The position of a skateboarder at any time t (in seconds) is given by the func
$s(t) = t^3 - 8t^2 + 8t$ measured in feet.

1) What are the velocity and acceleration functions in terms of t?

$$v(t) = 3t^2 - 16t + 8$$

$$a(t) = 6t - 16$$

When is the skateboarder at rest? What is the position of the skateboar
n it is a rest?

$$V(t) = 0$$

$$3t^2 - 16t + 8 = 0$$

$$t = .558 \text{ sec.} \longrightarrow 2.147 \text{ ft.}$$

$$t = 4.775 \text{ sec.} \longrightarrow -35.332 \text{ ft}$$

What is the position of the skateboarder when its velocity is 15 feet per
cond?

$$v(t) = 15 ft/sec$$

$$3t^2 - 16t + 8 = 15$$

$$t = 5.740 sec$$

$$s(5.740) = -28.542 ft.$$

What are the position, velocity, and acceleration of the skateboarder at
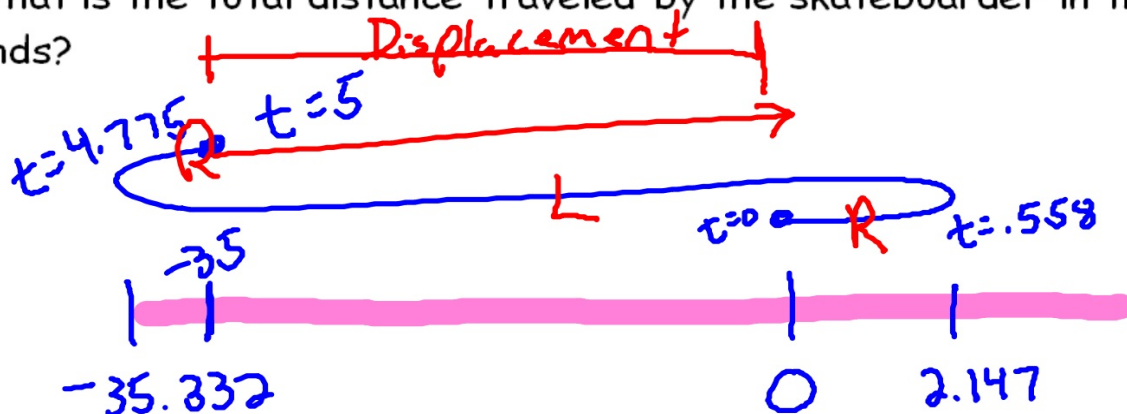ee seconds and five seconds?

$$S(3) = -21 ft$$

$$V(3) = -13 ft/sec$$

$$a(3) = 2 ft/sec^2$$

$$S(5) = -35 ft$$

$$v(5) = 3 ft/sec$$

$$a(5) = 14 ft/sec^2$$

What is the total distance traveled by the skateboarder in the first five conds?

Displacement

$t=4.775$ $t=5$

-35

$t=0$ R $t=.558$

-35.332 O 2.147

$S(0)=0$

$S(.558)=2.147$ { 2.147

$S(4.775)=-35.332$ } 37.479

$S(5)=-35\,f.$ { $.332$

$39.958\,ft$

What is the displacement of the skateboarder after the first five secon

35 ft to the left

When is the skateboarder moving to the right and to the left? Use inter-
ation for your answers.

$$R: (0, .558) (4.775, \infty)$$

$$L: (.558, 4.775)$$

The position of a particle is at any time t (in seconds) is given by the func

$s(t) = 2t^3 - 27t + 15$ measured in feet.

) What are the velocity and acceleration functions in terms of t?

$v(t) = 6t^2 - 27$

$a(t) = 12t$

When is the particle's velocity 10.5 feet per second? What is its position
t time?

$$v(t) = 10.5 \qquad\qquad s(2.5) = -21.25 \text{ ft}$$

$$6t^2 - 27 = 10.5$$

$$6t^2 = 37.5$$

$$\sqrt{t^2} = \sqrt{6.25}$$

$$\boxed{t = 2.5 \text{ sec}}$$

What is the acceleration of the particle when its position is 6.25 feet?

$$s(t) = 6.25 \qquad a(t) = ?$$

$$2t^3 - 27t + 15 = 6.25$$

$$t = .327 \qquad a(.327) = 3.924 \text{ ft/sec}^2$$

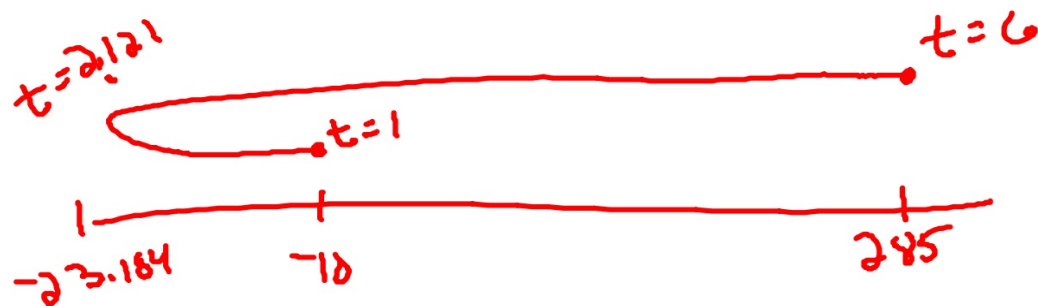$$t = 3.5 \text{ sec} \qquad a(3.5) = 42 \text{ ft/sec}^2$$

What are the initial position, velocity, and acceleration of the particle?

$$s(0) = 15 \text{ ft}$$

$$v(0) = -27 \text{ ft/sec}$$

$$a(0) = 0 \text{ ft/sec}^2$$

What is the total distance traveled by the particle from one second to s
:onds?

$$t=2.121 \qquad\qquad\qquad\qquad t=6$$

$$t=1$$

$$-23.184 \qquad -10 \qquad\qquad\qquad 285$$

$$v(t) = 0$$

$$6t^2 - 27 = 0$$

$$S(1) = -10 \, ft \qquad\Big\} \, 13.184$$

$$6t^2 = 27$$

$$S(2.121) = -23.184 \, ft \Big\}$$

$$t = 2.121 \, sec.$$

$$\Big\{ 308.184$$

$$S(6) = 285 \, ft.$$

$$\boxed{321.368 \, ft.}$$

f) What is the displacement of the particle for the same time frame?

295 ft to the right

) When is the particle moving to the right and to the left? Use interval notation for your answers.

$$L: (0, 2.121)$$

$$R: (2.121, \infty)$$