Trig Complex Numbers in Polar Form 6.5 Worksheet

Name Key Date _____ out of 22

In exercises 1-8 plot each complex number. Then write the complex numbers in polar form. You may express the argument (angle) in degrees or radians.

1. 2 – 2i

$2\sqrt{2}(\cos\frac{7\pi}{4}+i\sin\frac{7\pi}{4})$

2. -1 – i

$\sqrt{2}(\cos\frac{5\pi}{4}+i\sin\frac{5\pi}{4})$

3. -4i

$4(\cos\frac{3\pi}{2}+i\sin\frac{3\pi}{2})$

4. 2√3 – 2i

$4(\cos\frac{11\pi}{6}+i\sin\frac{11\pi}{6})$

5. -3

$3(\cos\pi+i\sin\pi)$

6. -3√2 – 3i√3

$3\sqrt{5}(\cos 4.3+i\sin 4.3)$

7. -3 + 4i

$5(\cos 2.2+i\sin 2.2)$

$2.2 \cong 126.9^\circ$

8. 3 – i√3

$2\sqrt{3}\cos\frac{11\pi}{6}+$

$i\sin\frac{11\pi}{6}$

In exercise 9-14 write each complex number in rectangular form. If necessary, round to the nearest tenth.

9. $6(\cos 30° + i\sin 30°)$

$3\sqrt{3}+3i$

10. $4(\cos 240° + i\sin 240°)$

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

11. $8\left(\cos\frac{7\pi}{4} + i\sin\frac{7\pi}{4}\right)$

$4\sqrt{2}-4\sqrt{2}i$

12. $8(\cos\frac{5\pi}{3} + i\sin\frac{5\pi}{3})$

$4-4\sqrt{3}i$

13. $20(\cos 205° + i\sin 205°)$

$-18.1-8.5i$

14. $14(\cos -10° + i\sin -10°)$

$13.8-2.4i$

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In exercise 15-18, find the product (z_1z_2) of the complex numbers. Leave answers in polar form.

15. $z_1 = 6\ (\cos 20° + i \sin 20°)$

$z_2 = 13(\cos 50° + i\sin 50°)$

$78 \text{cis} 70°$

16. $z_1 = 4\ (\cos 15° + i \sin 15°)$

$z_2 = 13(\cos -50° + i\sin -50°)$

$52 \text{cis} 325°$

17. $z_1 = 3\ (\cos \frac{5\pi}{8} + i \sin \frac{5\pi}{8})$

$z_2 = 10\ (\cos \frac{\pi}{16} + i \sin \frac{\pi}{16})$

$30 \text{cis} \frac{11\pi}{16}$

18. $z_1 = \cos \frac{\pi}{4} + i \sin \frac{\pi}{4}$

$z_2 = \cos \frac{\pi}{3} + i \sin \frac{\pi}{3}$

$\text{cis} \frac{7\pi}{12}$

In exercise 19-22 find the quotient z_1/z_2 of the complex numbers. Leave answers in polar form. Express the argument as an angle between 0° and 360° or between 0 and 2π.

19. $z_1 = 20\ (\cos 75° + i \sin 75°)$

$z_2 = 4\ (\cos 25° + i \sin 25°)$

$5 \text{cis} 50°$

20. $z_1 = 50\ (\cos 80° + i \sin 80°)$

$z_2 = 10\ (\cos 20° + i \sin 20°)$

$5 \text{cis} 60°$

21. $z_1 = 3(\cos \frac{\pi}{5} + i \sin \frac{\pi}{5})$

$z_2 = 33(\cos \frac{\pi}{20} + i \sin \frac{\pi}{20})$

$\frac{1}{11} \text{cis} \frac{3\pi}{20}$

22. $z_1 = 13(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6})$

$z_2 = 26(\cos \frac{5\pi}{6} + i \sin \frac{5\pi}{6})$

$\frac{1}{2} \text{cis} \frac{4\pi}{3}$