

Car Parts

Solution

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Relative to the ground, the bottom point of a tire is momentarily stationary, and its top point moves at 120 miles per hour.

This assumes an ideal wheel rolling without slipping. The center of the wheel moves forward with the car, at 60 miles per hour.

Relative to the wheel's center, rotation makes the bottom point move backward at 60 miles per hour. Relative to the ground, its two motions cancel:

$$60 - 60 = 0.$$

At the top, rotation moves the point *forward* at 60 miles per hour relative to the center. The two motions now add:

$$60 + 60 = 120.$$

The point at the bottom is stationary only for an instant. A moment later, that part of the tire has moved around the wheel and a different part touches the ground.

Without the “no slipping” assumption, the car's speed alone does not determine these speeds. A spinning or skidding wheel is a different situation. This is the standard rigid-wheel rolling calculation; real tires also deform at their contact patches.

History and sources: [companion history PDF](#).