Calculus Name_____ ID: 1

Linear Motion Practice (Pt.2)

Date_____ Period____

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the times t when the particle changes directions.

1) $s(t) = -t^3 + 13t^2$

2) $s(t) = t^4 - 13t^3$

3) $s(t) = t^3 - 18t^2 + 81t$

4) $s(t) = t^4 - 15t^3$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the intervals of time when the particle is moving left and moving right.

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

6) $s(t) = t^3 - 20t^2 + 100t$

7) $s(t) = t^3 - 4t^2 - 60t$

8) $s(t) = t^3 - 24t^2 + 144t$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the intervals of time when the particle is slowing down and speeding up.

9) $s(t) = -t^3 + 13t^2 - 40t$

10) $s(t) = t^3 - 26t^2 + 169t$

11) $s(t) = t^3 - 24t^2 + 144t$

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

Answers to Linear Motion Practice (Pt.2) (ID: 1)

1) Changes direction at: $t = \left\{\frac{26}{3}\right\}$

2) Changes direction at: $t = \left\{\frac{39}{4}\right\}$

3) Changes direction at: $t = \{3, 9\}$

4) Changes direction at: $t = \left\{\frac{45}{4}\right\}$

5) Moving left: $0 \le t < \frac{10}{3}$, $t > 12$, Moving right: $\frac{10}{3} < t < 12$

6) Moving left: $\frac{10}{3} < t < 10$, Moving right: $0 \le t < \frac{10}{3}$, $t > 10$

7) Moving left: $0 \le t < 6$, Moving right: $t > 6$

8) Moving left: $4 < t < 12$, Moving right: $0 \le t < 4$, $t > 12$

9) Slowing down: $0 \le t < 2$, $\frac{13}{3} < t < \frac{20}{3}$, Speeding up: $2 < t < \frac{13}{3}$, $t > \frac{20}{3}$

10) Slowing down: $0 \le t < \frac{13}{3}$, $\frac{26}{3} < t < 13$, Speeding up: $\frac{13}{3} < t < \frac{26}{3}$, $t > 13$

11) Slowing down: $0 \le t < 4$, $8 < t < 12$, Speeding up: $4 < t < 8$, $t > 12$

12) Slowing down: $5 < t < 10$, Speeding up: $0 < t < 5$, $t > 10$