos\left(5\pi/4\right)+i\sin\left(5\pi/4\right)\right)}$

29. $\dfrac{24\,\text{cis}\left(3\pi/2\right)}{4\,\text{cis}\left(\pi/6\right)}$

Find the complex conjugate of the given complex number in trigonometric form and find the product of the given number and its conjugate.

30. $5\left(\cos\left(\pi/7\right)+i\sin\left(\pi/7\right)\right)$

31. $6\,\text{cis}\,5^\circ$

Find $z_1 z_2$ and z_1 / z_2 for each pair of complex numbers by first converting them to trigonometric form, then multiplying or dividing in trigonometric form. Then write the answers in the form $a+bi$.

32. $z_1 = 6+6i,\ z_2 = 2i$

33. $z_1 = 4+4i,\ z_2 = -5-5i$

34. $z_1 = \sqrt{3}+i,\ z_2 = 2+2i\sqrt{3}$

35. $z_1 = 6-8i,\ z_2 = -1+3i$

Solve the problem.

36. If $z = 2+2i,$ find z^3 by writing z in trigonometric form and computing the product $z \cdot z \cdot z$.