1) A particle is moving with its position defined by $s(t) = 2t^3 - 6t^2 - 18t + 7$ where t is seconds and s is in feet.

    a) What are the particle's velocity and acceleration functions?
    b) What is the total distance traveled by the particle in the first three seconds
    c) What is the displacement of the particle after the first eight seconds?
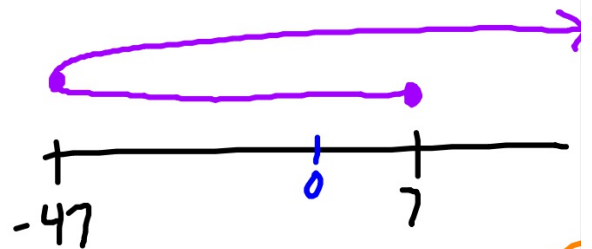
$s(t) = 2t^3 - 6t^2 - 18t + 7$
$v(t) = 6t^2 - 12t - 18$
$a(t) = 12t - 12$

$s(0) = 7$
$s(8) = 503$
    496 ft. to the right

b) $s(0) = 7$
$s(3) = -47$ $\Big\rangle$ $\boxed{54 \text{ ft}}$

$v(t) = 6t^2 - 12t - 18 = 0$
$6(t^2 - 2t - 3) = 0$
$6(t-3)(t+1) = 0$

2) A silver dollar is dropped from a building that is 1,296 feet in height. Time is in second
    a) What are the silver dollar's height, velocity and acceleration functions?
    b) When does the silver dollar hit the ground and what is its impact velocity?
    c) How far does the silver dollar travel between 1 and 2 seconds?

a) $h(t) = -16t^2 + 0t + 1296$

$v(t) = -32t$

$a(t) = -32$

b) $h(t) = 0$

$-16t^2 + 1296 = 0$

$-16t^2 = -1296$

$t^2 = 81$

$\boxed{t = 9 \text{ sec}}$

$v(9) = -32(9)$

$= -288 \text{ ft/sec}$

c) $s(1) = 1280$

$s(2) = 1232$

$\boxed{48.}$

3) The displacement in feet of a body moving along a line at any time t in seconds is given
$s(t) = t^3 - 7t^2 + 8t + 4$.

    a) What are the velocity and acceleration functions?
    b) Find the total distance traveled in the first 5 seconds. Sketch a motion schemat
    c) What is the velocity of the body when the position is 8 feet?

$s(t) = t^3 - 7t^2 + 8t + 4$

$v(t) = 3t^2 - 14t + 8$

$a(t) = 6t - 14$

$s(t) = 8$

$t^3 - 7t^2 + 8t + 4 = 8$

$t = 5.725 \text{ sec}$

$v(5.725) = 26.177 \text{ ft/sec}$

b) $s(0) = 4$

$s(\tfrac{2}{3}) = 6.519$ ⟩ 2.519

$s(4) = -12$ — 18.519

$s(5) = -6$ — 6 ⟩ 27.038 ft

$v(t) =$
$3t^2 - 14t$

$(t-4)(3t$

$t = 4, ^2$

-12   -6   4   6.5
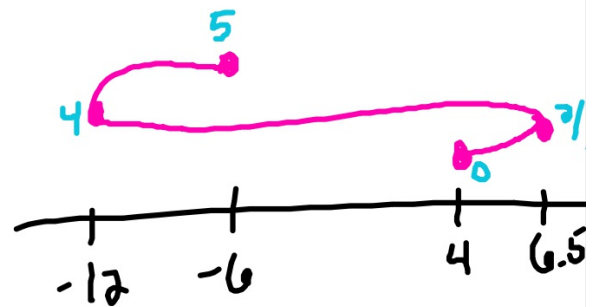
4) A marble is thrown straight <u>down</u> from the top of a 220-foot building. Its initial veloc
was 22 feet per second.
    a) What are the marble's height, velocity, and acceleration functions?
    b) When does the marble hit the ground and what is its impact velocity?
    c) What are the velocity and position at three seconds?
    d) What is its velocity after falling 108 feet?

a) $h(t) = -16t^2 - 22t + 220$
   $v(t) = -32t - 22$
    $a(t) = -32$

b) $h(t) = 0$
   $-16t^2 - 22t + 220 = 0$
    $t = 3.084 \, sec$
   $v(3.084) = -120.688 \, ft/sec$

c) $h(3) = 10 \, ft$
   $v(3) = -118 \, ft/sec$

d) $h(t) = 112$
   $-16t^2 - 22t + 220 = 112$
    $t = 2 \, sec$

$\boxed{v(2) = -86 \, ft/sec}$

5) An object has its position defined by $s(t) = t^3 - 8t^2 + 5t + 2$ in feet. Time is in seconds.

a) What are the velocity and acceleration functions?
b) What is the total distance traveled by the object during the first eight seconds?
c) What is the displacement of the object after the first eight seconds?
d) What is the position when the velocity is 3.1 feet per second?
e) What is the velocity when the acceleration in -2.7 feet per second²?

$(t) = 3t^2 - 16t + 5$

$(t) = 6t - 16$

$0) = 2$

$\frac{1}{3}) = 2.815$ .815

$5) = -48$ 50.815

$8) = 42$ 90

141.63ft

$v(t) = 0$
$3t^2 - 16t + 5 = 0$
$(3t - 1)(t - 5)$
$t = \frac{1}{3}, 5$
sec

c) 40 ft to the right

-48 2 2.815   42

d) $3t^2 - 16t + 5 = 3.1$
$t = .122, 5.212$
sec.
$s(.122) = 2.493 ft$
$s(5.212) = -47.676 ft$

e) $6t$

t

$v(t)$

6) A bag of sugar is launched vertically upward from a height of 455 feet with an initial velocity of 102 feet per seconds.

    a) What are the bag's height, velocity, and acceleration functions?

    b) What is the position of the bag when the velocity is 6 feet per second?

    c) When will the bag hit the ground? What is its impact velocity?

    d) When will the bag reach its maximum height? What is its maximum height?

    e) What is the velocity of the bag when it is 250 feet above the ground?

$h(t) = -16t^2 + 102t + 455$

$v(t) = -32t + 102$

$a(t) = -32$

$v(t) = 6$

$32t + 102 = 6$

$t = 3 sec$

$h(3) = 617 ft$

d) $-32t + 102 = 0$

$t = 3.188 sec$

$S(3.188) = 617.562 ft$

c) $-16t^2 + 102t + 455 = 0$

$t = 9.4 sec.$

$v(9.4) = -198.8 ft/sec$

e) $-16t^2 + 102t + 45$

$t = 7.98 sec$

$v(7.98) = -153$