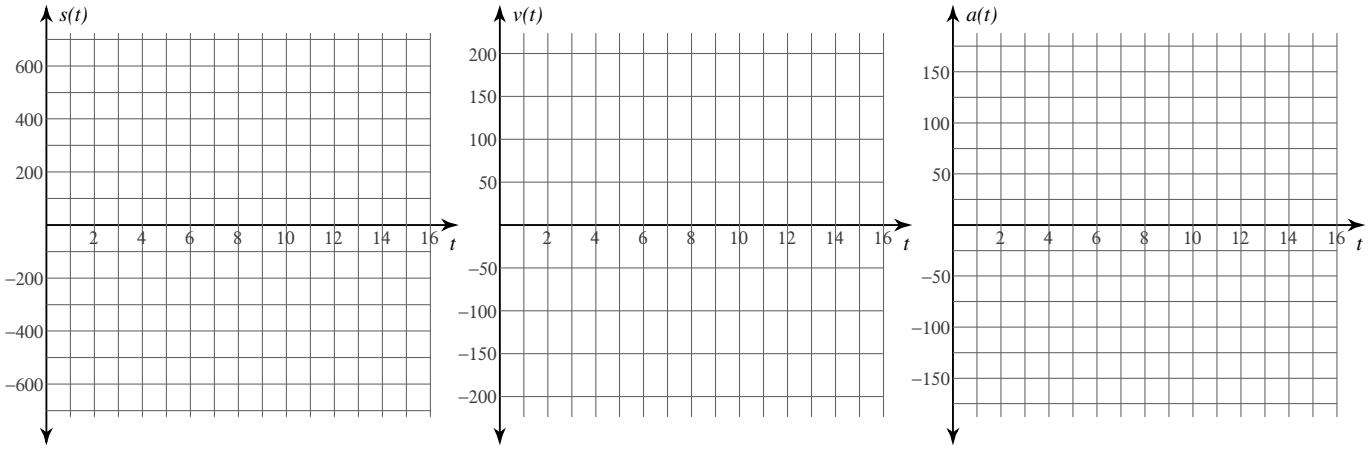
Kuta Software - Infinite Calculus Name_____

Motion Along a Line

Date_____ Period____

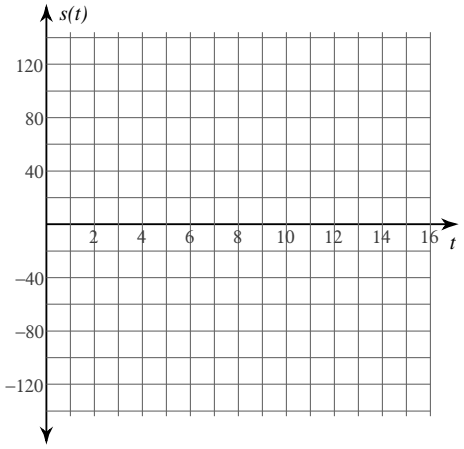
A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the velocity function $v(t)$ and the acceleration function $a(t)$. You may use the blank graphs to sketch $s(t)$, $v(t)$, and $a(t)$.

1) $s(t) = t^3 - t^2 - 56t$

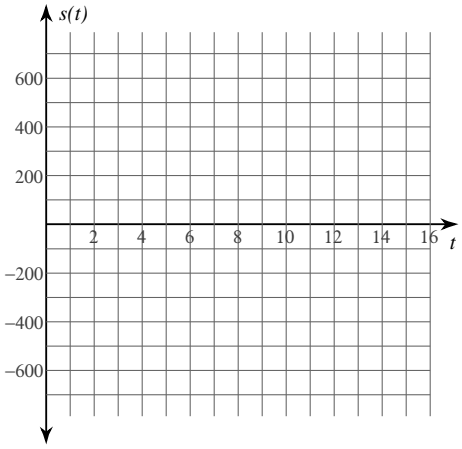


A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the displacement of the particle and the distance traveled by the particle over the given interval. You may use the blank graph to sketch $s(t)$.

2) $s(t) = -t^2 + 6t + 27;\ 0 \leq t \leq 4$

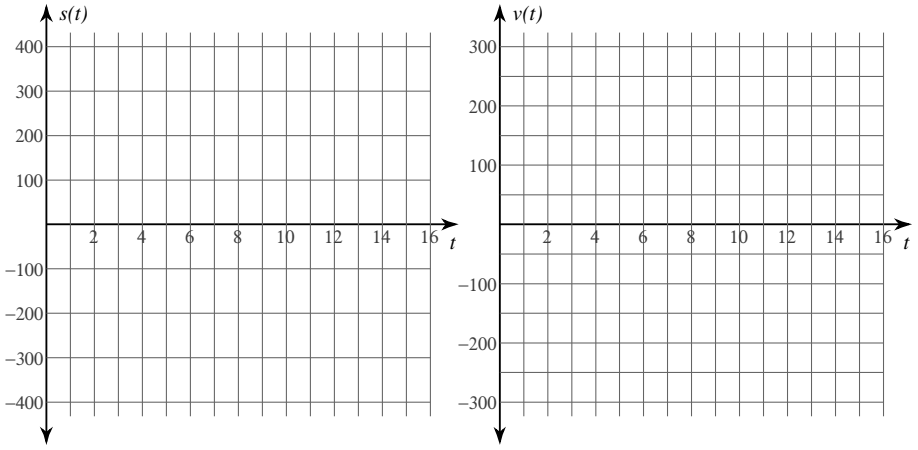


3) $s(t) = -t^3 + 11t^2;\ 3 \leq t \leq 8$



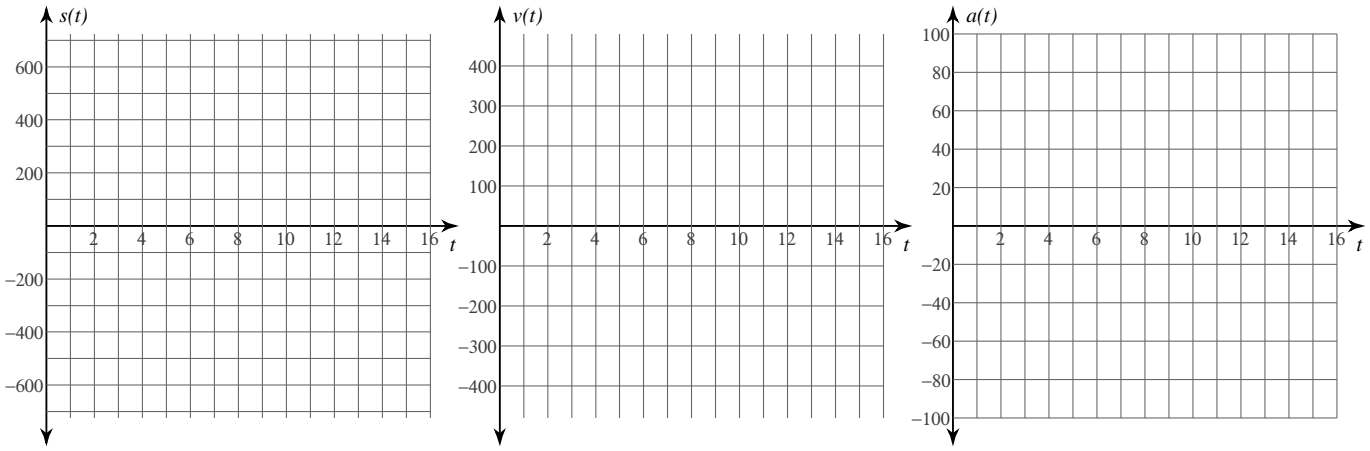
A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the maximum speed and times t when this speed occurs over the given interval. You may use the blank graphs to sketch $s(t)$ and $v(t)$.

4) $s(t) = -t^3 + 18t^2 - 81t;\ 2 \leq t \leq 7$



A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the velocity function $v(t)$, the acceleration function $a(t)$, the times t when the particle changes directions, the intervals of time when the particle is moving left and moving right, the times t when the acceleration is 0, and the intervals of time when the particle is slowing down and speeding up. You may use the blank graphs to sketch $s(t)$, $v(t)$, and $a(t)$.

5) $s(t) = t^3 - 23t^2 + 120t$



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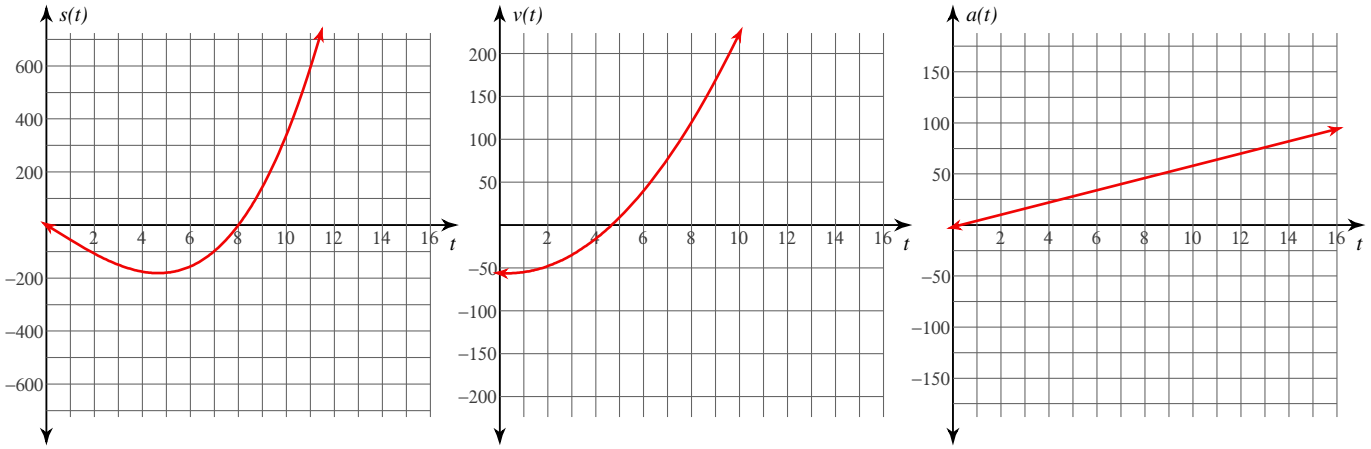
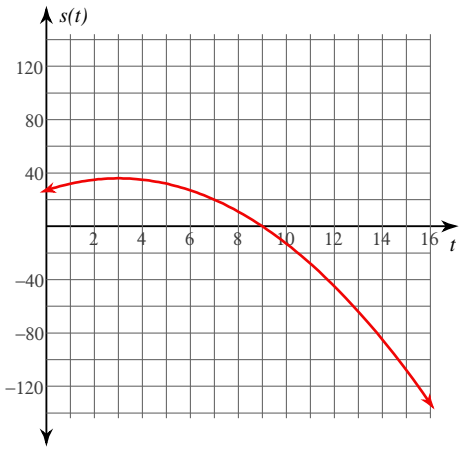
1) $s(t) = t^3 - t^2 - 56t$



$v(t) = 3t^2 - 2t - 56$, $a(t) = 6t - 2$

A particle moves along a horizontal 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. You may use the blank graph to sketch $s(t)$.

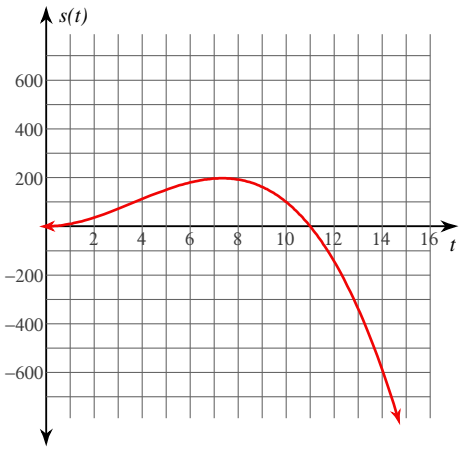
2) $s(t) = -t^2 + 6t + 27;\ 0 \leq t \leq 4$



Displacement: 8

Distance traveled: 10

3) $s(t) = -t^3 + 11t^2;\ 3 \leq t \leq 8$

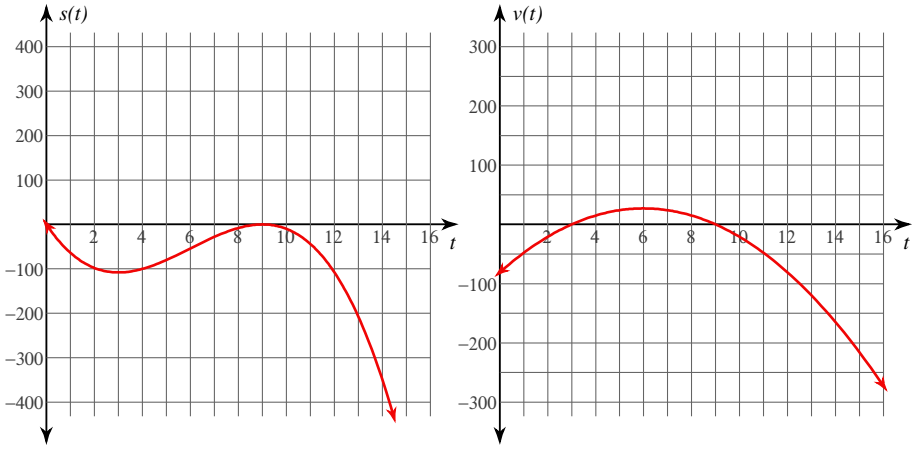


Displacement: 120

Distance traveled: $\frac{3520}{27} \approx 130.37$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the maximum speed and times t when this speed occurs over the given interval. You may use the blank graphs to sketch $s(t)$ and $v(t)$.

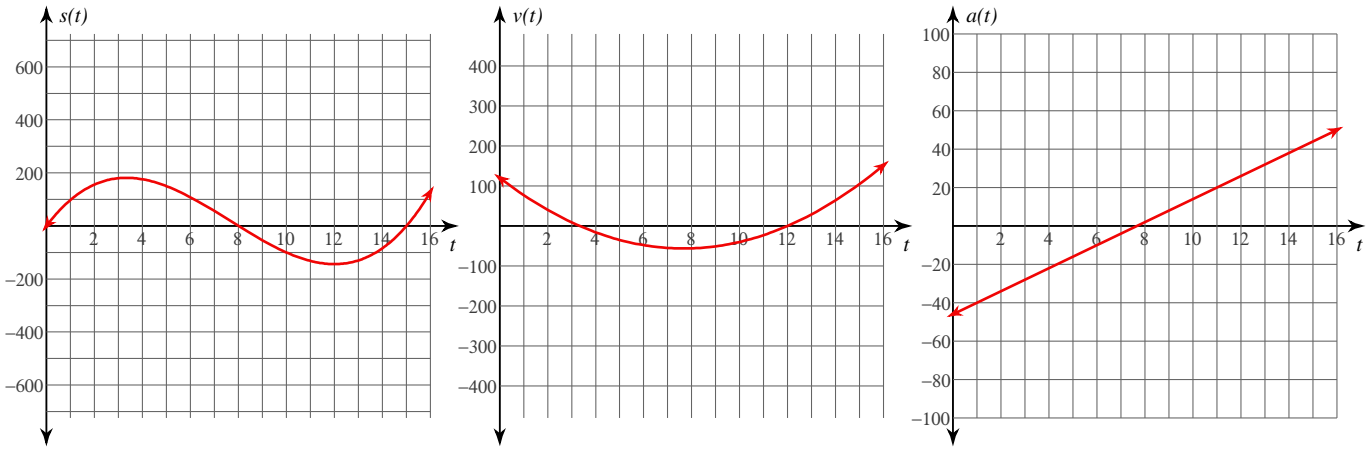
4) $s(t) = -t^3 + 18t^2 - 81t;\ 2 \leq t \leq 7$



Maximum speed: 27 at $t = \{6\}$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the velocity function $v(t)$, the acceleration function $a(t)$, the times t when the particle changes directions, the intervals of time when the particle is moving left and moving right, the times t when the acceleration is 0, and the intervals of time when the particle is slowing down and speeding up. You may use the blank graphs to sketch $s(t)$, $v(t)$, and $a(t)$.

5) $s(t) = t^3 - 23t^2 + 120t$



$v(t) = 3t^2 - 46t + 120,\ a(t) = 6t - 46$

Changes direction at: $t = \left\{\frac{10}{3}, 12\right\}$, Moving left: $\frac{10}{3} < t < 12$, Moving right: $0 \leq t < \frac{10}{3},\ t > 12$

Acceleration zero at: $t = \left\{\frac{23}{3}\right\}$, Slowing down: $0 \leq t < \frac{10}{3}, \frac{23}{3} < t < 12$, Speeding up: $\frac{10}{3} < t < \frac{23}{3},\ t > 12$