Kinematic Equations Algebra

Objective:
Algebraically solve each of the following equations

Name	**Equation**
Definition of Acceleration	$v_f = v_i + a \cdot \Delta t$
The King of Kinematic Equations	$\Delta x = v_i \cdot \Delta t + \frac{1}{2} a (\Delta t)^2$
The Average Velocity Formula	$\Delta x = \left(\frac{v_i + v_f}{2} \right) \Delta t$
No-Time Equation	$v_f^2 = v_i^2 + 2a \cdot \Delta x$

After each solution, use dimensional analysis to show that your result is dimensionally correct!

For each of the following situations, solve for an equation for the *variable* in terms of the *known quantities*.

1. Variable: initial velocity
Known quantities: final velocity, acceleration, and time

Solve for initial velocity in terms for final velocity, acceleration, and time.
a) Pick which formula has these four quantities in it.
b) Solve that formula.
c) Use dimensional analysis to prove that your new equation is dimensionally correct.

2. Variable: time
Known quantities: final velocity, initial velocity, and acceleration

3. Variable: acceleration
Known quantities: time, initial velocity, and displacement

4. Variable: initial velocity
Known quantities: time, acceleration, and displacement

5. Variable: initial velocity
Known quantities: time, final velocity, and displacement

6. Variable: time
Known quantities: initial velocity, final velocity, and displacement

7. Variable: final velocity
Known quantities: initial velocity, time, and displacement

8. Variable: initial velocity
Known quantities: final velocity, acceleration, and displacement

9. Variable: acceleration
Known quantities: initial velocity, final velocity, and displacement

10. Variable: displacement
Known quantities: initial velocity, final velocity, and acceleration

11. Variable: time**
Known quantities: displacement, initial velocity, and acceleration
** Note that deriving this equation involves using the *quadratic equation*.
BONUS: Simplify this by using one of the other kinematic equations!