

Assignment: Applications of integration(Kinematics)

Date _____

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

1) $s(t) = t^2 - 12t - 13$; $5 \leq t \leq 9$

2) $s(t) = t^3 - 12t^2$; $7 \leq t \leq 9$

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

3) $v(t) = -3t^2 + 20t$; $s(0) = 0$

4) $v(t) = -3t^2 + 8t + 60$; $s(0) = 0$

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 $v(t)$.

5) $a(t) = -2$; $s(0) = 20$; $v(0) = 8$

6) $a(t) = -6t + 44$; $s(0) = 0$; $v(0) = -121$

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) $a(t) = -6t + 26$; $v(0) = -40$; $1 \leq t \leq 7$

8) $a(t) = -6t + 32$; $v(0) = -64$; $0 \leq t \leq 5$

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

9) $v(t) = -3t^2 + 46t - 120$; $s(0) = 0$; at $t = 7$

10) $v(t) = 3t^2 - 46t + 120$; $s(0) = 0$; at $t = 8$

Answers to Assignment: Applications of integration(Kinematics)

1) Displacement: 8

Distance traveled: 10

4) $s(t) = -t^3 + 4t^2 + 60t$

6) $s(t) = -t^3 + 22t^2 - 121t, v(t) = -3t^2 + 44t - 121$

2) Displacement: 2

Distance traveled: 24

5) $s(t) = -t^2 + 8t + 20, v(t) = -2t + 8$

7) Displacement: 42

3) $s(t) = -t^3 + 10t^2$

Distance traveled: $\frac{1610}{27} \approx 59.63$

8) Displacement: -45

Distance traveled: $\frac{2881}{27} \approx 106.704$

9) $s(7) = -56, v(7) = 55, \text{ speed at } 7 = 55$

10) $s(8) = 0, v(8) = -56, \text{ speed at } 8 = 56$

