Answers to Exercises: Determining distance traveled from velocity

1. The area under the graph of $r(t)$ forms a triangle, so the red car's exact distance traveled can be found by geometry: 400 meters.
2. $G(t) = \frac{16}{3}t^{3/2}$; green car's exact distance traveled is 168.7 meters (rounded). $R(t) = 4t^2$; red car's exact distance traveled is 400 meters.
3. No, not enough information.
4. $21\frac{1}{3}$ meters
5. The additive constant in your antiderivative may differ (or equal zero):
    a. $F(t) = \frac{1}{4}t^4 + 6$
    b. $G(t) = \frac{3}{2}t^{4/3} - 1$
    c. $H(t) = \frac{2}{3}t^{3/2} + 2t^{1/2}$
    d. $k(t) = -2t^{-\frac{3}{2}} + 1$
6. Velocity
7. If the velocity is not always positive, the net area trapped by the velocity curve over an interval of time tells us the displacement of the object.
8. Only when rate is constant.
9. Rate is the vertical height of a rectangle that lies under a velocity graph. Time elapsed is the horizontal width of the rectangle. Distance = rate x time, and area of this rectangle equals rate x time. Therefore, area of this rectangle equals distance traveled.
10.
    a. $2\pi + 5.5$
    b. In the first second (or unit of time) the object moves first in reverse, then in the forward direction. The object's velocity increases until $t = 3$. The object's velocity decreases, until it comes to a rest (zero velocity) at time $t = 8$.