PHYSICS 20

Assignment 1

SHOW ALL WORK

Note: All answers must follow the rules for significant digits and be in scientific notation.

1. 3.54 m + 23.6 m =
   .055 m – 1.04m =
   8.9 kg x 9 ms^{-1} =
   27 ms^{-1} ÷ 3.0 s =
   856 N x 27.2 m =
   217 m x 2.03 s =
   23 0171 m ÷ 8.0s =

2. What are the following units and what do they measure?
   m
   mol
   ampere
   kg
   s
   cd
   K

3. A players pre-game ritual involves walks once around the entire edge of the basketball court, stopping in the same place she started. The dimensions of a basketball court are 28.0m by 15.0m.

   a. What is her total displacement?
   b. What is her total distance traveled?
   c. What basketball rules are observed on a court this size?

3. A plastic bag is dropped to the ground outside a supermarket and is immediately caught by the wind and carried away. It travels 6m away from the car then enters a dust devil and spins around the parking lot 3 times before getting caught 4.2 m up in a tree.

   Assume the bag follows a perfectly circular path and that the car is in the dead centre of the parking lot:

   a. What is distance the bag travels?
   b. What is its displacement?

4. A measurement that has both magnitude and direction is known as a?

5. Draw an example of a vector with all necessary information.

6. Mike parks his car then walks 1.2 km [E] along the main street to work, but remembers he has to return his *This is Spinal Tap* DVD and has to walk 7.0 x 10^{-1} km [W] in order to drop it off. He then walks another 2.0 km [E] to where he works.

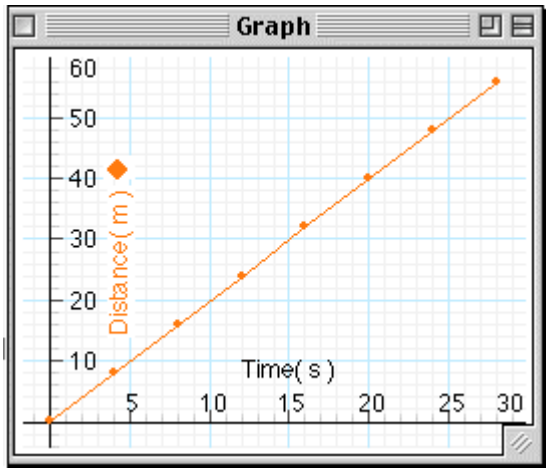
   a. Mike's total displacement for the trip was?
   b. What was the distance he traveled?

7. Give the definition of displacement.

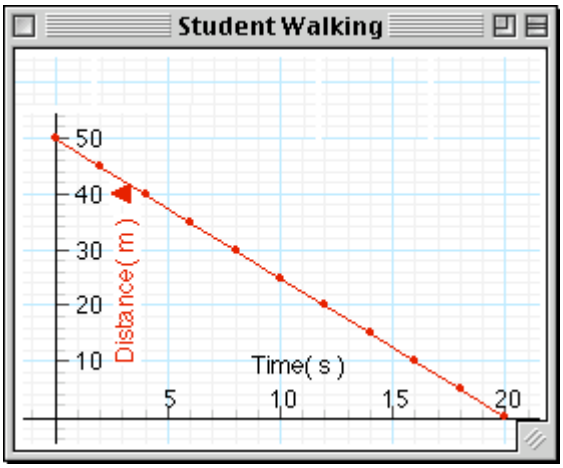
8. Are the following statements regarding speed and velocity true or false
   a. Velocity is a scalar quantity.
   b. Speed is a vector quantity.
   c. Objects with the same speed can have different velocities.
   d. Objects with different speeeds can have the same velocities.
   e. 75 ms^{-1} E is a speed
   f. The answers to the questions " What is the displacement of the object?" and "What is the distance of the object?" can be the same.

9. Sketch a position time graph of an object at rest 5 m S of its origin.

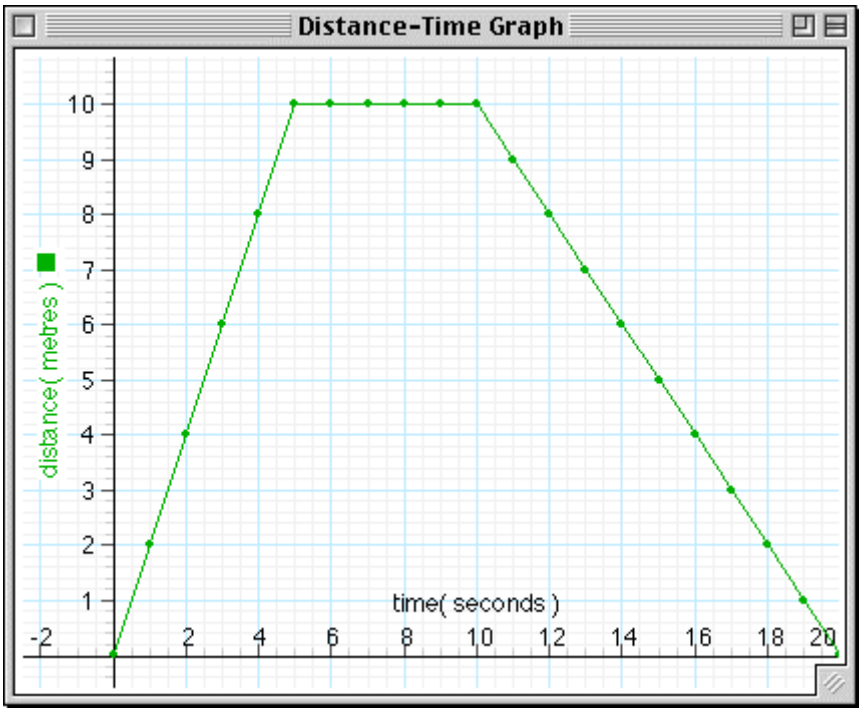
10. From the graph below determine the velocity.



11. From the graph below:
    a. determine the velocity
    b. determine the speed



12. A student carefully tracked their cat walking along a path. They used the data they collected to create the position time graph shown below.



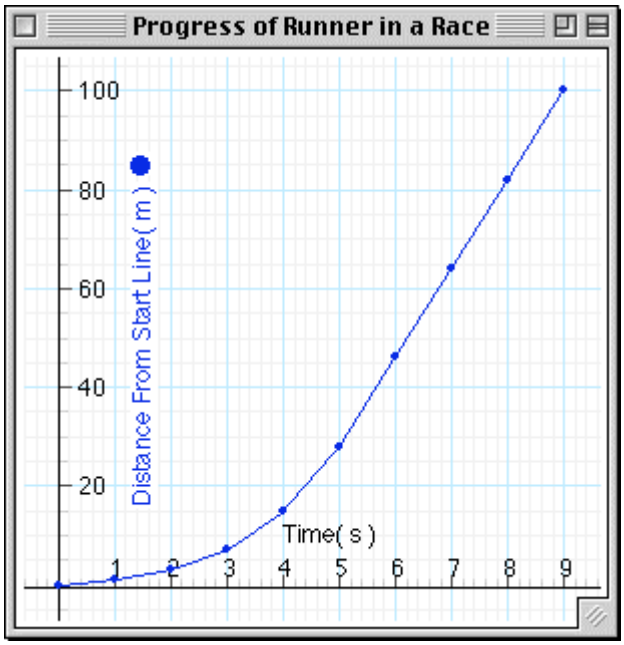
    a. Describe the cat's motion paying particular attention to the velocity of the cat and its movement with respect to the origin.

13. What is the cat's instantaneous velocity after 15 s?

14. If the cat stopped moving and went to sleep after 16 s what would its average velocity have been?

15. **The reading from a car's speedometer at a particular moment in time would be best described as?**

16. Use the graph below to answer the following questions:

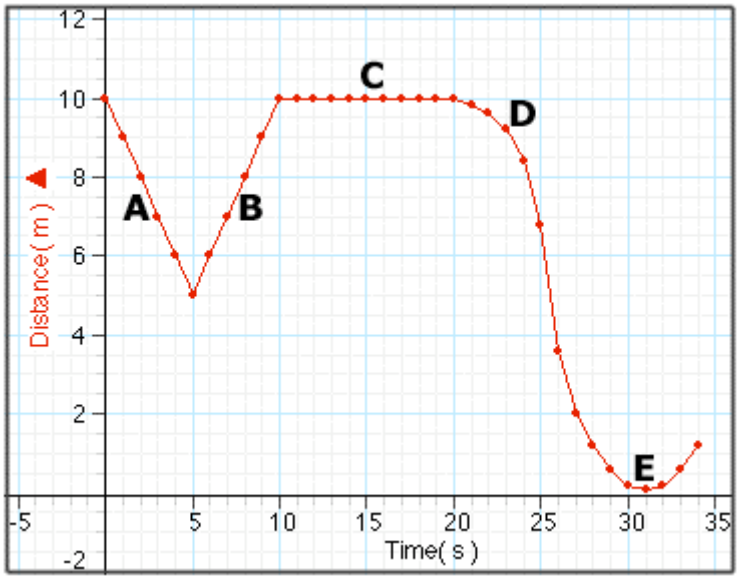


a. describe the runner's motion over the first 5 seconds
b. describe the runner's motion over the last 3 seconds of the race
c. What would a tangent to the line at the 3 s mark be used to calculate?
d. What is the runner's instantaneous velocity after 4 seconds
e. describe the runners motion over the last 4 seconds

17. When a space shuttle takes off it reaches a velocity of $145ms^{-1}$ after just 5 seconds
a. what is this in kmh^{-1}?
b. what is the shuttle's acceleration?

18. **A dragster moving at 81.8 m/s [S] accelerates at 13.50 m/s^2 [N] for 3.00 s. What is the truck's final velocity?**

19. In what sections of the graph below is the object accelerating?



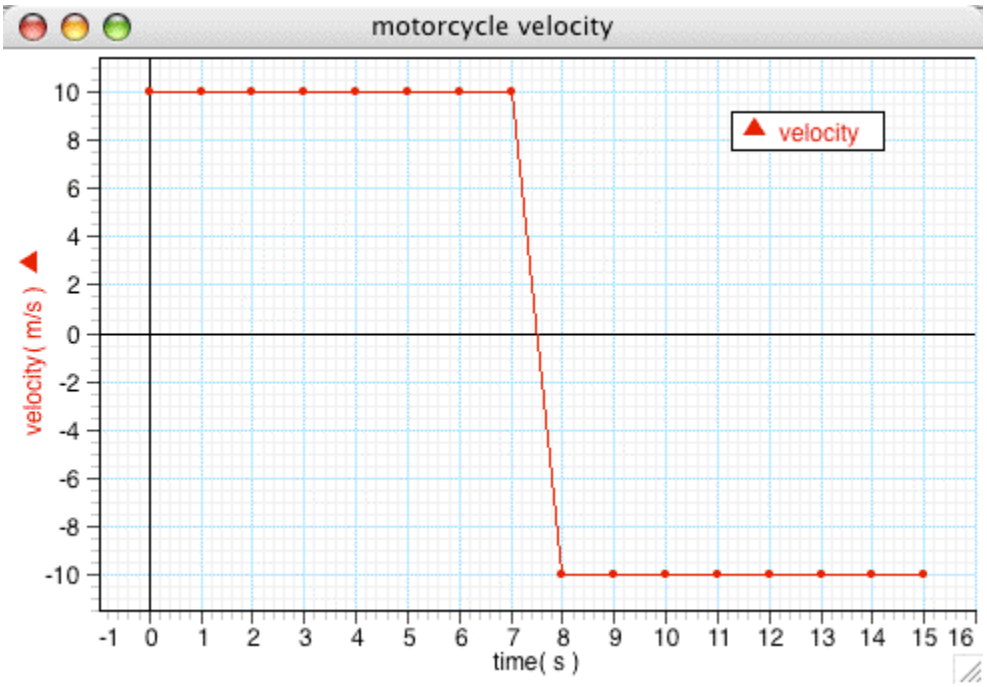
20. What does the slope of a velocity time graph give you?

21. Sketch a velocity time graph of an object that is not undergoing acceleration.

22. What is the displacement of a bird that dives 300 kmh^{-1} straight down for 8 s?

23. An object travels at a constant velocity of 8.4 m/s [W]. How long will it take the object to travel 6.6 m?

24. Use the graph below to answer the following questions



a. describe the motorcycles motion over the first 7 seconds
b. describe the motorcycles motion between 7 and 8 second mark
c. what was the total displacement for the entire trip?

25. A dog runs at an average velocity of 2.50 m/s [N] for 110 s, and then jogs in the same direction at an average velocity of 1.650 m/s for 88.0 s. What is the average velocity of the dog for the entire trip?

26. A border patrol travels at a constant velocity of 9.50 m/s [E] for 25.0 min, then travels at a constant velocity of 4.50 m/s [W] for 11.5 min.

a. What is their average velocity?
b. What is their total distance covered?