

The position of a particle is given by the equation $s = f(x) = t^3 - 6t^2 + 9t$ where t is measured in seconds and s in meters.

- a. Find the velocity at time t .
- b. What is the velocity after 2 sec.? After 4 sec.?
- c. When is the particle at rest?
- d. When is the particle moving forward?
- e. Draw a diagram to represent the motion of the particle.
- f. Find the total distance traveled by the particle during the first five seconds.

HOW DO MILITARY EXPERTS MEASURE THE DISTANCE TRAVELED BY A BULLET PROJECTED FROM A GUN?

The position s , at any time t , of an object with a constant acceleration is given by: $s(t) = \frac{1}{2}at^2 + v_0t + s_0$, where a is the constant acceleration, v_0 the initial velocity, and s_0 the initial position.

A cliff is 147 meters high. A bullet is shot upward from the cliff with an initial velocity of 63.7 m/s. It rises and then falls until it hits the ground. If ground level is position 0 meters, upward motion has positive velocity, and the acceleration of gravity on earth is about -9.8 m/s^2 (-32 ft/s^2) then

$s(t) =$ _____ Position vs. Time
 $s'(t) = v(t) =$ _____ Velocity vs. Time

Complete the following and match with an answer below.

1) The position of the object at $t = 1$:	13) The graph of velocity vs. time:
2) The position of the object at $t = 12$:	14) The graph of acceleration vs. time:
3) The velocity of the object at $t = 1$:	11) The acceleration of the object when it hits the ground:
4) The velocity of the object at $t = 12$:	9) The time at which the object hits the ground:
5) The position of the object at $t = 6.5$:	7) The time at which the object reaches a maximum height:
6) The velocity of the object at $t = 6.5$:	8) The maximum height reached by the object:
7) The time at which the object reaches a maximum height:	10) The velocity of the object when it hits the ground:
8) The maximum height reached by the object:	11) The acceleration of the object when it hits the ground:
9) The time at which the object reaches a maximum height:	12) The graph of position vs. time:
10) The velocity of the object when it hits the ground:	13) The graph of acceleration vs. time:

Answers (to 3 significant figures).

A. 2 s	B. 15 s	E. 6.5 s	F. 0 s	G. 206 m
H. 0 m	I. 53.9 m/s	K. 83.3 m/s	M. -53.9 m/s	N. -83.3 m/s
O. 0 m/s	P. 63.7 m/s	Q. 147 m	R. 354 m	S. -9.8 m/s ²

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