



## DIFFERENTIATION

### DISPLACEMENT, VELOCITY AND ACCELERATION

Ref: G989. **7R4**

<p><b>A1</b> The displacement of a particle is given by  <math display="block">s = 3t^2 + 5t + 1</math>           Find an expression for the velocity at time <math>t</math>.</p>	<p><b>A2</b> The displacement of a particle is given by  <math display="block">s = 2t^3 + 4t + 5</math>           Find an expression for the velocity at time <math>t</math>.</p>	<p><b>A3</b> The displacement of a particle is given by  <math display="block">s = 5t^3 + 3t - 2</math>           Find an expression for the acceleration at time <math>t</math>.</p>	<p><b>A4</b> The velocity of a particle is given by  <math display="block">v = t^3 - 3t^2 - 2</math>           Find an expression for the acceleration at time <math>t</math>.</p>
<p><b>B1</b> The displacement of a particle is given by  <math display="block">s = 2t^2 + t - 3</math>           Find the velocity when <math>t = 2</math></p>	<p><b>B2</b> The displacement of a particle is given by  <math display="block">s = t^3 - 2t^2 + 2</math>           Find the velocity when <math>t = 2.5</math></p>	<p><b>B3</b> The velocity of a particle is given by  <math display="block">v = 6t^2 - 5t</math>           Find the acceleration when <math>t = 3</math></p>	<p><b>B4</b> The displacement of a particle is given by  <math display="block">s = t^4 + 4t + 7</math>           Find the acceleration when <math>t = 1.5</math></p>
<p><b>C1</b> The displacement of a particle is given by  <math display="block">s = 4t^2 - 3t + 6</math>           Find the time at which the velocity is 5 m/s</p>	<p><b>C2</b> The displacement of a particle is given by  <math display="block">s = t^3 - 1.5t^2 - 6t</math>           Find the time at which the velocity of the particle is zero.</p>	<p><b>C3</b> The displacement of a particle is given by  <math display="block">s = 2t^3 - 5t^2 - 3t</math>           Find the time at which the acceleration of the particle is zero</p>	<p><b>C4</b> The displacement of a particle is given by  <math display="block">s = t^3 - t^2 + t - 1</math>           Find the time at which the acceleration of the particle is 15 m/s<sup>2</sup></p>
<p><b>D1</b> The displacement of a particle is given by  <math display="block">s = 3t^3 - 7.5t^2 - 6t + 5</math>           Find the acceleration when the velocity is zero.</p>	<p><b>D2</b> The displacement of a particle is given by  <math display="block">s = 2t^3 - 4t^2 + 7</math>           Find the time at which the velocity is equal to the acceleration.</p>	<p><b>D3</b> The displacement of a particle is given by  <math display="block">s = 4t^3 + t^2 + 2t</math>           Find the acceleration when the velocity is 20 metres.</p>	<p><b>D4</b> The velocity of a particle is given by  <math display="block">v = 6t^2 + 7</math>           Find a possible expression for the displacement at time <math>t</math>.</p>



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<p><b>A1</b> <span style="background-color: yellow;"><math>v = 6t + 5</math></span></p> <p>The displacement of a particle is given by</p> $s = 3t^2 + 5t + 1$ <p>Find an expression for the velocity at time <math>t</math>.</p>	<p><b>A2</b> <span style="background-color: yellow;"><math>v = 6t^2 + 4</math></span></p> <p>The displacement of a particle is given by</p> $s = 2t^3 + 4t + 5$ <p>Find an expression for the velocity at time <math>t</math>.</p>	<p><b>A3</b> <span style="background-color: yellow;"><math>a = 30t</math></span></p> <p>The displacement of a particle is given by</p> $s = 5t^3 + 3t - 2$ <p>Find an expression for the acceleration at time <math>t</math>.</p>	<p><b>A4</b> <span style="background-color: yellow;"><math>a = 3t^2 - 6t</math></span></p> <p>The velocity of a particle is given by</p> $v = t^3 - 3t^2 - 2$ <p>Find an expression for the acceleration at time <math>t</math>.</p>
<p><b>B1</b> <span style="background-color: yellow;"><math>v = 9 \text{ ms}^{-1}</math></span></p> <p>The displacement of a particle is given by</p> $s = 2t^2 + t - 3$ <p>Find the velocity when <math>t = 2</math></p>	<p><b>B2</b> <span style="background-color: yellow;"><math>v = 8.75 \text{ ms}^{-1}</math></span></p> <p>The displacement of a particle is given by</p> $s = t^3 - 2t^2 + 2$ <p>Find the velocity when <math>t = 2.5</math></p>	<p><b>B3</b> <span style="background-color: yellow;"><math>a = 31 \text{ ms}^{-2}</math></span></p> <p>The velocity of a particle is given by</p> $v = 6t^2 - 5t$ <p>Find the acceleration when <math>t = 3</math></p>	<p><b>B4</b> <span style="background-color: yellow;"><math>a = 27 \text{ ms}^{-2}</math></span></p> <p>The displacement of a particle is given by</p> $s = t^4 + 4t + 7$ <p>Find the acceleration when <math>t = 1.5</math></p>
<p><b>C1</b> <span style="background-color: yellow;"><math>t = 1 \text{ second}</math></span></p> <p>The displacement of a particle is given by</p> $s = 4t^2 - 3t + 6$ <p>Find the time at which the velocity is 5 m/s</p>	<p><b>C2</b> <span style="background-color: yellow;"><math>t = 2 \text{ seconds}</math></span></p> <p>The displacement of a particle is given by</p> $s = t^3 - 1.5t^2 - 6t$ <p>Find the time at which the velocity of the particle is zero.</p>	<p><b>C3</b> <span style="background-color: yellow;"><math>t = 0.83 \text{ seconds}</math></span></p> <p>The displacement of a particle is given by</p> $s = 2t^3 - 5t^2 - 3t$ <p>Find the time at which the acceleration of the particle is zero</p>	<p><b>C4</b> <span style="background-color: yellow;"><math>t = 2.83 \text{ seconds}</math></span></p> <p>The displacement of a particle is given by</p> $s = t^3 - t^2 + t - 1$ <p>Find the time at which the acceleration of the particle is 15 m/s<sup>2</sup></p>
<p><b>D1</b> <span style="background-color: yellow;"><math>a = 21 \text{ ms}^{-2}</math></span></p> <p>The displacement of a particle is given by</p> $s = 3t^3 - 7.5t^2 - 6t + 5$ <p>Find the acceleration when the velocity is zero.</p>	<p><b>D2</b> <span style="background-color: yellow;"><math>t = 0.465, t = 2.87</math></span></p> <p>The displacement of a particle is given by</p> $s = 2t^3 - 4t^2 + 7$ <p>Find the time at which the velocity is equal to the acceleration.</p>	<p><b>D3</b> <span style="background-color: yellow;"><math>a = 29.5 \text{ ms}^{-2}</math></span></p> <p>The displacement of a particle is given by</p> $s = 4t^3 + t^2 + 2t$ <p>Find the acceleration when the velocity is 20 metres.</p>	<p><b>D4</b> <span style="background-color: yellow;"><math>s = 2t^3 + 7t \pm \text{anything}</math></span></p> <p>The velocity of a particle is given by</p> $v = 6t^2 + 7$ <p>Find a possible expression for the displacement at time <math>t</math>.</p>