Physics 123 Spring 2000



A. The pulse shown at right travels on a spring with a constant speed of 50 cm/s. A piece of yarn is tied to the spring at the position shown.

- i. In the space provided at right draw the shape of the spring at the instants t = 0.1 s, t = 0.2 s, and t = 0.3 s. Be sure to include the piece of yarn in your drawing.
- ii. Draw an arrow on the piece of yarn to represent the direction of the velocity vector of the piece of yarn at t = 0.1 s, t = 0.2 s, and t = 0.3 s. If the velocity of the piece of yarn is zero at any time state that explicitly. Explain your reasoning.



iii. Determine the instantaneous velocity for the piece of yarn at t = 0.1 s, t = 0.2 s, and t = 0.3 s. Indicate magnitude and direction. (*Hint*: Consider the average velocity of the piece of yarn as it moves up and as it moves down.) Explain your reasoning.

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i. Determine the speed of the two pulses. Explain your reasoning.

- ii. Determine the time, t_3 , when the peaks of the pulses are at the same location along the spring.
- iii. Sketch the shape of the spring at t_3 on the figure above.
- iv. Determine the average velocity of the piece of yarn from t = 0.05 s to $t = t_3$. Explain your reasoning.