

Position, Velocity, Acceleration Practice

© 2013 Kuta Software LLC. All rights reserved.

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the velocity function $v(t)$. $v(t) = -4t^3 + 45t^2$

1) $s(t) = -t^4 + 15t^3$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the acceleration function $a(t)$. $v(t) = 4t^3 - 36t^2$

2) $s(t) = t^4 - 12t^3$ $a(t) = 12t^2 - 72t$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the times t when the particle changes directions.

3) $s(t) = t^4 - 8t^3$ $v(t) = 4t^3 - 24t^2 = 0$
 $4t^2(t-6) = 0$
 $t = 0, 6$



* note why do no direction change at $t=0$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the times t when the acceleration is 0. $v(t) = 2t - 4$

4) $s(t) = t^2 - 4t - 96$ $a(t) = 2 = 0$
 $t = \text{none}$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the intervals of time when the particle is slowing down and speeding up.

5) $s(t) = -t^2 + t + 72$ $v(t) = -2t + 1 = 0$
 $t = 1/2$



$a(t) = -2$
 $t = \text{none}$



speeding up: $(1/2, \infty)$
 slowing down: $(0, 1/2)$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the position, velocity, speed, and acceleration at the given value for t .

6) $s(t) = -t^2 + 13t$; at $t = 4$
 $s(4) = -(4)^2 + 13(4) = 36$
 $v(t) = -2t + 13$ $a(t) = -2$
 $v(4) = -2(4) + 13 = 5$ $a(4) = -2$
 $|v(4)| = 5$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the velocity function $v(t)$ and the acceleration function $a(t)$.

7) $s(t) = t^3 - 28t^2 + 196t$ $v(t) = 3t^2 - 56t + 196$ $a(t) = 6t - 56$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the position, velocity, speed, and acceleration at the given value for t .

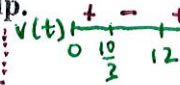
8) $s(t) = -t^3 + 10t^2$; at $t = 7$
 $s(7) = -(7)^3 + 10(7)^2 = 147$
 $v(t) = -3t^2 + 20t$ $a(t) = -6t + 20$
 $v(7) = -3(7)^2 + 20(7) = -7$ $a(7) = -6(7) + 20 = -22$
 $|v(7)| = 7$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the times t when the acceleration is 0. $v(t) = -3t^2 + 24t$

9) $s(t) = -t^3 + 12t^2$ $a(t) = -6t + 24 = 0$
 $-6t = -24$
 $t = 4$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the intervals of time when the particle is slowing down and speeding up.

10) $s(t) = t^3 - 23t^2 + 120t$ $v(t) = 3t^2 - 46t + 120 = 0$
 $(3t-10)(t-12) = 0$
 $t = 10/3, 12$



$a(t) = 6t - 46 = 0$
 $t = 46/6 = 23/3$



Speed \uparrow : $(10/3, 23/3)$ $(12, \infty)$
 Slow \downarrow : $(0, 10/3)$ $(23/3, 12)$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the position, velocity, speed, and acceleration at the given value for t .

11) $s(t) = -t^4 + 11t^3$; at $t = 4$
 $s(4) = -(4)^4 + 11(4)^3 = 448$
 $v(t) = -4t^3 + 33t$ $a(t) = -12t^2 + 33$
 $v(4) = -4(4)^3 + 33(4) = 272$ $a(4) = -12(4)^2 + 33 = -72$
 $|v(4)| = 272$