August 14/15

AP Physics

Homework check

8a) 23 min

b) 64 mi

In:

For an object that travels 20 km north and then15 km south, what is the ratio of the distance traveled to the displacement?

a) 0
b) 1/7
c) 1
d) 7
e) 35

Objective:

- To finish work on the Graph matching lab
- To begin an understanding of acceleration

Lab: Graph Matching

- Finish lab

Conclusion

- Restate the problem:
  - We were trying to find out……
- Procedure:
  - We did this by…..
- Results:
  - We found out….
- Explain the results:
  - This is because….
- Next steps:
  - Next time I would like to try…..

Kinematics Equations

- Displacement:

$$\Delta d = d_2 - d_1$$

- Velocity

$$V = \frac{\Delta d}{t} = \frac{(d_2 - d_1)}{t}$$

- Acceleration

$$A = \frac{\Delta V}{t} = \frac{(V2 - V1)}{t}$$

Constant Acceleration Equations

Problem 1

Average acceleration

A shuttle bus comes to a sudden stop to avoid hitting a dog. It accelerates uniformly at -4.1 m/s^2 as it slows from 9.0 m/s to 0.0 m/s. Find the time interval of acceleration for the bus.

Problem 2

Average acceleration

A treadmill has an average acceleration of 4.7×10^{-3} m/s^2.

a) How much does its speed change after 5.0 min?

b) If the treadmill's initial speed is 1.7 m/s, what will its final speed be?

Problem 3

Displacement with constant acceleration:

A driver in a car traveling at a speed of 21.8 m/s sees a cat 101 m away on the road. How long will it take for the car to accelerate uniformly to a stop in exactly 99 m?

Problem 4

Displacement with constant acceleration

When Maggie applies the brakes of her car, the car slows uniformly from 15.0 m/s to 0.0 m/s in 2.50 sec. How many meters before a stop sign must she apply her brakes in order to stop at the sign?

Problem 5

Velocity and displacement with constant acceleration

A car with an initial speed of 6.5 m/s accelerates at a uniform rate of 0.92 m/s^2 for 3.6 s. Find the final speed and the displacement of the car during this time.

Problem 6

Final velocity after any displacement

A car traveling initially at =7.0 m/s accelerates uniformly at the rate of =0.80 m/s^2 for a distance of 245 m.

a) What is its velocity a the end of the acceleration?
b) What is its velocity after it accelerates for 125 m?
c) What is its velocity after it accelerates for 67 m?

Problem 7

Final velocity after any displacement

An aircraft has a liftoff speed of 33 m/s. What minimum constant acceleration does this require if the aircraft is to be airborne after a take-off run of 240 m?

Out:

Which of the following is/are true?

I. If an object's acceleration is constant, then it must move in a straight line

II. If an object's acceleration is zero, then its speed must remain constant.

III. If an object's speed remains constant, then its acceleration must be zero.

a) I and II only
b) I and III only
c) II only
d) III only
e) II and III only