Constant Acceleration Problems

1. A car on the highway constantly accelerates from an initial speed of 20 m/s to a final speed of 30 m/s over a time of 5 seconds.
   a. What was the car's acceleration?

   b. What was the car's average speed?

   c. How far did the car travel during this 5 seconds?

2. A Boeing 767 airplane can accelerate at a rate of 3.3 m/s^2. If a 767 starts from rest,
   a. How many seconds will it take to reach a take-off speed of 100 m/s?

   b. How far would it travel in that time?

   c. What would be the average speed of the plane over this interval?

3. Bill constantly accelerates from rest, covering a distance of 20 meters in a time of 3.0 seconds.
   a. What was Bill's acceleration?

   b. What was his final velocity?

4. Emily is riding her bike with a speed of 5 m/s. She then constantly accelerates at a rate of 2 m/s^2.
   a. How long will it take her to reach a speed of 10 m/s?

   b. How far will she travel in that time?

   c. What is her average speed for this interval?

5. Chelsea is rollerblading down Charter Road with a velocity of 18 m/s when a small child jumps out in front of her, and she attempts to stop. If her acceleration was a constant rate of -1.5 m/s^2,
   a. After 4 seconds, how fast is Chelsea going?

   b. How many seconds will it take her to stop?

   c. How far does she travel before she comes to rest?

   d. Why is her acceleration negative?

Answers:

1) a. $a=2\ m/s^2$ b. $v_{ave}=25\ m/s$ c. $d=125\ m$ 2) a. $t=30.3\ s$ b. $d=1515\ m$ c. $v_{ave}=50\ m/s$
3) a. $a=4.4\ m/s^2$ b. $v_f=13.2\ m/s$ 4) a. $t=2.5\ s$ b. $d=18.75\ m$ c. $v_{ave}=7.5\ m/s$
5) a. $v_f=12\ m/s$ b. $t=12\ s$ c. $d=108\ m$ d. slowing down in positive direction