

Understanding Motion

Analyze position, velocity, and acceleration on the stated closed time interval.

1. degree 2

A particle has position $s(t)$ in meters at time t seconds on $0 \leq t \leq 12$. Find: maximum velocity; when direction changes; when it moves left and right; displacement over the interval.

$$s(t) = 4 - 10t + t^2$$

Set-up and work:



2. degree 3

A particle has position $s(t)$ in meters at time t seconds on $0 \leq t \leq 8$. Find: maximum velocity; when direction changes; when it moves left and right; displacement over the interval.

$$s(t) = -6 - 6t + 6t^2 - 2t^3$$

Set-up and work:



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3. degree 3

A particle has position $s(t)$ in meters at time t seconds on $0 \leq t \leq 12$. Find: maximum velocity; when direction changes; when it moves left and right; displacement over the interval.

$$s(t) = 7 - 48t + 18t^2 - 2t^3$$

Set-up and work:



4. degree 3

A particle has position $s(t)$ in meters at time t seconds on $0 \leq t \leq 8$. Find: maximum velocity; when direction changes; when it moves left and right; displacement over the interval.

$$s(t) = -3 - 6t + 6t^2 - 2t^3$$

Set-up and work:



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5. degree 3

A particle has position $s(t)$ in meters at time t seconds on $0 \leq t \leq 10$. Find: maximum velocity; when direction changes; when it moves left and right; displacement over the interval.

$$s(t) = 7 + 108 \cdot t - 27 \cdot t^2 + 2 \cdot t^3$$

Set-up and work:



6. degree 2

A particle has position $s(t)$ in meters at time t seconds on $0 \leq t \leq 10$. Find: maximum velocity; when direction changes; when it moves left and right; displacement over the interval.

$$s(t) = -4 \cdot t + t^2$$

Set-up and work:



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7. degree 2

A particle has position $s(t)$ in meters at time t seconds on $0 \leq t \leq 10$. Find: maximum velocity; when direction changes; when it moves left and right; displacement over the interval.

$$s(t) = -6 + 4 \cdot t - t^2$$

Set-up and work:



8. degree 2

A particle has position $s(t)$ in meters at time t seconds on $0 \leq t \leq 12$. Find: maximum velocity; when direction changes; when it moves left and right; displacement over the interval.

$$s(t) = -20 \cdot t + 2 \cdot t^2$$

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9. degree 3

A particle has position $s(t)$ in meters at time t seconds on $0 \leq t \leq 12$. Find: maximum velocity; when direction changes; when it moves left and right; displacement over the interval.

$$s(t) = 90 \cdot t - 24 \cdot t^2 + 2 \cdot t^3$$

Set-up and work:



10. degree 2

A particle has position $s(t)$ in meters at time t seconds on $0 \leq t \leq 6$. Find: maximum velocity; when direction changes; when it moves left and right; displacement over the interval.

$$s(t) = 4 - 2 \cdot t + t^2$$

Set-up and work:



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11. degree 3

A particle has position $s(t)$ in meters at time t seconds on $0 \leq t \leq 6$. Find: maximum velocity; when direction changes; when it moves left and right; displacement over the interval.

$$s(t) = 4 - 6t + 6t^2 - 2t^3$$

Set-up and work:



12. degree 2

A particle has position $s(t)$ in meters at time t seconds on $0 \leq t \leq 10$. Find: maximum velocity; when direction changes; when it moves left and right; displacement over the interval.

$$s(t) = 7 - 4t + t^2$$

Set-up and work:

