1.   A boy rode his bicycle towards the North for 20.0 minutes at a constant speed of 12.5 m/s. He then turned around and rode towards the South at a constant speed of 9.0 m/s for 10.0 minutes.
   a)   What total **distance** did he travel?

   b)   What was his final **displacement** from his starting position?

   c)   What was his average **speed** over the duration of his whole ride?

   d)   What was his average **velocity** over the duration of his whole ride?

2.   A car travels on the road at a constant speed of 45.0 km/h. How long does it take to travel a distance of 6500.0 m?
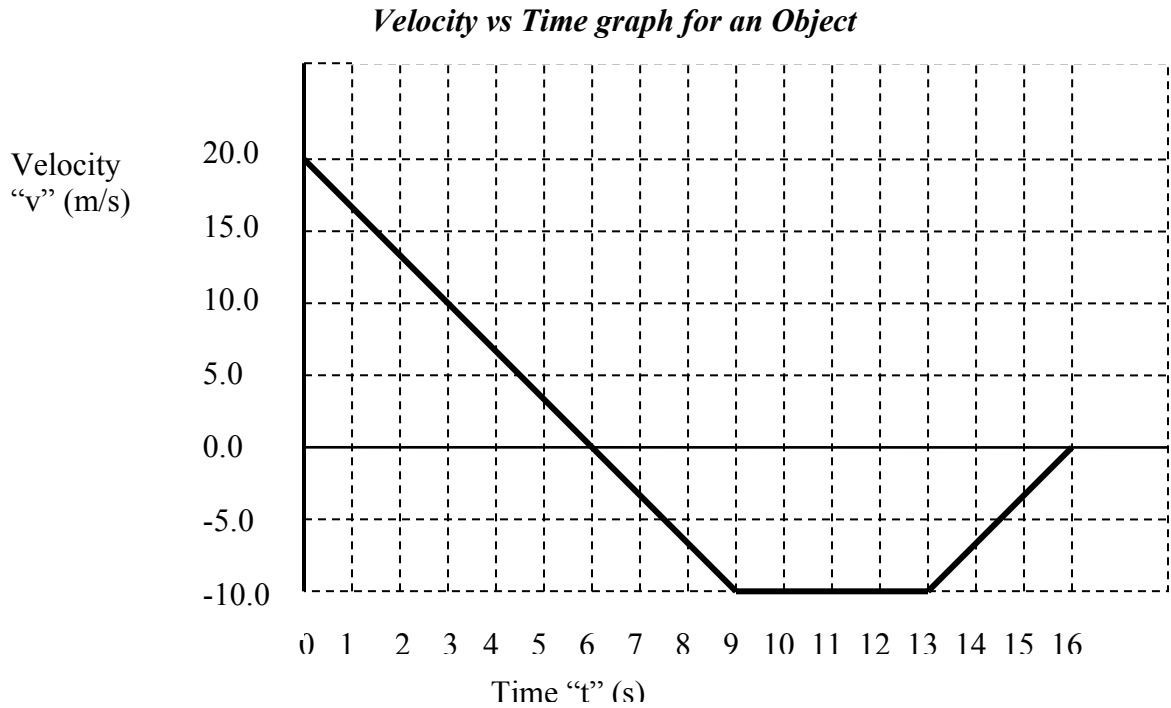
3.   Answer the following questions with reference to the graph shown below:

**Position vs Time graph for a Girl Walking**

Position "d" (m)
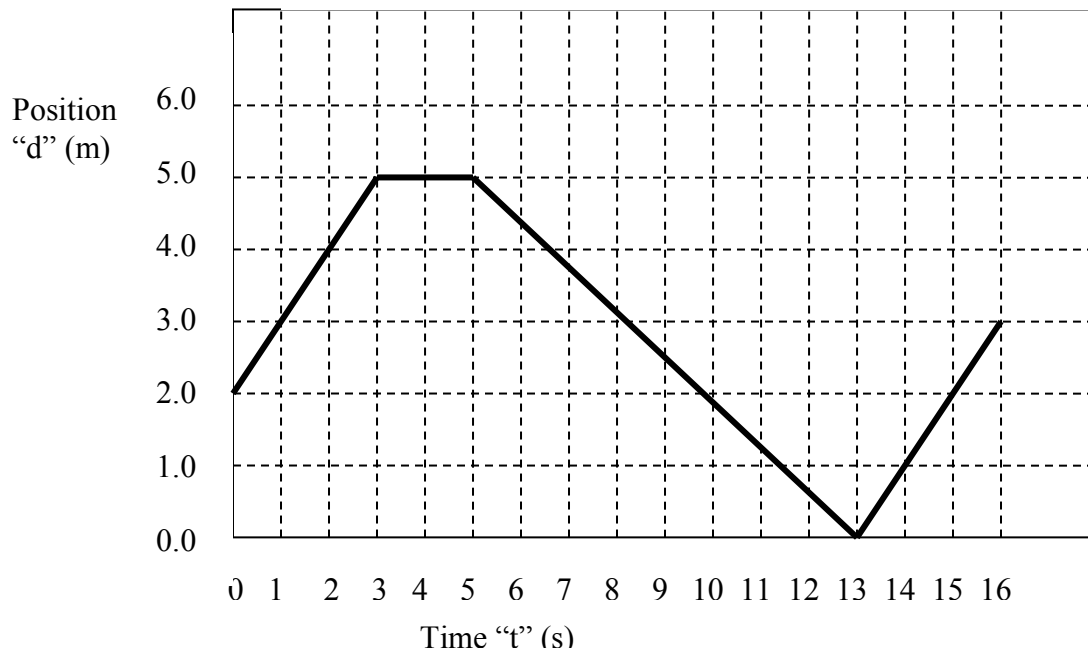
a)   What is the **average velocity** of the girl during her 16 second walk? (show your work)

b)   What is the velocity of the girl at the following instants in time? (show all work)
(i) $t = 2.0$ s

(ii) $t = 4.0$ s

(iii) $t = 10.0$ s

4.   Answer the following questions with reference to the graph shown below:

Velocity vs Time graph for an Object

Velocity "v" (m/s)

20.0
15.0
10.0
5.0
0.0
-5.0
-10.0

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Time "t" (s)

a)   What is the total displacement of the object for the duration of its motion? (show all work)

b)   What is the acceleration of the object when t = 11.0s?

c)   Give the equation of the portion of the graph from t = 0.0s to t =9.0s. Show all steps you took in obtaining the equation.

5. Use the graph below to answer the following questions (show all your work!):

Position vs Time graph for an Object

Position "d" (m)
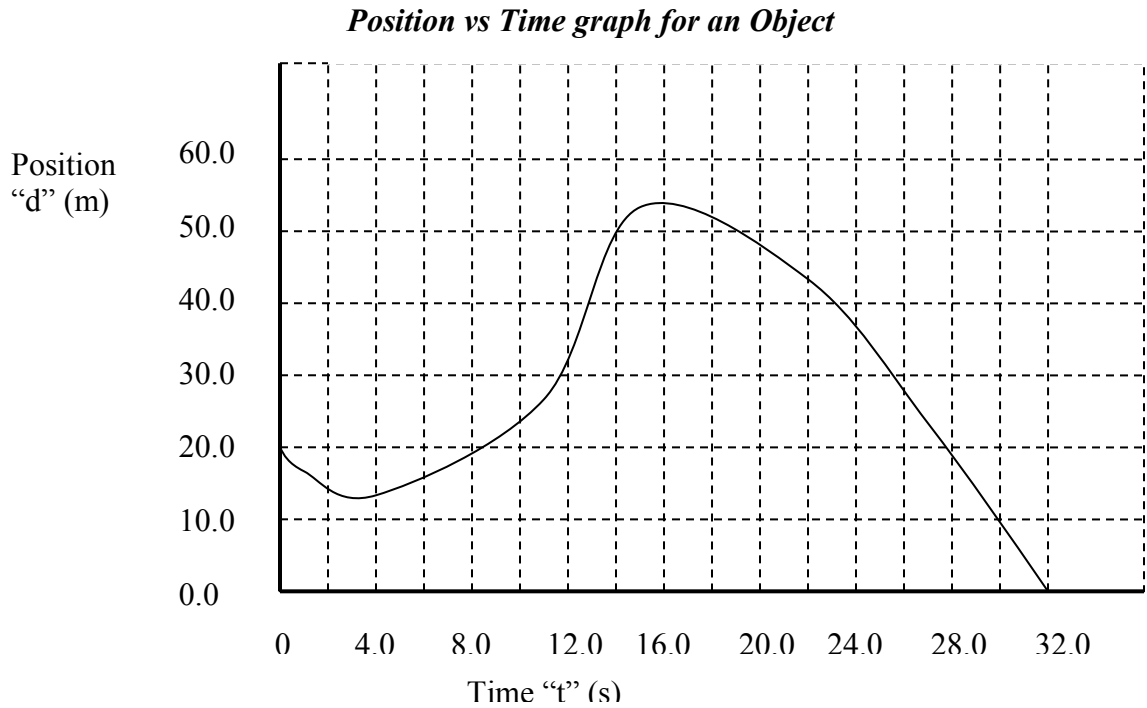
What is the **instantaneous velocity** of the object at the following times:

    a.   t = 12.0 s

    b. t = 16.0 s

    c.   t = 24.0 s

6. A car moving at 25.0 m/s [West] passes a stationary observer, and at the same time a boy on a bicycle rides by at 5.0 m/s [East].
    a. From the frame of reference of the driver in the car, what is the velocity of the observer (velocity of the observer relative to the car)?

    b. From the frame of reference of the driver of the car, what is the velocity of the boy on the bicycle?

    c. From the frame of reference of the boy on the bicycle, what is the velocity of the boy on the bicycle?