

Name : _____

Score : _____

Teacher : _____

Date : _____

Understanding Motion

$s(t)$ is a particle's position in ft after t seconds. Find the equations for the velocity and acceleration functions. Then find all the listed properties, where t takes a value on the interval $[0,10]$.

1) $s(t) = -2t^3 + 27t^2 - 120t - 4$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

2) $s(t) = -t^3 + 15t^2 - 75t + 2$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

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

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

4) $s(t) = -2t^3 + 21t^2 - 36t + 3$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

5) $s(t) = -t^3 + 18t^2 - 108t + 1$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

6) $s(t) = 2t^3 - 21t^2 + 72t - 4$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:



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$s(t)$ is a particle's position in ft after t seconds. Find the equations for the velocity and acceleration functions. Then find all the listed properties, where t takes a value on the interval $[0,10]$.

7) $s(t) = 2t^2 - 8t + 2$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

8) $s(t) = 2t^2 - 20t - 3$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

9) $s(t) = -t^2 + 2t - 1$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

10) $s(t) = t^3 - 12t^2 + 45t + 2$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

11) $s(t) = 3t^2 - 24t + 2$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

12) $s(t) = -2t^2 + 20t + 3$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:



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$s(t)$ is a particle's position in ft after t seconds. Find the equations for the velocity and acceleration functions. Then find all the listed properties, where t takes a value on the interval $[0,10]$.

1) $s(t) = -2t^3 + 27t^2 - 120t - 4$

$$v(t) = -6t^2 + 54t - 120$$

$$a(t) = -12t + 54$$

Max. Vel.: 0 ft/s at $t = 5s$

Dir. Change: $t = 4s$ and $5s$

Moving Left: $[0, 4)$, $(5, 10]$

Moving Right: $(4, 5)$

Displacement: -500 ft

2) $s(t) = -t^3 + 15t^2 - 75t + 2$

$$v(t) = -6t^2 + 60t - 150$$

$$a(t) = -12t + 60$$

Max. Vel.: 0 ft/s at $t = 5s$

Dir Change: None

Moving Right: Never

Moving Left: $[0, 10]$

Displacement: -250 ft

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

$$v(t) = -2t + 6$$

$$a(t) = -2$$

Max. Vel.: 6 ft/s at $t = 0s$

Dir. Change: $t = 3s$

Moving Left: $[3,10]$

Moving Right: $[0,3]$

Displacement: -40 ft

4) $s(t) = -2t^3 + 21t^2 - 36t + 3$

$$v(t) = -6t^2 + 42t - 36$$

$$a(t) = -12t + 42$$

Max. Vel.: 0 ft/s at $t = 6s$

Dir. Change: $t = 1s$ and $6s$

Moving Left: $[0, 1)$, $(6, 10]$

Moving Right: $(1, 6)$

Displacement: -260 ft

5) $s(t) = -t^3 + 18t^2 - 108t + 1$

$$v(t) = -6t^2 + 72t - 216$$

$$a(t) = -12t + 72$$

Max. Vel.: 0 ft/s at $t = 6s$

Dir Change: None

Moving Right: Never

Moving Left: $[0, 10]$

Displacement: -280 ft

6) $s(t) = 2t^3 - 21t^2 + 72t - 4$

$$v(t) = 6t^2 - 42t + 72$$

$$a(t) = 12t - 42$$

Max. Vel.: 252 ft/s at $t = 10s$

Dir. Change: $t = 3s$ and $4s$

Moving Right: $[0, 3)$, $(4, 10]$

Moving Left: $(3, 4)$

Displacement: 620 ft



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$s(t)$ is a particle's position in ft after t seconds. Find the equations for the velocity and acceleration functions. Then find all the listed properties, where t takes a value on the interval $[0,10]$.

7) $s(t) = 2t^2 - 8t + 2$

$v(t) = 4t - 8$

$a(t) = 4$

Max. Vel.: 32 ft/s at $t = 10$ s

Dir. Change: $t = 2$ s

Moving Left: $[0,2]$

Moving Right: $[2,10]$

Displacement: 120 ft

8) $s(t) = 2t^2 - 20t - 3$

$v(t) = 4t - 20$

$a(t) = 4$

Max. Vel.: 20 ft/s at $t = 10$ s

Dir. Change: $t = 5$ s

Moving Left: $[0,5]$

Moving Right: $[5,10]$

Displacement: 0 ft

9) $s(t) = -t^2 + 2t - 1$

$v(t) = -2t + 2$

$a(t) = -2$

Max. Vel.: 2 ft/s at $t = 0$ s

Dir. Change: $t = 1$ s

Moving Left: $[1,10]$

Moving Right: $[0,1]$

Displacement: -80 ft

10) $s(t) = t^3 - 12t^2 + 45t + 2$

$v(t) = 6t^2 - 48t + 90$

$a(t) = 12t - 48$

Max. Vel.: 210 ft/s at $t = 10$ s

Dir. Change: $t = 3$ s and 5 s

Moving Right: $[0, 3)$, $(5, 10]$

Moving Left: $(3, 5)$

Displacement: 250 ft

11) $s(t) = 3t^2 - 24t + 2$

$v(t) = 6t - 24$

$a(t) = 6$

Max. Vel.: 36 ft/s at $t = 10$ s

Dir. Change: $t = 4$ s

Moving Left: $[0,4]$

Moving Right: $[4,10]$

Displacement: 60 ft

12) $s(t) = -2t^2 + 20t + 3$

$v(t) = -4t + 20$

$a(t) = -4$

Max. Vel.: 20 ft/s at $t = 0$ s

Dir. Change: $t = 5$ s

Moving Left: $[5,10]$

Moving Right: $[0,5]$

Displacement: 0 ft

