Main Ideas/Questions	Notes/Examples
The Imaginary Numbers	• Equations such as $x^2+1=0$ have no real solution, so mathematicians defined the **imaginary numbers** to represent their solutions. • The **imaginary unit**, ______, is defined as ______________. This is useful when working with square roots of negative numbers. • A **pure imaginary number** is written in the form ________, where ______ is the real number and ______ is the imaginary part.
Simplifying Negative Square Roots	**Step 1:** Rewrite $\sqrt{-a}$ as $\sqrt{-1\cdot a}$ **Step 2:** Break a down if it is not a perfect square. **Step 3:** Simplify the radical, recalling that $\sqrt{-1}=i$.

1. $\sqrt{-9}$	**2.** $\sqrt{-196}$	**3.** $\sqrt{-5}$
4. $\sqrt{-80}$	**5.** $\sqrt{-32}$	**6.** $\sqrt{-192}$

Powers of "i"

i^1 = ______________ = ______	i^5 = ______________ = ______
i^2 = ______________ = ______	i^6 = ______________ = ______
i^3 = ______________ = ______	i^7 = ______________ = ______
i^4 = ______________ = ______	i^8 = ______________ = ______

Use the pattern to simplify!

i^{15}	i^{62}

Pure Imaginary Numbers

7. i^{11}	**8.** $-3i^{21}$	**9.** $6i^{13}\cdot 18i^{3}$
10. $(2i^9)^5$	**11.** $(-i^2)^5\cdot(-3i^{10})^3$	**12.** $\left(\sqrt{-9}\right)^3\cdot(2i)^6$

Products of Pure Imaginary Numbers

Directions: Simplify the expressions below.

13. $4i\cdot 7i$	14. $(-4i)(2i)(-9i)$
15. $(2i)^3\cdot(5i)$	16. $(i\sqrt{3})^2\cdot(-8i)^2$
17. $\sqrt{-18}\cdot\sqrt{-10}$	18. $\sqrt{-24}\cdot\sqrt{-3}\cdot\sqrt{-2}$

Directions: Write each radical as a complex number.

19. $\sqrt{-121}$	20. $\sqrt{-45}$	21. $\sqrt{-\frac{81}{4}}$

Directions: Evaluate.

22. i^2	23. i^{59}	24. $4i^{15}\cdot 5i^6$
25. $(-3i^{16})^3$	26. $(2i)^7\cdot(-5i^9)^2$	27. $(i^4\sqrt{6})^2\cdot(-4i)^3$