Group: ______________ Present: ____

1. Write $-1+i$ in trigonometric form and compute its fifth power:

   $-1+i =$ ____(cos(___) + i sin(___))

   Thus $(-1+i)^5 =$ (____)^5

   = _____(cos(____) + i sin(____))

   = ____

   (next convert back to $a+bi$ form)

   = ____

2. Visualize the 6^{th} roots of unity. Set grapher as follows: Radian mode; Parametric mode; Viewing window: $T \in [0, 2\pi, \frac{2\pi}{6}], X \in [-1.5, 1.5, 1], Y \in [-1, 1, 1]$. Graph the parametric function $X_{1T} = \cos(T), Y_{1T} = \sin(T)$. Use ZSQUARE if you wish. Trace. The six points traced are the six roots of unity. Explain why the choice of TSTEP gives us these points.

   Now change TSTEP to see the 8^{th} roots of unity. TSTEP = ____

   Change TSTEP to see the 12^{th} roots of unity. TSTEP = ____

3. Let's find the cube roots of $z = -8i$.

   In trigonometric form $-8i =$ ____(cos(___) + i sin(___))

   A "first" cube root of $-8i$ is

   $z_0 =$ ____(cos($\frac{\_\_\_}{\_\_\_}$) + i sin($\frac{\_\_\_}{\_\_\_}$)) = ____(cos(___) + i sin(___))

   = ____________________________ (convert to $a+bi$ form)

   Now repeatedly add ____ to the argument (angle) to get the other cube roots z_1 and z_2:

   $z_1 =$ ____(cos(___ + ___) + i sin(___ + ___))

   = ____(cos(___) + i sin(___)) = ____________________________

   $z_2 =$ ____(cos(___ + ___) + i sin(___ + ___))

   = ____(cos(___) + i sin(___)) = ____________________________

   Sketch a circle of radius 2 in the complex plane, centered at 0, and mark the three cube roots of $-8i$ on the circle.