Example 4 ***Find Velocity and Speed***

A rock falls from a bridge at a rate of 9.8 meters per second. What are its velocity and speed?

Velocity indicates both speed and direction (up is positive and down is negative). The *speed* of an object is the absolute value of its velocity.

Solution

Velocity = -9.8 meters per second **Motion is** down

Speed = $|-9.8|$

= 9.8 meters per second **Speed is never negative.**

Example 5 ***Using a Counterexample***

Determine whether the statement is *true* or *false*. If it is false, give a counterexample.

a. The absolute value of a negative number is *never* positive.

b. The expression $-|a|$ is *always* less than a.

Solution

a. False. Counterexample: The absolute value of -1 is 1, which is positive

b. False. Counterexample: If a = -6, then $-|a|$ = -6, which is not less than -6.

✔ ***Checkpoint*** **Complete the following exercises.**

9. A hotel elevator rises from the 1st floor to the 29th floor at a rate of 63 feet per minute. What are the elevator's velocity and speed?

$V = +63$ ft/min.

Sp = 63 ft/min.

10. Determine whether the following statement is *true* or *false*. If it is false, give a counterexample.

The expression $-a$ is always negative.

false

If $a = -6$, then $-a = -(-6) = 6$, which is positive.