Name: _____ Date: _____

Guided Learning: Power and Motion (Part 1)

Learning goals
After completing this activity, you will be able to …

- Explain why the acceleration of powered systems (e.g., cars, electric motors, human runners) differs from the acceleration of freely falling bodies.
- Calculate the power generated in a system.
- Compute and graph the velocity curves for systems employing a constant power source.

Vocabulary: Calorie, calorie, efficiency, power, watt

Warm-up questions: Thinking about… running

1. A physically fit human can run 100 meters in about 12 seconds. Imagine sprinting for 12 seconds. Do you accelerate more during the first three seconds or during the last nine?

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2. Imagine you were able to accelerate at a constant rate for the entire 12 seconds. Do you think you would be burning the same number of calories per second at the beginning of the race as you did at the end? Explain your reasoning:

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3. It takes humans about three seconds to get close to their maximum speed, but a skydiver dropping from a plane falls for about thirteen seconds before nearing maximum speed, assuming he has not deployed his parachute by then.

   If gravity, a nearly constant force, can significantly increase a human's velocity for over ten seconds, why do you think it is so hard for human racers to keep getting faster and faster? (Note: The answer is not "Gravity is a stronger force." During the first half-second, a human runner accelerates faster forward than a skydiver falls downward.)

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