

Examples and Practice

1. A particle moves along the x-axis. Its position is modeled by the function $x(t) = 2t^3 - 9t^2 + 12t - 4$, for $t \geq 0$.

$f(x) = 2x^3 + 7$

- a. Find all t for which the particle is moving to the right.
- b. Find all t for which the velocity is increasing, in the positive direction.
- c. Find all t for which the speed of the particle is increasing.
- d. Find the speed when $t = 1.5$.
- e. Find the total distance traveled between $t = 0$ and $t = 4$.

a) $v(t) = x'(t)$

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

$v(t) = 0$

$6t^2 - 18t + 12 = 0$

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

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

$t = 1$ $t = 2$

$v(t) = \frac{t^2 - 3t + 2}{1 \quad 2}$

b) $a(t) = v'(t)$

$a(t) = 2t - 3$

$a(t) = 0$

$2t - 3 = 0$

$t = \frac{3}{2}$

$t \cdot (0,1) v(t, +ve)$

velocity is increasing, in the positive direction.