Lesson 9-1

Example 1 Find Square Roots
Find each square root.

a. $\sqrt{25}$ $\sqrt{25}$ indicates the positive square root of 25.

Since $5^2 = 25$, $\sqrt{25} = 5$.

b. $-\sqrt{49}$ $-\sqrt{49}$ indicates the negative square root of 49.

Since $7^2 = 49$, $-\sqrt{49} = -7$.

c. $\pm\sqrt{16}$ $\pm\sqrt{16}$ indicates both square roots of 16.

Since $4^2 = 16$, $\sqrt{16} = 4$ and $-\sqrt{16} = -4$.

Example 2 Calculate Square Roots
Use a calculator to find each square root to the nearest tenth.

a. $\sqrt{12}$

2nd [$\sqrt{}$] 12 ENTER 3.464101615	Use a calculator.
$\sqrt{12} \approx 3.5$	Round to the nearest tenth.
	CHECK Since $(3.5)^2 = 12.25$, the answer is reasonable.

b. $-\sqrt{40}$

2nd [$\sqrt{}$] 40 ENTER 6.32455532	Use a calculator.
$-\sqrt{40} \approx -6.3$	Round to the nearest tenth.
	CHECK Since $(-6)^2 = 36$, the answer is reasonable.

Example 3 Estimate Square Roots
Estimate each square root to the nearest whole number.

a. $\sqrt{50}$

Find the two perfect squares closest to 50. To do this, list some perfect squares.

1, 4, 9, 16, 25, 36, 49, 64, …

$49 < 50 < 64$	50 is between 49 and 64.
$\sqrt{49} < \sqrt{50} < \sqrt{64}$	$\sqrt{50}$ is between $\sqrt{49}$ and $\sqrt{64}$.
$7 < \sqrt{50} < 8$	$\sqrt{49} = 7$ and $\sqrt{64} = 8$.

Since 50 is closer to 49 than 64, the best whole number estimate is 7.

b. $-\sqrt{140}$

Find the two perfect squares closest to 140. List some perfect squares.

…, 100, 121, 144, 169, …

$-144 < -140 < -121$		-140 is between –144 and –121.
$-\sqrt{144} < -\sqrt{140} < -\sqrt{121}$		$-\sqrt{140}$ is between $-\sqrt{144}$ and $-\sqrt{121}$.
$-12 < -\sqrt{140} < -11$		$-\sqrt{144} = -12$ and $-\sqrt{121} = -11$.

Since –140 is closer to –144 than –121, the best whole number estimate for $-\sqrt{140}$ is –12. **CHECK** $-\sqrt{140} \approx -11.8$

Example 4 Use Square Roots to Solve a Problem

SCIENCE To estimate how far you can see from a point above the horizon, you can use the formula $D = 1.22 \times \sqrt{A}$ where D is the distance in miles and A is the altitude, or height, in feet. Use this information to determine how far you can see when standing on the top of an office building that is 350 feet high.

$D = 1.22 \times \sqrt{A}$	Write the formula.
$= 1.22 \times \sqrt{350}$	Replace *A* with 350.
$\approx 1.22 \times 18.71$	Evaluate the square root first.
≈ 22.8262	Multiply.

On a clear day, you can see about 22.8 miles from the top of the office building.