

Specific Models Using Constant Acceleration

Construct Motion Maps and Kinematic Graphs for the motions described below.

- 1) A coal train in Montana starts from rest and accelerates at 2.5 m/s^2 for 15s.
- 2) A motorcycle traveling at 36 m/s, slams on the brakes to avoid an accident. The motorcycle skids 23m before stopping.
- 3) A lime is thrown upward with a velocity of 5 m/s.
- 4) An egg is dropped from a building that is 61 m high.
- 5) An emu moving with constant acceleration covers the distance between two points that are 92 m apart in 6.5s. Its speed as it passes the second point is 14 m/s.
- 6) A monorail starts from rest and accelerates at a rate of 2.2 m/s^2 for 10 s. It runs at a constant speed for 74 s and then slows down at a rate of 1.5 m/s^2 .
- 7) A speedboat traveling at a constant velocity of 20 m/s passes a police boat at rest. The police boat starts 8 seconds after the speedboat passes at 2.3 m/s^2 for 10 s. When and where does the cop catch the speedboat?
- 8) Determined to test gravity a student walks off the Burj Khalifa in Dubai, which is 829 m high, and falls freely. His initial velocity is zero. Jetpack Woman leaves the roof with an initial velocity downward and then is in free-fall. In order both to catch the student and to prevent injury to her, Jetpack Woman should catch the student at a sufficiently great height and arrive at the ground with zero velocity. The upward acceleration that accomplishes this is provided by Jetpack Woman's jet pack, which she turns on just as she catches the student; before then the student is in free-fall. To prevent discomfort to the student the magnitude of the acceleration is limited to four

times gravity (4 G). How high above the ground must Jetpack Woman catch the student?