Warmup:

$$
\begin{gathered}
2 x-10=122 \\
x=66
\end{gathered}
$$

$$
8 x-9=583
$$

$$
x=74
$$

$$
\text { 1) } \left.\begin{array}{rl}
2(a+3)^{2}-10 & =122 \\
+10 & +10
\end{array}\right] \begin{aligned}
& \frac{2(a+3)^{2}}{2}=\frac{132}{2} \\
& \sqrt{(a+3)^{2}}=\sqrt{66} \\
& a+p= \pm \sqrt{66} \\
&-3+\sqrt{66}=-3 \\
&-3-\sqrt{66} \quad a=-3 \pm \sqrt{66}
\end{aligned}
$$

2) 

$$
\begin{gathered}
8 x^{2}-9=583 \\
+9 \quad \begin{array}{r}
+9 \\
\frac{8 x^{2}}{8}
\end{array}=\frac{592}{8} \\
\sqrt{x^{2}}=\sqrt{74} \\
x= \pm \sqrt{74}
\end{gathered}
$$

$$
4 n+10=14
$$

3) 

$$
\begin{array}{r}
4 n^{2}+10=14 \\
-10=-10 \\
\frac{4 n^{2}}{4}=\frac{4}{4} \\
\sqrt{n^{2}}=\sqrt{1} \\
n= \pm 1
\end{array}
$$

$$
\begin{aligned}
& \text { 4) } \begin{array}{rl}
3(n-10)^{2} & +4=247 \\
& -4-4 \\
\frac{3(n-10)^{2}}{3}= & \frac{243}{3} \\
\sqrt{(n-10)^{2}}=\sqrt{81} \\
n-10 & = \pm 9 \\
+10 & +10 \\
n=10 \pm 9 \\
n=19 & n=1
\end{array}
\end{aligned}
$$

$$
\begin{gathered}
\text { 5) } \begin{array}{c}
(x-11)^{2}+9=90 \\
-9 \\
\sqrt{(x-9} \\
\sqrt{(x-11)^{2}}=\sqrt{81} \\
x-11= \pm 9 \\
x=11 \pm 9 \\
x=20 \\
x=2
\end{array}
\end{gathered}
$$

$$
\text { 6) } \begin{aligned}
& 3(x+5)^{2}-2=22 \\
&+2+2 \\
& \frac{3(x+5)^{2}}{3}=\frac{27}{3} \\
& \sqrt{(x+5)^{2}}=\sqrt{8} \\
& x+5= \pm 2 \sqrt{2} \\
& x=-5 \pm 2 \sqrt{2}
\end{aligned}
$$

## Homework \#7

## Solving Quadratics by Square Roots

Solve each equation by taking square roots.

1) $\mathrm{m}^{2}=81$
2) 

$$
p^{2}=82
$$

$$
m= \pm \sqrt{81}
$$

$$
M=-9 \text { or } 9
$$

3) $b^{2}+4=76$
4) 

$$
\begin{aligned}
& x^{2}+3=27 \\
& x^{2}=24 \\
& x= \pm \sqrt{24}= \pm \sqrt{4 \cdot 6}= \pm 2 \sqrt{6} \\
& x=-2 \sqrt{6} \text { or } 2 \sqrt{6}
\end{aligned}
$$

5) $m^{2}+8=33$

$$
\begin{aligned}
& m^{2}=25 \\
& m= \pm \sqrt{25}= \pm 5 \\
& m=-5 \text { or } 5
\end{aligned}
$$

6) 

$$
\begin{aligned}
-9 x^{2} & =504 \\
x^{2} & =56 \\
x & = \pm \sqrt{56} \quad x= \pm 2 \sqrt{14}
\end{aligned}
$$

7) 

$$
\begin{aligned}
8 v^{2}+4 & =444 \\
8 v^{2} & =440 \\
v^{2} & =55 \\
v & = \pm \sqrt{55}
\end{aligned}
$$

9) 

$$
\begin{aligned}
8 x^{2}+7 & =263 \\
8 x^{2} & =256 \\
x^{2} & =32 \\
x & =\sqrt{32}= \pm \sqrt{16 \cdot 2}= \pm 4 \sqrt{2} \\
x & =-4 \sqrt{2} \text { of } 4 \sqrt{2}
\end{aligned}
$$

8) $5 m^{2}+5=90$

$$
\begin{aligned}
5 m^{2} & =85 \\
m^{2} & =17 \\
m & = \pm \sqrt{17} \quad M=-\sqrt{17} \text { or } \sqrt{17}
\end{aligned}
$$

10) $-10 k^{2}-5=-165$
$-10 k^{2}=-160$
$k^{2}=16$
$k= \pm \sqrt{16}$
$\pm 4$

$$
\begin{aligned}
& \text { 11) }(x+3)^{2}-4=23 \\
& (x+3)^{2}=27 \\
& x=-3 \sqrt{3}-3 \\
& x+3= \pm \sqrt{27} \\
& \text { or } \\
& x= \pm \sqrt{27}-3-3 \pm 3 \sqrt{3} \\
& x=3 \sqrt{3}-3 \\
& x= \pm \sqrt{9 \cdot 3}-3= \pm 3 \sqrt{3}-3 \\
& \text { 12) } \\
& \sqrt{2(x-6)^{2}}=50 \\
& x-6= \pm \sqrt{25} \\
& x-6= \pm 5 \\
& x-6=-5 \text { or } x-6=5 \\
& \text { 14) } \\
& \begin{array}{c}
x=1 \quad \text { or } x=11 \\
(x-5)^{2}-15=30
\end{array} \\
& (x-5)^{2}=45 \\
& x-5= \pm \sqrt{45} \\
& x=5 \pm \sqrt{45}=5 \pm \sqrt{905} \\
& x=5 \pm 3 \sqrt{5} \quad\left(\begin{array}{l}
x=5-3-\sqrt{5} \\
\text { or } \\
x=5+3 \sqrt{5}
\end{array}\right)
\end{aligned}
$$

15) $-3(x+6)^{2}-7=-22$

Sorry ${ }^{\prime \prime}$
17)

$$
\begin{aligned}
-(x-10)^{2} & =4=12 \\
-(x-10)^{2} & =-8 \\
(x-10)^{2} & =8 \\
(x-10) & = \pm \sqrt{8} \quad x=10 \pm 2 \sqrt{2} \\
x-10 & = \pm 2 \sqrt{2}
\end{aligned}
$$

16) 

$$
\begin{aligned}
& \frac{1}{4}(x+6)^{2}+4=10 \\
& \frac{1}{4}(x+6)^{2}=6 \\
&(x+6)^{2}=24 \\
& x+6= \pm \sqrt{24} \\
& x= \pm \sqrt{24}-6
\end{aligned}
$$

$$
x= \pm \sqrt{4.6}-6
$$

$$
x= \pm 2 \sqrt{6}-6
$$

$$
x=-2 \sqrt{6}-6
$$

18) 

$$
\begin{gathered}
2(x-7)^{2}+9=107 \\
2(x-7)^{2}=98 \\
(x-7)^{2}=49 \\
x-7= \pm 7 \\
x=7 \pm 7
\end{gathered}
$$

$$
x=2 \sqrt{6}+6
$$

$$
x=7+7=14
$$

or

$$
x=7-7=0
$$

$$
-3(x+6)^{2}=-15
$$

$$
(x+6)^{2}=5
$$

$x+6= \pm \sqrt{5}$

$$
x=-6 \pm \sqrt{5}
$$

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19) $(x+6)^{2}-4=40$
20) $\quad 7(x-8)^{2}=112$

$$
(x+6)^{2}=44
$$

$x+6= \pm \sqrt{44}$
$x=-2 \sqrt{11}-6$
$x=2 \sqrt{11}-6$

$$
(x-8)^{2}=16
$$

$$
x= \pm \sqrt{44}-6
$$

$x= \pm \sqrt{4 \cdot 11}-6$

$$
x= \pm 2 \sqrt{11}-6
$$

$$
-6 \pm 2 \sqrt{11}
$$

## Solving by Square Roots with Imaginary Solutions

$$
\begin{aligned}
& \frac{-8 a^{2}}{-8}=\frac{216}{-8} \\
& \sqrt{a^{2}}=\sqrt{-27} \\
& a= \pm \sqrt{-27} \\
& a= \pm i \sqrt{27} \\
& a= \pm 3 ; \sqrt{3}
\end{aligned}
$$

$$
\begin{aligned}
& \frac{3 b^{2}}{3}=\frac{-180}{3} \\
& \sqrt{b^{2}}=\sqrt{-60} \\
& b= \pm \sqrt{-60}= \pm 2 i \sqrt{15}
\end{aligned}
$$

$$
\begin{aligned}
8 n^{2}+8 & =-120 \\
-8 & -8 \\
\frac{8 n^{2}}{8} & =-\frac{128}{8} \\
\sqrt{n^{2}} & =\sqrt{-16} \\
n & = \pm 4 i
\end{aligned}
$$

$$
\begin{gathered}
-(x-\mathbf{x})^{2}-\mathbf{1 2}=\mathbf{0} \\
+12 \\
\frac{-(x-4)^{2}}{-1}=\frac{12}{-1} \\
\sqrt{(x-4)^{2}}=\sqrt{-12} \\
x-4= \pm 2 i \sqrt{3} \\
+4=+4
\end{gathered}
$$

$$
x=4 \pm 2 i \sqrt{3}
$$

$$
\begin{aligned}
& \frac{\mathbf{1}}{\mathbf{3}}(x+2)^{2}+\mathbf{4}=-\mathbf{- 2 2} \\
& \frac{1}{3}(x+2)^{2}=\frac{-26}{\frac{1}{3}} \\
& \sqrt{(x+2)^{2}}=\sqrt{-78} \quad x+2= \pm i \sqrt{78} \\
& x=-2 \pm i \sqrt{78}
\end{aligned}
$$

## $-3(x+5)^{2}-2=22$

$$
\begin{aligned}
&(6 x+2)^{2}+4=-28 \\
&-4=-4 \\
& \sqrt{(6 x+2)^{2}}=\sqrt{-32} \\
& 6 x+2= \pm 4 i \sqrt{2} \\
&-2-2 \\
& \frac{6 x}{6}=\frac{-2 \pm 4 i \sqrt{2}}{6} \\
& x=\frac{-2}{6}=\frac{-1}{3} \\
& \frac{4}{6}=\frac{2}{3} \\
& 3
\end{aligned}
$$

# HW \#8 <br> Solving by Square Roots 

## Imaginary Solutions

