

Day 1 In Class--NO CALCULATORS

Make a factor tree on each of the following radicals, then simplify.

1) $\sqrt[2]{64}$ $2 \cdot 2 \cdot 2 = 8$

2) $\sqrt[2]{27}$ $3\sqrt{3}$

3) $\sqrt{-64} = \sqrt{-1 \cdot 64}$
 $= \sqrt{-1} \cdot \sqrt{64}$
 $i \cdot 8 = 8i$

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

5) $\sqrt{-9} = 3i$

6) $\sqrt{-25} = 5i$

7) $\sqrt{-72} = \sqrt{-1} \cdot \sqrt{72}$
 $i \cdot 2 \cdot 3 \cdot \sqrt{2} \cdot i = 6i\sqrt{2}$

8) $\sqrt{-1} = i$

Before today, we couldn't simplify square roots of negative numbers. Why not?

9) Turn to the first page of notes for this unit, Let's find out what that last box represents!

10) $i = \sqrt{-1}$

go back on the above problems, where necessary and rewrite them in terms of i

Complex Numbers: $A + Bi$

11) Which is the real part of the complex number?

Which is the imaginary part of the complex number?
 Bi

Simplify each of the complex expressions below. Then list the real part of the complex number and the imaginary part of the complex number.

12) $(-5 + 7i) + (6 - 8i)$

$1 - i$
A + Bi

14) $(4 + 5i) + (-2 + 5i)$

13) $(3 - 6i) - 2 + (6i)$

$1 + 0i$
 $\boxed{1}$

15) $(8 + 7i) - (6 - 8i)$
 $8 + 7i - 6 + 8i$

$2 + 15i$

17) $(-2 - 7i)(7 + 3i)$
 $-14 - 6i - 49i + 21$
 $-14 - 55i + 21$
 $\boxed{7 - 55i}$

19) $(2 + 8i)(5 + i)$

16) $i^2 = -1$ $\sqrt{-1} = (-1)^{\frac{1}{2}} = i$
 $(-1)^{\frac{1}{2}}(-1)^{\frac{1}{2}} = (-1)^1 = -1$
 $i = i^3$ $i^2 = \sqrt{-1}$

18) $(7 - 7i)^2 = (7 - 7i)(7 - 7i)$
 $49 - 98i + 49(i^2)$
 $\boxed{0 - 98i} = -98i$

Complex Conjugates:

20) The Conjugate of $A + Bi$ is $A - Bi$

21) The Conjugate of $A + \sqrt{B}$ is $A - \sqrt{B}$

Find the conjugate of each complex number below. Then multiply the conjugates together to verify your answer.

22) $(5 - 2i)(5 + 2i)$
 $25 + 10i - 10i + 4(i^2)$
 29

If this was a fraction...
23) $\frac{1}{(2 + 4i)} \cdot \frac{(2 - 4i)}{(2 - 4i)} = \frac{2 - 4i}{4 + 16(i^2)}$
 $= \frac{2 - 4i}{20}$

24) $-2i = (0 - 2i)(0 + 2i)$
 $-2i(2i)$
 $-4(i^2) = 4$

25) $(4)(+4) = (4 + 0i)(4 + 0i)$
 $+ 16$

26) $(-2 + \sqrt{14})(-2 - \sqrt{14})$
 $+4 + 2\sqrt{14} - 2\sqrt{14} - 14$
 $\boxed{-10}$

27) $(7 - \sqrt{5})(7 + \sqrt{5})$
 $49 + 7\sqrt{5} - 7\sqrt{5} - 5$
 $\boxed{44}$

28) $-5\sqrt{2} = (0 - 5\sqrt{2})(0 + 5\sqrt{2})$
 $= (-5\sqrt{2})(5\sqrt{2})$
 $= -50$

29) $-2 + 3 \cdot i\sqrt{5}$