

### Acceleration, velocity and position in 1d

1. In the *Fellowship of the Ring*, Pippin Took drops a bucket down a well which takes a very long time to reach the "bottom." In the movie, this takes about 8 seconds.
  - a. Assuming the bucket starts at rest at the top of the well and accelerates at a constant value of  $10 \text{ m/s}^2$ , how fast is the bucket going just before it hits bottom?
  - b. How deep is the well? Ignore the time it takes for the sound to get back up the well.
  - c. If we assume the speed of sound is  $340 \text{ m/s}$ , was it reasonable to ignore the time it took the sound to get back up the well?

*adapted and altered for our use from Understanding Physics (Cummings, Laws, Redish & Cooney; Wiley 2004)*

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2. Given this graph of the velocity of an object as a function of time, draw graphs of the position and acceleration as functions of time. Label the graphs as precisely as you can.

