



Physics. *You work it out.*

[Home](#) [Gameboard](#) [Maths](#) [Acceleration f\(t\) 2ii](#)

Acceleration f(t) 2ii

A Level



A particle P travels in a straight line. The velocity of P at time t seconds after it passes through a fixed point A is given by $(0.6t^2 + 3) \text{ m s}^{-1}$.

Part A Velocity at A

Find the velocity of P when it passes through A . Give your answer to 1 significant figure.

Part B Displacement at $t = 1.5$

Find the displacement of P from A when $t = 1.5$. Give your answer to 3 significant figures.

Part C Velocity at $a = 6$

Find the velocity of P when it has acceleration 6 m s^{-2} . Give your answer to 2 significant figures.

Used with permission from UCLES, A Level, June 2014, OCR M1, Question 3

Gameboard:

Mechanics Practice: Acceleration f(t)

All materials on this site are licensed under the [Creative Commons license](#), unless stated otherwise.



Physics. *You work it out.*

[Home](#) [Gameboard](#) [Maths](#) [Acceleration f\(t\) 3ii](#)

Acceleration f(t) 3ii



A cyclist travels along a straight road. Her velocity $v \text{ m s}^{-1}$, at time t seconds after starting from a point O , is given by

$$v = 2 \text{ for } 0 \leq t \leq 10$$

$$v = 0.03t^2 - 0.3t + 2 \text{ for } t \geq 10$$

Part A Displacement at $t = 10$

Find the displacement of the cyclist from O when $t = 10$.

Part B Expression for displacement

Find an expression for the displacement of the cyclist from O as a function of time. Give your answer using fractions, not decimals.

The following symbols may be useful: t

Part C Time

Find the time when the acceleration of the cyclist is 0.6 m s^{-2} .

Part D Displacement

Find the displacement of the cyclist from O when her acceleration is 0.6 m s^{-2} .

Used with permission from UCLES, A Level, June 2006, OCR M1, Question 4

Gameboard:

Mechanics Practice: Acceleration $f(t)$

All materials on this site are licensed under the **Creative Commons license**, unless stated otherwise.

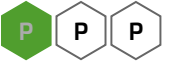


Physics. *You work it out.*

[Home](#) [Gameboard](#) [Maths](#) [Acceleration f\(t\) 4ii](#)

Acceleration f(t) 4ii

A Level



A particle moves in a straight line. Its velocity t s after leaving a fixed point on the line is $v \text{ m s}^{-1}$, where $v = t + 0.1t^2$.

Part A Acceleration

Find an expression for the acceleration of the particle at time t .

The following symbols may be useful: t

Part B Distance travelled

Find the distance travelled by the particle from time $t = 0$ until the instant when its acceleration is 2.8 m s^{-2} . Give your answer to 3 significant figures.

Used with permission from UCLES, A Level, January 2005, OCR M1, Question 4

Gameboard:

Mechanics Practice: Acceleration f(t)

All materials on this site are licensed under the [Creative Commons license](#), unless stated otherwise.



Physics. *You work it out.*

[Home](#) [Gameboard](#) [Maths](#) [Acceleration f\(t\) 1i](#)

Acceleration f(t) 1i

A Level



A particle P moves in a straight line. At time t s after passing through a point O of the line the displacement of P from O is x m where $x = 0.06t^3 - 0.45t^2 - 0.24t$.

Part A Velocity of P

Find the velocity of P when $t = 0$.

Part B Acceleration of P

Find the acceleration of P when $t = 0$.

Part C Minimum velocity of P

Find the speed of P when it is at its minimum velocity. Give your answer to 3 significant figures.

Part D Positive value of t

Find the positive value of t when the direction of motion of P changes. Give your answer to 3 significant figures.

Used with permission from UCLES, A Level, June 2013, OCR M1, Question 6

Gameboard:

Mechanics Practice: Acceleration $f(t)$

All materials on this site are licensed under the **Creative Commons license**, unless stated otherwise.



Physics. *You work it out.*

[Home](#) [Gameboard](#) [Maths](#) [Acceleration f\(t\) 3i](#)

Acceleration f(t) 3i

A Level



A particle starts from rest at the point A and travels in a straight line. The displacement s m of the particle from A at time t s after leaving A is given by

$$s = 0.001t^4 - 0.04t^3 + 0.6t^2, \quad \text{for } 0 \leq t \leq 10$$

Part A Velocity $t = 10$

Find the velocity of the particle when $t = 10$.

Part B Velocity $t = 20$

The acceleration of the particle for $t \geq 10$ is $(0.8 - 0.08t) \text{ m s}^{-2}$.

Calculate the velocity of the particle when $t = 20$.

Part C Displacement $t = 20$

Find the displacement from A of the particle when $t = 20$. Give your answer to 3 significant figures.

Used with permission from UCLES, A Level, June 2007, OCR M1, Question 6

Gameboard:

Mechanics Practice: Acceleration f(t)

All materials on this site are licensed under the [Creative Commons license](#), unless stated otherwise.



Physics. *You work it out.*

[Home](#) [Gameboard](#) [Maths](#) [Acceleration \$f\(t\)\$ 4i](#)

Acceleration $f(t)$ 4i

A Level



A car is travelling along a straight horizontal road with velocity 32.5 m s^{-1} . The driver applies the brakes and the car decelerates at $(8 - 0.6t) \text{ m s}^{-2}$, where $t \text{ s}$ is the time which has elapsed since the brakes were first applied.

Part A Velocity

Find an expression for the velocity of the car when it is decelerating.

The following symbols may be useful: t

Part B Time taken

Find the time taken to bring the car to rest.

Part C Distance travelled

Find the total distance travelled by the car whilst it is decelerating.

Used with permission from UCLES, A Level, January 2012, OCR M1, Question 3

All materials on this site are licensed under the [Creative Commons license](#), unless stated otherwise.



Physics. *You work it out.*

[Home](#) [Gameboard](#) [Maths](#) [Calculus and Vectors 1ii](#)

Calculus and Vectors 1ii

A Level



A particle P of mass 0.2 kg moves on a smooth horizontal plane. Initially it is projected with velocity 0.8 m s^{-1} from a fixed point O towards another fixed point A . At time $t \text{ s}$ after projection, P is $x \text{ m}$ from O and is moving with velocity $v \text{ m s}^{-1}$, with the direction OA being positive. A force of $(1.5t - 1) \text{ N}$ acts on P in the direction parallel to OA .

Part A Expression for v

Find an expression for v in terms of t .

The following symbols may be useful: t , v

Part B Time when $v = 0.8 \text{ m, s}^{-1}$

Find the time (in seconds) when the velocity of P is next 0.8 m s^{-1} .

Part C Times through O

Find the first time when P subsequently passes through O .

Find the second time when P subsequently passes through O .

Part D Distance in third second

Find the distance P travels in the third second of its motion.

Used with permission from UCLES, A Level, June 2013, OCR M3, Question 3

All materials on this site are licensed under the [Creative Commons license](#), unless stated otherwise.



Physics. *You work it out.*

[Home](#) [Gameboard](#) [Maths](#) [General Kinematics 1ii](#)

General Kinematics 1ii

A Level
P P P

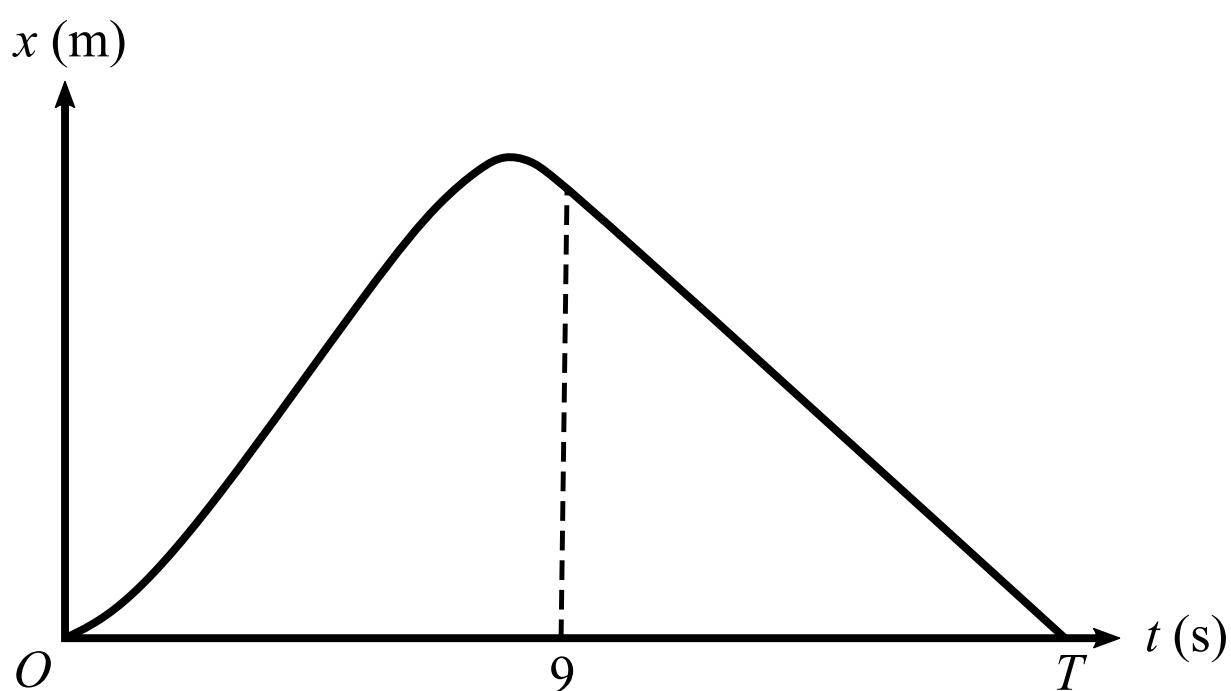


Figure 1: Distance-time graph showing the motion of the particle between A and B .

A particle travels along a straight line from a point A to a point B and then returns to A along the same straight line. During the first 9 s of the motion the displacement x m of the particle from A at time t s is given by $x = t^2 - \frac{1}{12}t^3$. The particle then travels at a constant speed of $2\frac{1}{4} \text{ m s}^{-1}$ until it reaches A at time $t = T$.

Part A Velocity expression

Find an expression for the velocity of the particle during the first 9 s of its motion.

The following symbols may be useful: t

Part B Time and distance

Find the time it takes the particle to reach B .

Find the distance AB in metres.

Part C Time taken

Find the value of T .

Used with permission from UCLES, A-level, November 2004, OCR M1

All materials on this site are licensed under the [Creative Commons license](https://creativecommons.org/licenses/by/4.0/), unless stated otherwise.