Motion Along a ~~curve~~ Line

A particle moves along a line $s = 2t^3 - 9t^2 + 12t - 4$ where $t \geq 0$.

a. Find all t for which the distance s is increasing.

$$v = \frac{ds}{dt} = 6t^2 - 18t + 12 = 6(t-2)(t-1)$$

$$a = \frac{dv}{dt} = 12t - 18 = 12(t - 3/2)$$

D $v = 6(t-2)(t-1)$

$0 = 6(t-2)(t-1)$

$t = 2, t = 1$

$t < 1$, $v > 0$

$1 < t < 2$ $v < 0$

$t > 2$ $v > 0$

s is increasing when $t < 1$, or $t > 2$.

b. Find all t for which the velocity is increasing

$a = 12(t - 3/2)$ $3/2$ - critical #

$t < 3/2$ $a < 0$

$t > 3/2$ $a > 0$

$t > 3/2$

Find the total distance traveled between $t = 0$, $t = 4$.

t	s
0	-4
1	1
2	0
4	28

$(0, -4)$ $(1, 1)$ $(2, 0)$ $(4, 28)$

$5 + 28$

34 units

c. Find the speed when $t = 3/2$.

speed

$v = 6t^2 - 18t + 12$

$|v| = 6(3/2)^2 - 18(3/2) + 12$

$|v| = 3/2$

speed $= 3/2$