Acceleration Problems

1. An object has a velocity (in SI units) given by the expression $v = 3t^2 - 10t + 5$. If it starts at the origin, after 5 seconds:
   a. What is its acceleration?

   b. Where is it?

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

   b. What was her final velocity?

4. Sam 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?

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5. Lewbert is traveling with a constant speed of 20 m/s when he passes T-Bo, who has a speed of 5 m/s. When Lewbert is 50 meters ahead of T-Bo, T-Bo tries to catch up to Lewbert with a constant acceleration of 4 m/s^2. How fast is T-Bo going when he passes Lewbert?

6. Gibby is driving with a constant acceleration and travels a distance of 120 meters in 4 seconds. He has a final speed of 40 m/s. What was his acceleration?

7. Spencer has a constant acceleration of 3 m/s^2 for a distance of 50 meters. His final velocity is 20 m/s. How long did it take him to travel that distance?

8. Starting from rest, Freddie has a constant acceleration for 7 seconds. He then slows to a stop with a different constant acceleration in 12 seconds. He traveled a total of 90 meters. What was his maximum speed?

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Answers:

1) a. 20 m/s² *b. 25 m*

2) a. t=30.3 s *b. d=1515 m* *c. v_{ave}=50 m/s*

3) a. a=4.4 m/s² *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) 45 m/s *6) 5 m/s²* *7) 3.33 s* *8) 9.47 m/s*