Warmup: Solve by square roots

$$
\begin{aligned}
4 x^{2}+8 & =44 \\
-8 & -8 \\
\frac{4 x^{2}}{4} & =\frac{36}{4} \\
\begin{aligned}
& x^{2}=\sqrt{9} \\
& 3 x^{2}-3=-39 \\
&+3 \\
&+3
\end{aligned} & \frac{3 x^{2}}{3}=-\frac{36}{3} \\
& \sqrt{x^{2}}=\sqrt{-12} \\
x & = \pm 2 i \sqrt{3}
\end{aligned}
$$

Warmup: solve by square roots

$$
\begin{aligned}
& \begin{array}{c}
2(x+1)^{2}-4=36 \\
+4 \begin{array}{c}
4 \\
2(x+1)^{2} \\
2
\end{array}=\frac{40}{2} \\
\sqrt{(x+1)^{2}}=\sqrt{20}
\end{array} \quad \rightarrow \begin{array}{l}
x+1= \pm 2 \sqrt{5} \\
-1=-1 \\
x=-1 \pm 2 \sqrt{5}
\end{array} \\
& -3(2 x-3)^{2}+2=14 \\
& -2 \quad-2 \\
& \frac{-3(2 x-3)^{2}}{-3}=\frac{12}{-3} \\
& \sqrt{(2 x-3)^{2}}=\sqrt{-4} \\
& \begin{array}{l}
\begin{array}{l}
2 x-3= \pm 2 i \\
+3+3
\end{array} \\
\frac{2 x}{2}=\frac{3 \pm 2 i}{2}
\end{array} \\
& x=\frac{3 \pm 2 i}{2}
\end{aligned}
$$

1) $n^{2}=-80$ $n= \pm 4 i \sqrt{5}$
2) $x^{2}=-57$

$$
x= \pm i \sqrt{57}
$$

3) $6 x^{2}=-486$

$$
\begin{aligned}
& x^{2}=-81 \\
& x= \pm 9 i
\end{aligned}
$$

4) 

$$
\begin{aligned}
-8 x^{2} & =504 \\
x^{2} & =-63 \\
x & = \pm 3 i \sqrt{7}
\end{aligned}
$$

5) $6 p^{2}+4=-86$

$$
\begin{aligned}
6 p^{2} & =-90 \\
p^{2} & =-15 \\
p & = \pm i \sqrt{15}
\end{aligned}
$$

7) $(x-3)^{2}=-16$

$$
\begin{aligned}
x-3 & = \pm 4 i \\
x & =3 \pm 4 i
\end{aligned}
$$

9) $(x-2)^{2}+25=0$

$$
\begin{array}{rl}
(x-2)^{2}=-25 & x-2= \pm 5 i \\
& x=2 \pm 5 i
\end{array}
$$

8) $(5 x+1)^{2}=-25$

$$
\begin{array}{r}
5 x+1= \pm 5 i \quad 5 x=-1 \pm 5 i \\
x=\frac{-1 \pm 5 i}{5}
\end{array}
$$

10) $(x+1)^{2}+4=0$
$(x+1)^{2}=-4$
$x+1= \pm 2 i$
$x=-1 \pm 2 i$

D17 Quad Formula 4th.GWB - 5/15 - Thu Aug 242017 07:41:47

$$
\begin{aligned}
& \text { 11) } \begin{aligned}
& 2(x-3)^{2}+10=-8 \\
& 2(x-3)^{2}=-18 \\
&(x-3)^{2}=-9 \quad x-3= \pm 3 i \\
& x=3 \pm 3 i
\end{aligned}
\end{aligned}
$$

12) $-3(x-4)^{2}=15$

$$
\begin{array}{r}
(x-4)^{2}=-5 \quad x-4= \pm i \sqrt{5} \\
x=4 \pm i \sqrt{5}
\end{array}
$$

13) $-4(6 x-1)^{2}-5=223$

$$
-4(6 x-1)^{2}=228
$$

$$
\begin{aligned}
(6 x-1)^{2} & =-57 \\
6 x-1 & = \pm i \sqrt{57}
\end{aligned} \quad \begin{aligned}
& x=\frac{1 \pm i \sqrt{57}}{6}
\end{aligned}
$$

$$
\text { 14) } \begin{aligned}
(6 x+2)^{2} & +4=-28 \\
(6 x+2)^{2} & =-32 \\
6 x+2 & = \pm 4 i \sqrt{2} \quad x=\frac{-2 \pm 4 i \sqrt{2}}{6} \\
6 x & =-2 \pm 4 i \sqrt{2}
\end{aligned}
$$

$$
\begin{aligned}
-\frac{2}{6} & =\frac{-1}{3} \quad \frac{1}{2} \pm \frac{2 i \sqrt{2}}{3} \\
\frac{4}{6} & =\frac{2}{3}
\end{aligned}
$$

$$
\frac{-2}{6} \pm \frac{4 i \sqrt{2}}{6}
$$

# Quiz \#4 <br> Solving by Square Roots 

E.Q.:

$$
\begin{aligned}
& (x+2)(x+1) \\
& x^{2}+1 x+2 x+2
\end{aligned}
$$

How do we solve quadratic equations using the quadratic formula?

$$
\begin{gathered}
\rightarrow x^{2}+3 x+2 \leftarrow \\
a x^{2}+b x+c
\end{gathered}
$$

standard form of a
quadratic

## The Quadratic Formula

$$
\frac{-b \pm \sqrt{b^{2}-4 a c}}{2 a}
$$

This formula works for all standard form quadratic equations.

It is directly derived by completing the square on the standard form of a quadratic equation:

$$
a x^{2}+b x+c=0
$$

The Quabratic Formula is a method of solving quadratics that works for every quabratic equation.
-In order to set up quadratic formula, we need our quadratic equation written in standard form:

$$
a x^{2}+b x+c
$$

-Once the quadratic is in standard form, we plug the coefficients $\mathrm{a}, \mathrm{b}$, and c into the quadratic formula:

$$
x=\frac{-b \pm \sqrt{b^{2}-4 a c}}{2 a}
$$

Solve using the quadratic formula:

$$
\begin{aligned}
& x^{2}+6 x+5=0 \\
& a=1 \quad b=6 \quad c=5 \\
& =\frac{-6 \pm \sqrt{(6)^{2}-4(1)(5)}}{2(1)} \\
& =\frac{-6 \pm \sqrt{36-20}}{2}
\end{aligned}
$$

FXAPFS set up the quadratic formula for each of the following quadratic equations.

$$
\begin{gathered}
6 x^{2}-45=3 x \\
-3 x-3 x \\
6 x^{2}-3 x-45=0 \\
a=6 \\
b=-3 \\
c=-45
\end{gathered}
$$

$$
\begin{aligned}
& \begin{array}{l}
\text { opposite } \\
\text { of } \\
b \\
-(-3) \pm \sqrt{(-3)^{2}-4(6)(-45)} \\
\frac{2(6)}{12} \\
\frac{3 \pm \sqrt{9+1080}}{12}=\frac{3 \pm \sqrt{1089}}{12} \\
3)=\frac{36}{12}
\end{array} \\
& \frac{\frac{30}{12}}{2}=
\end{aligned}
$$

$$
=\frac{-5}{2}
$$

$$
\begin{aligned}
& 4 x^{2}=-9-9 x \\
& +9 x+9+9+9 x \\
& \quad 4 x^{2}+9 x+9=0 \\
& a=4 \\
& b=9 \\
& c=9
\end{aligned}
$$

$$
\begin{gathered}
\frac{-9 \pm \sqrt{9^{2}-4(4)(9)}}{2(4)} \\
\frac{-9 \pm \sqrt{81-144}}{8} \\
\frac{-9 \pm \sqrt{-63}}{8} \\
\frac{-9 \pm i \sqrt{63}}{8} \\
8
\end{gathered}
$$

## $8 x^{2}+x-13=-11 x$

$5 x^{2}=80$

## HW \#9:

## Solving Quadratic Equations Using the Quadratic Formula

