

Set up the steps required to solve the following problems. (You cannot solve since there are no equations).

1. What is the acceleration when the velocity is 46 ft/sec?

$v(t) = 46$ (Set velocity equal to 46 then solve for t)

plug t into acceleration equation $a(t) =$

2. When is the object at its maximum height?

Set $v(t)=0$ and solve for t

3. What is the velocity when the object is at 140ft?

Set the $h(t)$ or $s(t) = 140$ and solve for t

Plug t into velocity $v(t)=$

4. What is the impact velocity?

Set $h(t)=0$ and solve for t

Plug t into velocity equation $v(t)=$

5. What is the maximum height of the object?

Set $v(t)=0$ and solve for t

Plug t into height equation $h(t)=$

6. Projectile: Determine the distance traveled by an object.

Determine where you start $\rightarrow h(0)=$ where

Determine the maximum height

Set $v(t)=0$ and solve for t (when) $\rightarrow$ Plug t into position (where)

Draw Graph (label positions and times)

You always end at a height of 0ft

Determine the length of each segment and add them all together

7. Rectilinear: Determine the distance traveled by an object in the first 6 seconds.

Determine where you start $\rightarrow s(0)=$ where

Determine when you turn around points and where you are located

Set $v(t)=0$ and solve for t (when) $\rightarrow$ Plug t into position (where)

Draw Graph (label positions and times)

Find where you are at 6 seconds $s(6)=$ _____

Determine the length of each segment and add them all together

8. An object is dropped from a building that is 1,425 feet in height.

$$h(t) = -16t^2 + 1425$$

9. An object is thrown down from a cliff that is 150ft high at a velocity of 40 feet/second.

$$h(t) = -16t^2 - 40t + 150$$

10. An object is thrown up from the ground with an initial velocity of 120 feet/second.

$$h(t) = -16t^2 + 120t + 0 \text{ (you don't have to write the plus 0)}$$

11. An object is thrown up from a building that is 300ft high with a velocity of 75 ft/sec.

$$h(t) = -16t^2 + 75t + 300$$

12. Calculator: A skateboard is moving with its position defined by $s(t) = t^3 - 12t^2 + 43t$ where t is in seconds and s is in feet.

- What are the particle's velocity and acceleration functions?
- What is the total distance traveled by the particle in the first 2 seconds?
- What is the total distance traveled by the particle in the first 4.5 seconds?
- What is the total distance traveled by the particle in the first 9 seconds?
- What is the displacement of the particle after the first 2 seconds?
- What is the displacement of the particle after the first 4.5 seconds?
- What is the displacement of the particle after the first 9 seconds?
- What is the position when the velocity is 25 feet/second?

$$s(t) = t^3 - 12t^2 + 43t$$

$$v(t) = 3t^2 - 24t + 43$$

$$a(t) = 6t - 24$$

Total Distance

Start

$$s(0) = 0 \text{ ft}$$

$$v(0) = 43 \text{ ft/sec}$$

Turn Arounds

$$v(t) = 0$$

$$0 = 3t^2 - 24t + 43$$

$$t = 2.709 \text{ sec}$$

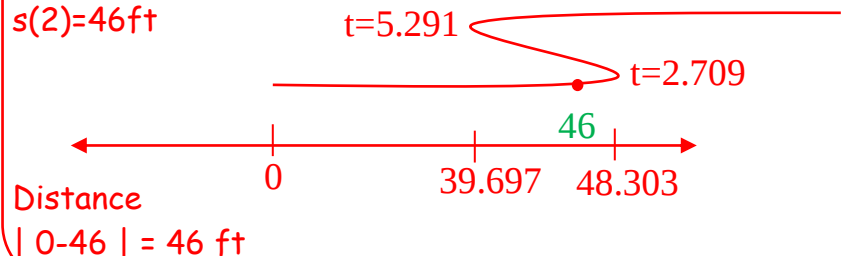
$$t = 5.291 \text{ sec}$$

$$s(2.709) = 48.303 \text{ ft}$$

$$s(5.291) = 39.697 \text{ ft}$$

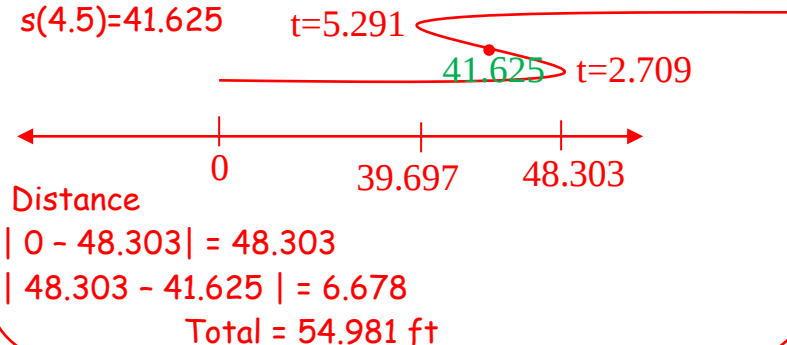
b) first 2 seconds

$$s(2) = 46 \text{ ft}$$



c) first 4.5 seconds

$$s(4.5) = 41.625$$



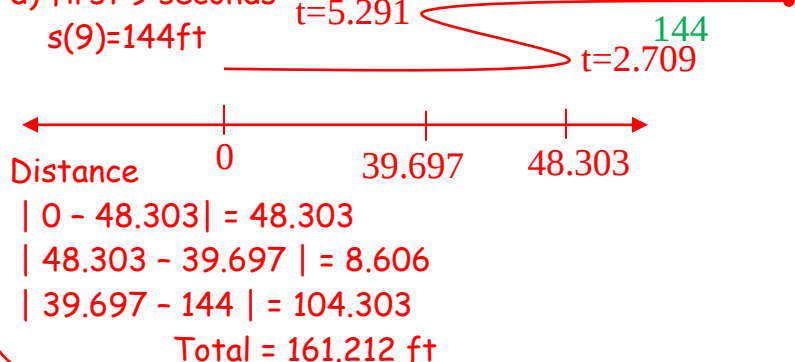
e) 46ft to the right

f) 41.625ft to the right

g) 144ft to the right

d) first 9 seconds

$$s(9) = 144 \text{ ft}$$



$$h) v(t) = 25 \text{ ft/sec}$$

$$25 = 3t^2 - 24t + 43$$

$$t = .838 \text{ sec}, 7.162 \text{ sec}$$

$$s(.838) = 28.196 \text{ ft}$$

$$s(7.162) = 59.804 \text{ ft}$$

13. Calculator: An object is thrown up from a 310-foot building with an velocity of 54 feet per second.

- a) What are the object's height, velocity, and acceleration functions?
- b) When does the object hit the ground and what is its impact velocity?
- c) What is the total distance traveled by the object?
- d) What is the velocity of the object when its height is 325 feet?

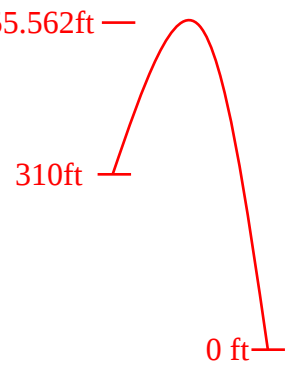
a) $h(t) = -16t^2 + 54t + 310$
 $v(t) = -32t + 54$
 $a(t) = -32$

b) Set $h(t) = 0$ and solve for t
 $0 = -16t^2 + 54t + 310$
 $t = 6.402 \text{ sec}$
 $v(6.402) = -150.864 \text{ ft/sec}$

c) Total Distance

Start
 $s(0) = 310 \text{ ft}$
 $v(0) = 54 \text{ ft/sec}$

Turn Arouds
 $v(t) = 0$
 $0 = -32t + 54$
 $t = 1.688 \text{ sec}$
 $s(1.688) = 355.562 \text{ ft}$



Total Distance
 $|310 - 355.562| = 45.562$
 $|355.562 - 0| = 355.562$

Total = 401.124 ft

d) $h(t) = 325$ and solve for t
 $325 = -16t^2 + 54t + 310$
 $t = .305 \text{ sec}$ and 3.07 sec
 $v(.305) = 44.24 \text{ ft/sec}$
 $v(3.07) = -44.24 \text{ ft/sec}$