

NAME _____ PD _____

1998-99[D]

LAB PHYSICS - TEST CH 2 KINEMATICS IN ONE DIMENSION

ANSWER EACH OF THE FOLLOWING PROBLEMS! BE SURE TO SHOW ALL WORK CAREFULLY!

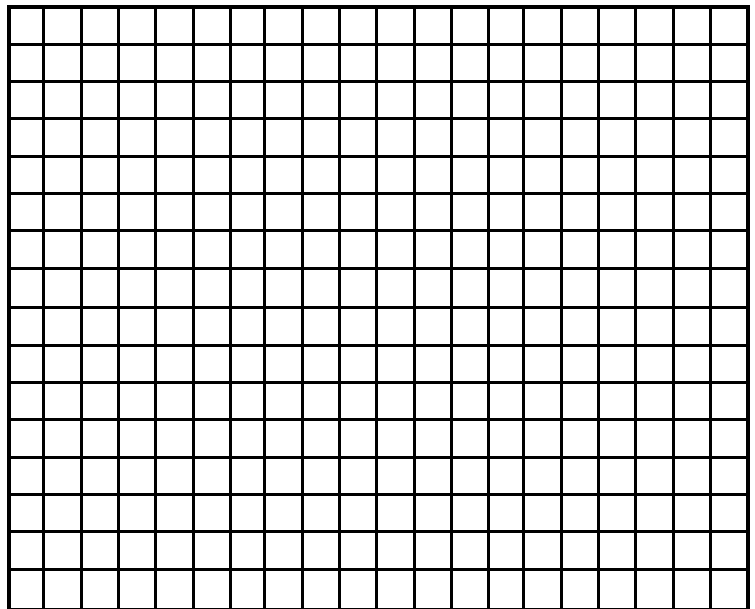
1. You are on top of a building 45 meters high when you toss a ball **upward** with an initial velocity of 52.0 m/s. This ball then lands on the roof of an adjacent building which is 155 meters high.
 - a. How long will it take for the ball to reach the adjacent roof? [4 pts]
 - b. What will be the velocity of the ball just as it lands on the roof? [4 pts]
 - c. What will be the average velocity of the ball from the time it leaves your hand until it lands on the roof? [4 pts]
 - d. When will the ball be 230 meters above the ground? [4 pts]
 - e. What will be the speed of the ball when it is 230 meters above the ground? [4 pts]
 - f. What will be the highest point reached by this ball? [4 pts]
 - g. What will be the velocity of this ball at the highest point? [4 pts]

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2. Using the supplied tickertape;
- Complete the data table to the right [4 pts]
 - Based on the tickertape supplied, what would be the appropriate errors on the displacements, velocities and accelerations? [4 pts]
 - Based on these data, make a well labeled graph below plotting the velocity of this object as a function of time. [4pts]
 - Using the velocity - time graph you have developed, determine the equation predicting the velocity of this accelerating object as a function of time. [4 pts]
 - Test your equation at $t = 0.3$ seconds and make a well labeled bar graph testing your equation. [4 pts]
 - Write an appropriate conclusion based on the bar graph you have drawn. [4 pts]

<u>Time [s]</u>	<u>Displacement [m]</u>	<u>Velocity [m/sec]</u>	<u>Acceleration [m/s²]</u>
0	_____		
0.1	_____	_____	_____
0.2	_____	_____	_____
0.3	_____	_____	_____
0.4	_____	_____	_____
0.5	_____	_____	_____
0.6	_____	_____	_____

Tape ID = _____

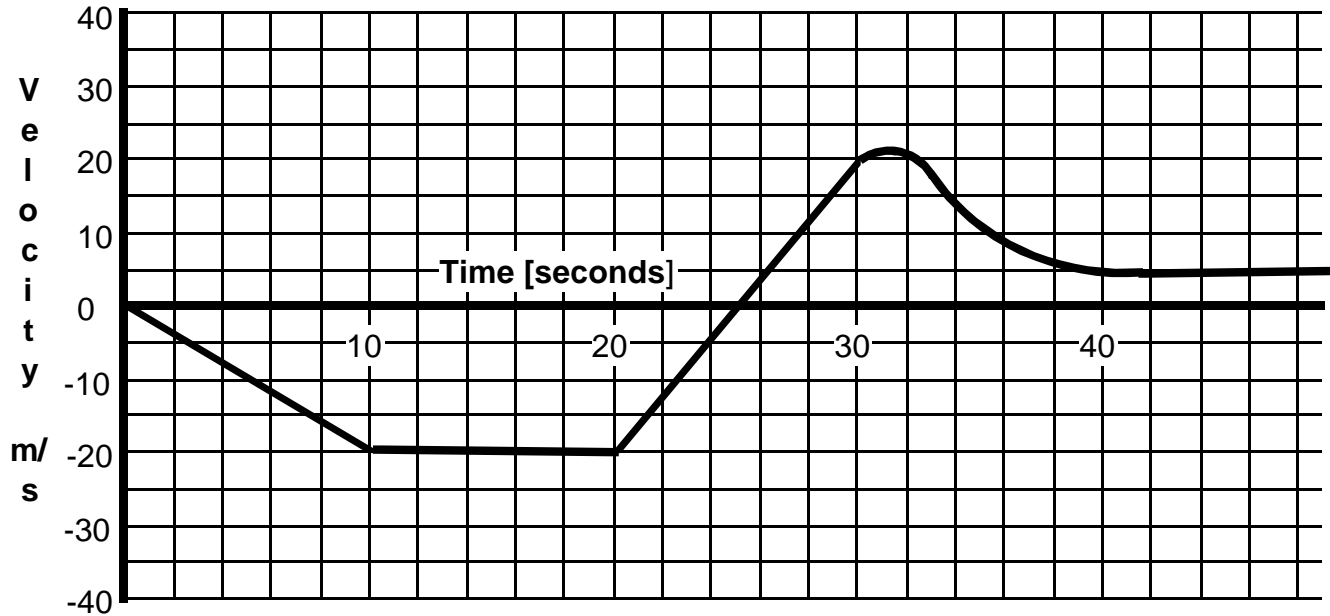


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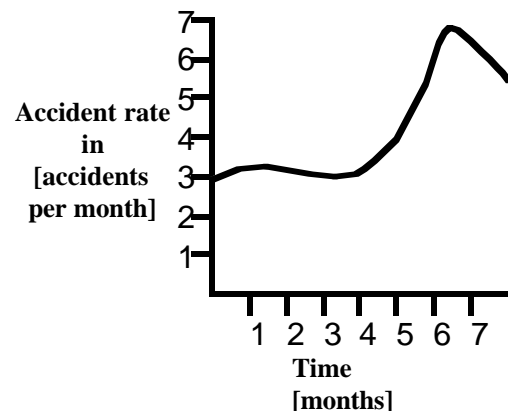
- 3 A hot air balloon is initially sitting on the roof of a building which is 120 meters tall. At $t = 0$ sec the balloon is released and initially accelerates upward at 1.2 m/sec^2 until after 5.0 seconds the balloon finally achieves its maximum upward speed. Exactly 4.0 seconds after the balloon achieves its maximum speed a brick accidentally is dropped from the balloon.
- What was the maximum velocity of the balloon? [4 pts]
 - What was the height of the balloon when it reached the maximum velocity? [4 pts]
 - What was the height of the balloon when the brick was dropped? [4 pts]
 - What was the velocity of the brick as it was dropped from the balloon? [4 pts]
 - What was the maximum height reached by the brick? [4 pts]
 - How long after it was dropped did the brick strike the ground? [4 pts]

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Each of the following multiple choice questions refers to the graph below which plots the velocity of a car as a function of time.



4. According to the graph what was the displacement of the car after 20 seconds? [4 pts]
 A. 15 m B. 400 m C. 20 m D. -300 m E. -50 m
5. What will be the velocity of this car when $t = 5$ seconds? [4 pts]
 A. 5.0 m/sec B. -2 m/sec C. 2.0 m/sec D. -10.0 m/sec E. 0.0 m/sec
6. What will be the acceleration of this car when $t = 25$ seconds? [4 pts]
 A. -5.25 m/sec^2 B. 10 m/sec^2 C. 4.0 m/sec^2 D. 5.5 m/sec^2 E. 0.0 m/sec^2
7. During which of the following time intervals is the acceleration of this car increasing? [4 pts]
 A. 0-10 sec B. 10-20 sec C. 20-30 sec D. 30-40 sec E. 40-50 sec
8. What is happening to this car during the time interval $t = 40$ to $t = 45$ seconds? [4 pts]
 A. The car is stopping. B. The car is moving at a constant speed. C. The car is moving in reverse.
 D. The car's displacement is increasing. E. The car is going faster. F. The car is moving in reverse at a decreasing rate.
9. During which of the following time intervals will the acceleration of this car be zero? [4 pts]
 A. 0-10 sec B. 10-20 sec C. 20-30 sec D. 40-50 sec E. all of these
10. What physical quantity would be represented by the slope of the graph to the right? [4 pts]
 A. total accidents B. accidents per year
 C. the rate at which the accident rate is changing in accidents/month²
 D. the number of accidents times the months
 E. the cost of each accident
11. What physical quantity would be represented by the area under the curve shown in the graph to the right? [4 pts]
 A. total accidents B. accidents per year
 C. the rate at which the accident rate is changing in accidents/month²
 D. the number of accidents times the months
 E. the cost of each accident



LAB PHYSICS TEST KINEMATICS IN ONE DIMENSION 1998-99 D

1. $d_o := 45\text{-m}$ $d_f := 155\text{-m}$ $v_o := 52\frac{\text{m}}{\text{sec}}$ $v_f := 1\frac{\text{m}}{\text{sec}}$ $a := -9.8\frac{\text{m}}{\text{sec}^2}$ $t := 10\text{-sec}$

a. GIVEN $d_f = \frac{1}{2} \cdot a \cdot t^2 + v_o \cdot t + d_o$ $t := \text{FIND}(t)$ $t = 7.69\text{s}$ **a. Time for the ball to reach the adjacent roof. [4 pts]**

b. $v_f = a \cdot t + v_o$ $v_f = -23.41\frac{\text{m}}{\text{sec}}$ **b. The velocity of the ball just as it reaches the adjacent roof. [4 pts]**

c. $v_{\text{ave}} := \frac{v_f + v_o}{2}$ $v_{\text{ave}} = 14.30\frac{\text{m}}{\text{sec}}$ **c. The average velocity of the ball on its way to the adjacent roof. [4 pts]**

d. $d_f := 230\text{-m}$

$t := 1\text{-sec}$ GIVEN $d_f = \frac{1}{2} \cdot a \cdot t^2 + v_o \cdot t + d_o$

$t := \text{FIND}(t)$ $t = 1.00\text{s}$ **d. The ball will never reach this height. [4 pts]**

e. The ball never reaches this height. [4 pts]

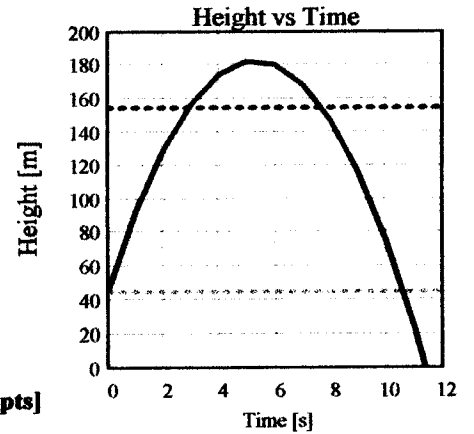
f. $v_f := 0\frac{\text{m}}{\text{sec}}$ $v_o = 52.00\frac{\text{m}}{\text{sec}}$ $a = -9.80\frac{\text{m}}{\text{sec}^2}$ $t := 1\text{-sec}$

GIVEN $v_f = a \cdot t + v_o$ $t := \text{FIND}(t)$ $t = 5.31\text{s}$

$D_f := \frac{1}{2} \cdot a \cdot t^2 + v_o \cdot t + d_o$ $D_f = 183\text{m}$ **1f. The highest point reached. [4 pts]**

g. The velocity at the highest point will be zero. [4 pts]

$t := 0\text{-sec}, 1\text{-sec}.. 20\text{-sec}$



A - $a = 0.678\text{ m/sec}^2$

2a. Complete table. [4 pts]

B - $a = 1.31\text{ m/sec}^2$

b. Errors? [4 pts]

c. Graph of Velocity vs Time. [4 pts]

C - $a = 1.98\text{ m/sec}^2$

d. Velocity equation. [4 pts]

e. Test equation & make bar graph. [4 pts]

D - $a = 2.83\text{ m/sec}^2$

f. Write conclusion. [4 pts]

E - $a = 4.38\text{ m/sec}^2$

