

Definite Integrals - Displacement & Distance

A particle moves along a coordinate line. Its velocity function is $v(t)$ 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) $v(t) = -2t + 7; 1 \leq t \leq 9$

2) $v(t) = -2t + 12; 5 \leq t \leq 10$

3) $v(t) = 3t^2 - 36t + 81; 1 \leq t \leq 4$

4) $v(t) = 2t - 9; 3 \leq t \leq 8$

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.

5) $a(t) = 6t - 18$; $v(0) = 0$; $3 \leq t \leq 9$

6) $a(t) = 2$; $v(0) = -4$; $2 \leq t \leq 8$

7) $a(t) = 6t - 46$; $v(0) = 120$; $3 \leq t \leq 4$

8) $a(t) = -6t + 30$; $v(0) = 0$; $9 \leq t \leq 11$

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A particle moves along a coordinate line. Its velocity function is $v(t)$ 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) $v(t) = -2t + 7; 1 \leq t \leq 9$

Displacement: -24 Distance traveled: $\frac{73}{2} = 36.5$

2) $v(t) = -2t + 12; 5 \leq t \leq 10$

Displacement: -15 Distance traveled: 17

3) $v(t) = 3t^2 - 36t + 81; 1 \leq t \leq 4$

Displacement: 36 Distance traveled: 52

4) $v(t) = 2t - 9; 3 \leq t \leq 8$

Displacement: 10 Distance traveled: $\frac{29}{2} = 14.5$

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5) $a(t) = 6t - 18$; $v(0) = 0$; $3 \leq t \leq 9$

Displacement: 54

Distance traveled: 162

6) $a(t) = 2$; $v(0) = -4$; $2 \leq t \leq 8$

Displacement: 36

Distance traveled: 36

7) $a(t) = 6t - 46$; $v(0) = 120$; $3 \leq t \leq 4$

Displacement: -4

Distance traveled: $\frac{188}{27} \approx 6.963$

8) $a(t) = -6t + 30$; $v(0) = 0$; $9 \leq t \leq 11$

Displacement: -2

Distance traveled: 30