Checkpoint 1: Assess Your Understanding, pages 108–109

2.1

1. Order the numbers in this set from greatest to least.

$-5, -|-6|, 0, |-3|, 1, \left|\frac{1}{2}\right|, \left|-3\frac{2}{3}\right|$

$-5 \qquad -|-6| = -(6) \qquad 0 \qquad |-3| = 3$
$\qquad\qquad\quad = -6$

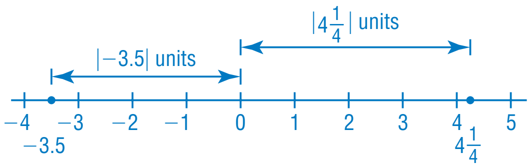
$1 \qquad \left|\frac{1}{2}\right| = \frac{1}{2} \qquad \left|-3\frac{2}{3}\right| = 3\frac{2}{3}$

From greatest to least: $3\frac{2}{3} > 3 > 1 > \frac{1}{2} > 0 > -5 > -6$

That is, $\left|-3\frac{2}{3}\right| > |-3| > 1 > \left|\frac{1}{2}\right| > 0 > -5 > -|-6|$

2. Use the numbers -3.5 and $4\frac{1}{4}$.

a) Mark each number on a number line and use absolute value to show its distance from 0.



b) Use absolute value to determine the distance between the numbers.

$$\begin{aligned}\left|4\tfrac{1}{4} - (-3.5)\right| &= \left|4\tfrac{1}{4} + 3.5\right| \\ &= |4.25 + 3.5| \\ &= |7.75| \\ &= 7.75\end{aligned}$$

The numbers are 7.75 units apart on a number line.

3. Multiple Choice Which expression has the least value?

A. $-3|-4| + 2$ **B.** $-3|-4 + 2|$

C. $|-3||-4 + 2|$ **D.** $|-3(-4) + 2|$

2.2

4. Arrange in order from least to greatest.

$2\sqrt{27}, 5\sqrt{3}, \sqrt{12}$

Each radical has index 2.
Write each mixed radical as an entire radical.

$2\sqrt{27} = \sqrt{2^2} \cdot \sqrt{27}$ $\quad 5\sqrt{3} = \sqrt{5^2} \cdot \sqrt{3}$ $\quad \sqrt{12}$

$= \sqrt{4 \cdot 27}$ $\quad = \sqrt{25 \cdot 3}$

$= \sqrt{108}$ $\quad = \sqrt{75}$

Compare the radicands: $12 < 75 < 108$

So, from least to greatest: $\sqrt{12}, 5\sqrt{3}, 2\sqrt{27}$

5. Write each entire radical as a mixed radical.

a) $\sqrt{162}$

$= \sqrt{81 \cdot 2}$

$= 9\sqrt{2}$

b) $\sqrt[3]{-250}$

$= \sqrt[3]{-125 \cdot 2}$

$= -5\sqrt[3]{2}$

c) $\sqrt[3]{\frac{16}{27}}$

$= \sqrt[3]{\frac{8 \cdot 2}{27}}$

$= \frac{2\sqrt[3]{2}}{3}$

6. For which values of the variable is each radical defined?

a) $\sqrt{2a^2}$

$\sqrt{2a^2} \in \mathbb{R}$ **when** $2a^2 \geq 0$.

$2 > 0$ **and** $a^2 \geq 0$

So, $\sqrt{2a^2}$ **is defined for** $a \in \mathbb{R}$.

b) $\sqrt[4]{125x^3}$

$\sqrt[4]{125x^3} \in \mathbb{R}$ **when** $125x^3 \geq 0$.

$125 > 0$, **so** $x^3 \geq 0$; **that is,** $x \geq 0$

So, $\sqrt[4]{125x^3}$ **is defined for** $x \geq 0$.

c) $\sqrt[3]{-27v}$

Since the cube root of a number is defined for all real numbers,
$\sqrt[3]{-27v}$ **is defined for** $v \in \mathbb{R}$.