

Neill Hamilton

**CCEA**

**GCSE**

**FURTHER MATHS REVISION BOOKLET**

# **MECHANICS**



**COLOURPOINT  
EDUCATIONAL**

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## The Author

Neill Hamilton will be well known to Mathematics teachers in Northern Ireland. Until his retirement in 2012, he was a teacher of GCSE Mathematics and Additional/Further Mathematics at a Northern Ireland comprehensive school. His previous publications include *Further Mathematics for CCEA GCSE*, and GCSE Mathematics Revision Booklets *M3* and *M4*, also published by Colourpoint.

Dedicated to Arlene, for everything she has done for me, and to Marley who is the best and most loyal friend I could ever have.



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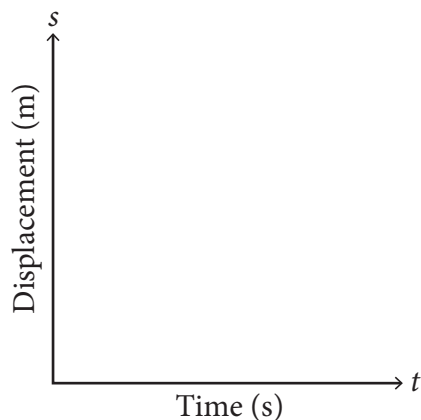
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# Revision Exercise 1

1. A particle travels at a uniform velocity,  $v$  m/s, from O to A in 4 seconds. It stops at A for 2 seconds and then returns to O at a uniform velocity of 5 m/s. The distance from O to A is 34 m.

(a) Sketch the displacement–time graph.



[2]

(b) Find the value of  $v$ .

Answer \_\_\_\_\_ [1]

(c) Find how long it takes for the whole journey.

Answer \_\_\_\_\_ s [1]

2. A particle accelerates uniformly at  $1.5 \text{ m/s}^2$  for 8 seconds in travelling 64 m.

Work out:

(a) its initial velocity,

Answer \_\_\_\_\_ m/s [2]

(b) its final velocity.

Answer \_\_\_\_\_ m/s [2]

3. A particle is initially at point P with position vector  $(2\mathbf{i} - \mathbf{j})$  m. Its velocity at P is  $(5\mathbf{i} + 2\mathbf{j})$  m/s. It moves with uniform acceleration  $(2\mathbf{i} - 3\mathbf{j})$  m/s<sup>2</sup>.

Find:

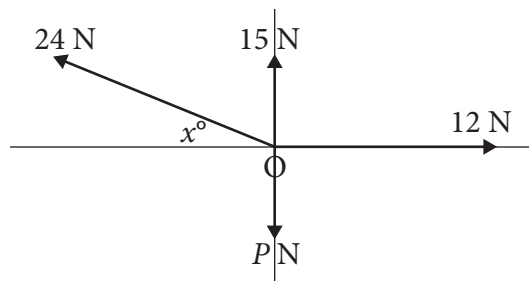
- (a) its velocity after 4 seconds,

Answer \_\_\_\_\_ m/s [2]

- (b) its position vector after 4 seconds.

Answer \_\_\_\_\_ [3]

4. A particle rests in equilibrium at O on a smooth horizontal plane. It is acted upon by 4 horizontal forces of magnitude 24 N, 15 N, 12 N and  $P$  N as shown.



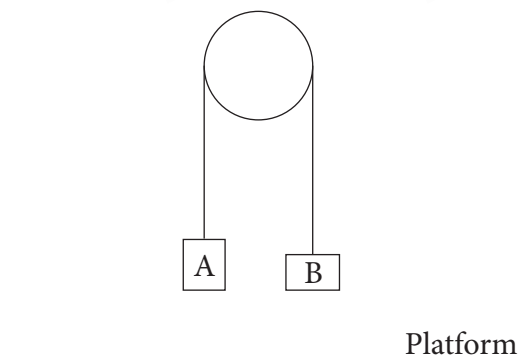
- (a) Find the value of  $x$ .

Answer \_\_\_\_\_ [2]

- (b) Find the value of  $P$ .

Answer \_\_\_\_\_ [2]

5. Two bodies A and B of masses 8 kg and  $m$  kg, where  $m < 8$ , are connected by a light inextensible string which passes over a smooth pulley as shown.



Both parts of the string are taut and hanging vertically. The system is released from rest. Each body accelerates at  $1.4 \text{ m/s}^2$ .

- (a) On the diagram mark all the forces acting on the bodies. [1]

Find:

- (b) the tension in the string,

Answer \_\_\_\_\_ N [1]

- (c) the value of  $m$ ,

Answer \_\_\_\_\_ kg [1]

- (d) the force exerted by the string on the pulley once the bodies are in motion.

Answer \_\_\_\_\_ N [1]

When the boxes have been in motion for 2.3 seconds, A strikes a fixed platform. The string becomes slack and B initially continues to rise.

Assuming B does not reach the pulley, calculate:

- (e) the speed of the boxes when A strikes the platform,

Answer \_\_\_\_\_ m/s [2]