Calculus Practice: Rectilinear Motion 3

A particle moves along a vertical line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the position, velocity, speed, and acceleration at the given value for t.

1) $s(t) = -t^2 + 7t + 30$; at $t = 5$

2) $s(t) = t^4 - 15t^3$; at $t = 7$

3) $s(t) = t^3 - 13t^2 + 40t$; at $t = 7$

4) $s(t) = t^4 - 14t^3$; at $t = 6$

5) $s(t) = -t^2 + 15t - 36$; at $t = 5$

6) $s(t) = -t^4 + 13t^3$; at $t = 3$

7) $s(t) = -t^3 + 4t^2 + 60t$; at $t = 5$

8) $s(t) = -t^2 + 5t + 104$; at $t = 5$

9) $s(t) = -t^3 + 13t^2$; at $t = 2$

10) $s(t) = t^2 - 11t$; at $t = 6$

A particle moves along a horizontal line. Its velocity function is $v(t)$ for $t \geq 0$. For each problem, find the velocity, speed, and acceleration at the given value for t.

11) $v(t) = -2t + 26$; at $t = 8$

12) $v(t) = 4t^3 - 39t^2$; at $t = 5$

13) $v(t) = 4t^3 - 24t^2$; at $t = 4$

14) $v(t) = -4t^3 + 45t^2$; at $t = 8$

15) $v(t) = 3t^2 - 20t$; at $t = 6$

16) $v(t) = -4t^3 + 30t^2$; at $t = 3$

17) $v(t) = -3t^2 + 44t - 121$; at $t = 4$

18) $v(t) = -2t + 10$; at $t = 4$

19) $v(t) = -2t + 17$; at $t = 2$

20) $v(t) = 4t^3 - 33t^2$; at $t = 8$

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A particle moves along a vertical line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the position, velocity, speed, and acceleration at the given value for t.

1) $s(t) = -t^2 + 7t + 30$; at $t = 5$

$s(5) = 40$, $v(5) = -3$, speed at 5 = 3, $a(5) = -2$

2) $s(t) = t^4 - 15t^3$; at $t = 7$

$s(7) = -2744$, $v(7) = -833$, speed at 7 = 833, $a(7) = -42$

3) $s(t) = t^3 - 13t^2 + 40t$; at $t = 7$

$s(7) = -14$, $v(7) = 5$, speed at 7 = 5, $a(7) = 16$

4) $s(t) = t^4 - 14t^3$; at $t = 6$

$s(6) = -1728$, $v(6) = -648$, speed at 6 = 648, $a(6) = -72$

5) $s(t) = -t^2 + 15t - 36$; at $t = 5$

$s(5) = 14$, $v(5) = 5$, speed at 5 = 5, $a(5) = -2$

6) $s(t) = -t^4 + 13t^3$; at $t = 3$

$s(3) = 270$, $v(3) = 243$, speed at 3 = 243, $a(3) = 126$

7) $s(t) = -t^3 + 4t^2 + 60t$; at $t = 5$

$s(5) = 275$, $v(5) = 25$, speed at 5 = 25, $a(5) = -22$

8) $s(t) = -t^2 + 5t + 104$; at $t = 5$

$s(5) = 104$, $v(5) = -5$, speed at 5 = 5, $a(5) = -2$

9) $s(t) = -t^3 + 13t^2$; at $t = 2$

$s(2) = 44$, $v(2) = 40$, speed at 2 = 40, $a(2) = 14$

10) $s(t) = t^2 - 11t$; at $t = 6$

$s(6) = -30$, $v(6) = 1$, speed at 6 = 1, $a(6) = 2$

A particle moves along a horizontal line. Its velocity function is $v(t)$ for $t \geq 0$. For each problem, find the velocity, speed, and acceleration at the given value for t.

11) $v(t) = -2t + 26$; at $t = 8$

$v(8) = 10$, speed at $8 = 10$, $a(8) = -2$

12) $v(t) = 4t^3 - 39t^2$; at $t = 5$

$v(5) = -475$, speed at $5 = 475$, $a(5) = -90$

13) $v(t) = 4t^3 - 24t^2$; at $t = 4$

$v(4) = -128$, speed at $4 = 128$, $a(4) = 0$

14) $v(t) = -4t^3 + 45t^2$; at $t = 8$

$v(8) = 832$, speed at $8 = 832$, $a(8) = -48$

15) $v(t) = 3t^2 - 20t$; at $t = 6$

$v(6) = -12$, speed at $6 = 12$, $a(6) = 16$

16) $v(t) = -4t^3 + 30t^2$; at $t = 3$

$v(3) = 162$, speed at $3 = 162$, $a(3) = 72$

17) $v(t) = -3t^2 + 44t - 121$; at $t = 4$

$v(4) = 7$, speed at $4 = 7$, $a(4) = 20$

18) $v(t) = -2t + 10$; at $t = 4$

$v(4) = 2$, speed at $4 = 2$, $a(4) = -2$

19) $v(t) = -2t + 17$; at $t = 2$

$v(2) = 13$, speed at $2 = 13$, $a(2) = -2$

20) $v(t) = 4t^3 - 33t^2$; at $t = 8$

$v(8) = -64$, speed at $8 = 64$, $a(8) = 240$