

Linear Motion and Integration!

Date _____ Period _____

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

1) $a(t) = 6t - 40$; $s(0) = 0$; $v(0) = 100$

2) $a(t) = 6t - 60$; $s(0) = 0$; $v(0) = 225$

3) $a(t) = -6t + 26$; $s(0) = 0$; $v(0) = 0$

4) $a(t) = -6t + 24$; $s(0) = 0$; $v(0) = 0$

5) $a(t) = -6t + 18$; $s(0) = 0$; $v(0) = 0$

6) $a(t) = 6t - 22$; $s(0) = 0$; $v(0) = 0$

A particle moves along a coordinate line. Its acceleration function is $a(t)$ for $t \geq 0$. For each problem, find the displacement of the particle and the distance traveled by the particle over the given interval.

7) $a(t) = -6t + 30$; $v(0) = 0$; $7 \leq t \leq 11$

8) $a(t) = -6t + 44$; $v(0) = -121$; $3 \leq t \leq 7$

9) $a(t) = 6t - 56$; $v(0) = 196$; $0 \leq t \leq 7$

10) $a(t) = 6t - 22$; $v(0) = 0$; $3 \leq t \leq 12$

11) $a(t) = 6t - 16$; $v(0) = 0$; $5 \leq t \leq 6$

12) $a(t) = 6t - 46$; $v(0) = 120$; $1 \leq t \leq 7$

Answers to Linear Motion and Integration! (ID: 1)

1) $s(t) = t^3 - 20t^2 + 100t$, $v(t) = 3t^2 - 40t + 100$

3) $s(t) = -t^3 + 13t^2$, $v(t) = -3t^2 + 26t$

5) $s(t) = -t^3 + 9t^2$, $v(t) = -3t^2 + 18t$

7) Displacement: 92

Distance traveled: 124

9) Displacement: 343

Distance traveled: $\frac{12691}{27} \approx 470.037$

11) Displacement: 3

Distance traveled: $\frac{127}{27} \approx 4.704$

2) $s(t) = t^3 - 30t^2 + 225t$, $v(t) = 3t^2 - 60t + 225$

4) $s(t) = -t^3 + 12t^2$, $v(t) = -3t^2 + 24t$

6) $s(t) = t^3 - 11t^2$, $v(t) = 3t^2 - 22t$

8) Displacement: 80

Distance traveled: $\frac{2440}{27} \approx 90.37$

10) Displacement: 216

Distance traveled: $\frac{12592}{27} \approx 466.37$

12) Displacement: -42

Distance traveled: $\frac{5642}{27} \approx 208.963$