1. You are given a function describing the motion of a race-car which has a constant acceleration \( a(t) = (8 \, \text{m/s}^2 \, t^2) \). If the race track is 1.8 km long, how long will it take for the race-car to complete one lap? How long will it take to complete the second lap?

2. Bryce likes throwing rocks straight down at cars from an overpass. If a rock is guaranteed to fall with a constant acceleration of 9.8 m/s\(^2\) and Bryce can throw the rock at 25 m/s, how fast is the rock moving after only one second? If the rock impacts the ground at a velocity of 50 m/s how long was it falling for?

3. A dropped object is shown to move over time following the function \( x(t) = (7 \, m \, t) + (6 \, m/s^2 \, t^3) \). What is the acceleration function for this object?

4. You are traveling by horse to a cabin. You are in a hurry, so you are traveling at 20 mph. On the return journey you travel a leisurely 10 mph. What was your average speed throughout the journey?

5. Two cars are racing on a 1500ft track. The first car has a top speed of 268 mph, and has a constant acceleration of 0-60mph in 4 seconds. The second car has a top speed of 85 mph. The driver of the first car is very confident and agrees to allow the second car to get up to speed before crossing the starting line. Is there a chance the second car could win the race?
Visual Problems:

6. A *position* curve of an object being thrown off of a cliff is shown below. Draw a curve of what you expect the *velocity* curve to look like.

7. A *velocity* curve is shown below. Draw a curve of what you expect the *position* to look like.

8. An *acceleration* plot of a mass hanging from a spring yields the plot below. Draw a curve of what you expect the *position* to look like.