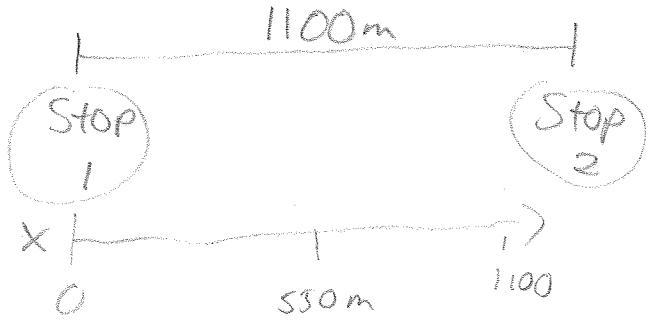
2-92 Train has $+1.2\ m/s^2 = a$



for first half the trip, and

$a = -1.2\ m/s^2$ for the second half.

a) how long does it take?

b) what's its max speed?

c) graph x, v, and a vs. t.

a) use eq. 2-15: $x - x_0 = v_0 t + \frac{1}{2} a t^2$

It has constant "a" from x=0 to 550, then a different constant "a" from 550 → 1100 m. So break it into two problems:

solve 2-15 for t,

$$t^2 = \left[(x - x_0) - v_0 t\right] \cdot \frac{2}{a}$$

$$t = \sqrt{\left((550m) - 0\right) \cdot \frac{2}{1.2\ m/s^2}} = 30.3\ s.$$

doing the same for the second half gives the same answer,

so (a) total $t = 60.6\ s$

b) Max speed is at the turn-around midway point, so use eq. 2-11

$v = v_0 + at$, where $v_0 = 0$ (stop) and $t = 30.3\ s$:

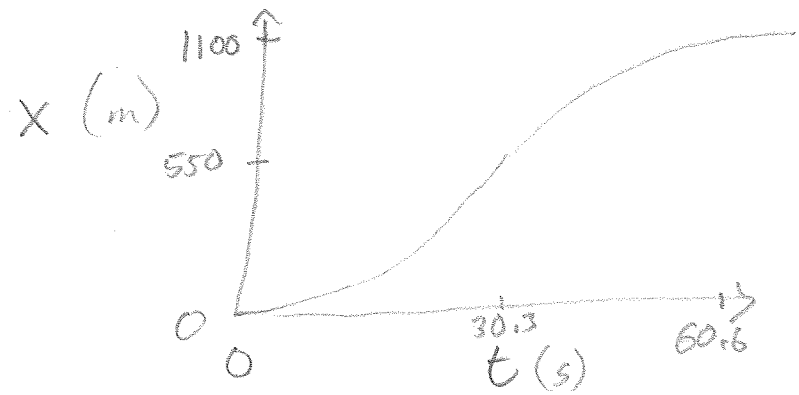
$$v = 0 + 1.2\ m/s^2 (30.3\ s) = 36.3\ m/s$$

c) graphs: see next page

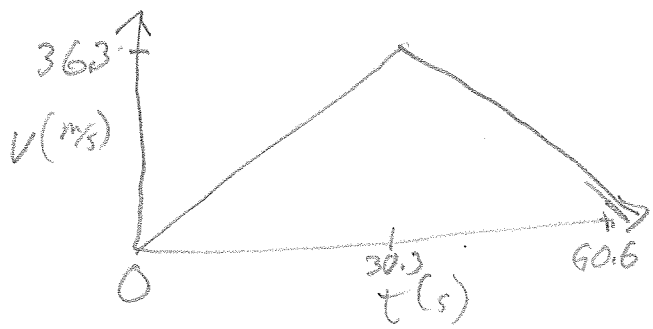
To graph, find the equations of whatever vs. t.

x: eq. 2-15, $x - x_0 = v_0 t + \frac{1}{2} a t^2$

Starts at x=0, and is a graph of $x \propto t^2$
and at x = 550m, switches around and goes to x = 1100 m.



v: eq. 2-11, $v = v_0 + at$; up to 30.3 s, $a = +1.2 m/s^2$
after 30.3 s, $a = -\frac{1}{2}$ m/s², so, two straight lines, meeting at 30.3 s with $v(30.3s) = 36.3$ m/s (from part b), $v(60.6s) = 0$ m/s



a: Given in problem