

## Particle Motion Calculator Circuit

Name \_\_\_\_\_

<p>Answer: Write in your final answer here: _____</p> <p><u>1</u> A particle moves along the <math>x</math> –axis with velocity <math>v(t) = \sqrt[4]{0.2t^2 + 1} - 0.9t</math>. What is the first time for <math>t \geq 0</math> that the particle changes direction? Justify.</p>	<p>Answer: <math>(2.043, 3.411) \cup (5.073, 6]</math></p> <p>_____ A particle moving along the <math>x</math> –axis has position given by <math>x(t) = 0.6t - e^t \sqrt{t}</math>. What is the velocity of the particle at <math>t = 1.3</math>?</p>
<p>Answer: <math>(0, 2.333)</math></p> <p>_____ A particle moves along the <math>x</math> –axis with velocity <math>v(t) = -(2^t) + 3t^{1.1} + 1.3</math>. Give any interval(s) of <math>t</math>, <math>0 \leq t \leq 6</math>, for which the particle's speed is increasing. Justify.</p>	<p>Answer: <math>t = 0.98, t = 3.041, t = 3.493</math></p> <p>_____ A particle moves along the <math>x</math> –axis with velocity <math>v(t) = \frac{2}{t+5} + t^{1.2} - 5</math>. For what interval(s) of <math>t</math>, <math>0 \leq t \leq 6</math>, is the particle moving left? Justify.</p>
<p>Answer: <math>[0, 1.957)</math></p> <p>_____ A particle moves along the <math>x</math> –axis with velocity <math>v(t) = \sin^2(0.5t) - 0.15t + 0.7</math>. Give any interval(s) of <math>t</math>, <math>0 \leq t \leq 6</math>, for which the particle is moving left. Justify.</p>	<p>Answer: <math>t = 4.263, t = 4.678</math></p> <p>_____ A particle moves along the <math>y</math> –axis with velocity <math>v(t) = 0.7t - 0.3t^2</math>. Give any interval(s) of <math>t</math>, <math>0 \leq t \leq 6</math>, for which the particle is moving up. Justify.</p>
<p>Answer: 1.181</p> <p>_____ A particle moves along the <math>x</math> –axis with velocity <math>v(t) = 2.5t \cos(\sqrt{0.5t}) + 1</math>. For what interval(s) of <math>t</math>, <math>0 \leq t \leq 9</math>, is the speed of the particle decreasing? Justify.</p>	<p>Answer: <math>(5.541, 6]</math></p> <p>_____ A particle moves along the <math>x</math> –axis with position <math>x(t) = 1.6t - (2t + 6)^{\frac{1}{3}} - 0.2t^2</math>. For what interval(s) of <math>t</math>, <math>0 \leq t \leq 9</math>, is the particle moving right? Justify.</p>

<p>Answer: [0,3.676)</p> <p>_____ A particle moves along the <math>x</math> –axis with velocity <math>v(t) = 1.5\cos^2(0.5t) - 0.2t</math>. Give any interval(s) of <math>t</math>, <math>0 \leq t \leq 6</math>, for which the particle’s speed is increasing. Justify.</p>	<p>Answer: [0,0.606)U(9.123,10]</p> <p>_____ A particle moves along the <math>x</math> –axis with velocity <math>v(t) = \sqrt[3]{t\sin(t+3)}</math>. Give any value(s) of <math>t</math>, <math>0 \leq t \leq 4</math>, for which the particle has speed equal to 0.9.</p>
<p>Answer: [0,2.376)U(3.865,6]</p> <p>_____ A particle moves along the <math>x</math> –axis with velocity <math>v(t) = t(0.6^t) - 0.5</math>. Give any interval(s) of <math>t</math>, <math>0 \leq t \leq 6</math>, for which the particle has positive acceleration. Justify.</p>	<p>Answer: (2.319, 5.411)</p> <p>_____ A particle moves along the <math>x</math> –axis with velocity <math>v(t) = e^{t/\pi} - 2t</math>. Give any interval(s) of <math>t</math>, <math>0 \leq t \leq 10</math>, for which the particle is moving right. Justify.</p>
<p>Answer: [0,3.704)</p> <p>_____ A particle moves along the <math>x</math> –axis with velocity <math>v(t) = 0.1t^2 - \tan^{-1}(t)</math>. Give the acceleration of the particle at <math>t = 5</math>.</p>	<p>Answer: -5.192</p> <p>_____ A particle moves along the <math>x</math> –axis with velocity <math>v(t) = \tan^3(0.2t) - 2</math>. Give any value(s) of <math>t</math>, <math>0 \leq t \leq 5</math>, for which the particle has speed equal to 0.5.</p>