

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

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

2) $s(t) = 3t^2 - 18t - 4$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

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

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

4) $s(t) = t^2 - 4t - 1$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

5) $s(t) = 3t^2 - 24t - 2$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

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

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:



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

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

8) $s(t) = -2t^3 + 15t^2 - 36t - 2$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

9) $s(t) = -4t^2 + 48t + 2$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

10) $s(t) = -t^3 + 9t^2 - 24t + 3$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

11) $s(t) = 2t^3 - 21t^2 + 36t + 1$

$v(t) =$

$a(t) =$

Max. Vel.:

Dir. Change:

Moving Left:

Moving Right:

Displacement:

12) $s(t) = 4t^2 - 48t + 1$

$v(t) =$

$a(t) =$

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

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

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

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

Dir Change: None

Moving Right: Never

Moving Left: $[0, 10]$

Displacement: -280 ft

2) $s(t) = 3t^2 - 18t - 4$

$$v(t) = 6t - 18$$

$$a(t) = 6$$

Max. Vel.: 42 ft/s at $t = 10s$

Dir. Change: $t = 3s$

Moving Left: $[0,3]$

Moving Right: $[3,10]$

Displacement: 120 ft

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

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

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

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

4) $s(t) = t^2 - 4t - 1$

$$v(t) = 2t - 4$$

$$a(t) = 2$$

Max. Vel.: 16 ft/s at $t = 10s$

Dir. Change: $t = 2s$

Moving Left: $[0,2]$

Moving Right: $[2,10]$

Displacement: 60 ft

5) $s(t) = 3t^2 - 24t - 2$

$$v(t) = 6t - 24$$

$$a(t) = 6$$

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

Dir. Change: $t = 4s$

Moving Left: $[0,4]$

Moving Right: $[4,10]$

Displacement: 60 ft

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

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

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

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



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

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

$a(t) = -2$

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

8) $s(t) = -2t^3 + 15t^2 - 36t - 2$

$v(t) = -6t^2 + 30t - 36$

$a(t) = -12t + 30$

Max. Vel.: 0 ft/s at $t = 3$ s

Dir. Change: $t = 2$ s and 3 s

Moving Left: $[0, 2)$, $(3, 10]$

Moving Right: $(2, 3)$

Displacement: -860 ft

9) $s(t) = -4t^2 + 48t + 2$

$v(t) = -8t + 48$

$a(t) = -8$

Max. Vel.: 48 ft/s at $t = 0$ s

Dir. Change: $t = 6$ s

Moving Left: $[6,10]$

Moving Right: $[0,6]$

Displacement: 80 ft

10) $s(t) = -t^3 + 9t^2 - 24t + 3$

$v(t) = -6t^2 + 36t - 48$

$a(t) = -12t + 36$

Max. Vel.: 0 ft/s at $t = 4$ s

Dir. Change: $t = 2$ s and 4 s

Moving Left: $[0, 2)$, $(4, 10]$

Moving Right: $(2, 4)$

Displacement: -340 ft

11) $s(t) = 2t^3 - 21t^2 + 36t + 1$

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

$a(t) = 12t - 42$

Max. Vel.: 216 ft/s at $t = 10$ s

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

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

Moving Left: $(1, 6)$

Displacement: 260 ft

12) $s(t) = 4t^2 - 48t + 1$

$v(t) = 8t - 48$

$a(t) = 8$

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

Dir. Change: $t = 6$ s

Moving Left: $[0,6]$

Moving Right: $[6,10]$

Displacement: -80 ft

