

Author: Mr Fan

This step-by-step solution guide has been created by **Mr Fan** for educational purposes. While we have made every effort to ensure the accuracy of the information presented, it is possible that there may be errors or omissions. We encourage users to critically evaluate and verify the content. BF Maths and the author cannot be held responsible for any errors or inaccuracies in this guide.

If you find any mistakes or have any suggestions for improvements, please contact us at bfmathshello@gmail.com. Your feedback is invaluable in helping us maintain the quality and accuracy of our resources. Please specify which exercise and which question in the email.

Thank you for using BF Maths for your maths revision!

BF MATHS

Chapter 9 Problem Solving Set B

BRONZE

a) From A to B

$s = -x$ (negative because B is below A)

$u = ?$

$v = -25$ (negative because pointing downwards)

$a = -9.8$ (negative because ball is **decelerating** upwards)

$t = 4.5$

$$v = u + at$$

$$-25 = u + (-9.8)(4.5)$$

$$-25 = u - 44.1$$

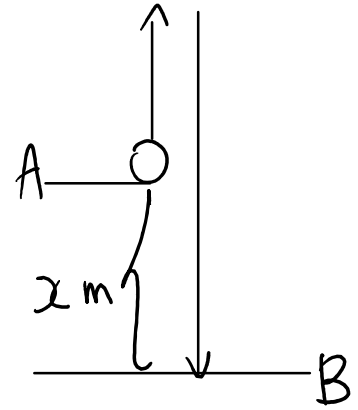
$$u = \mathbf{19.1 \text{ ms}^{-1}}$$

b) $s = ut + \frac{1}{2}at^2$

$$-x = 19.1(4.5) + \frac{1}{2}(-9.8)(4.5)^2$$

$$-x = -13.275$$

$$x = \mathbf{13.275 \text{ m}}$$



Take upwards as positive

BF MATHS

Chapter 9 Problem Solving Set B

Silver

From A to C

$$s = 7$$

$$u = u$$

$$v = 0 \text{ (highest point)}$$

$$a = -9.8$$

$$t =$$

$$v^2 = u^2 + 2as$$

$$0^2 = u^2 + 2(-9.8)(7)$$

$$u^2 = 137.2$$

$$u = 11.7 \text{ ms}^{-1}$$

From A to B

$$s = -6 \text{ (negative because B is below A)}$$

$$u = 11.7$$

$$v =$$

$$a = -9.8$$

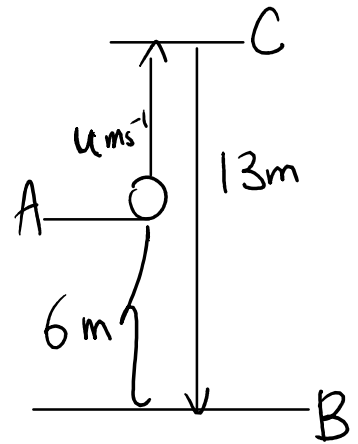
$$t = ?$$

$$s = ut + \frac{1}{2}at^2$$

$$-6 = 11.7t + \frac{1}{2}(-9.8)t^2$$

$$0 = -4.9t^2 + 11.7t + 6$$

$$t = -0.433 \text{ (rej)} \text{ or } \mathbf{2.82 \text{ seconds}}$$



Take upwards as positive

BF MATHS

Chapter 9 Problem Solving Set B

Gold

From A to B

$$s = h$$

$$u = 24.5$$

$$v =$$

$$a = -9.8$$

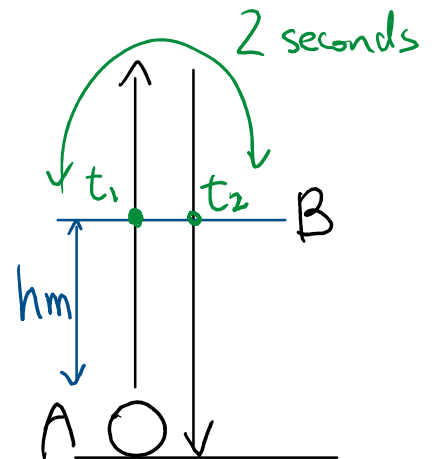
$$t = t$$

$$s = ut + \frac{1}{2}at^2$$

$$h = 24.5t + \frac{1}{2}(-9.8)t^2$$

$$h = 24.5t - 4.9t^2$$

$$4.9t^2 - 24.5t + h = 0$$



Using quadratic formula:

$$t = \frac{24.5 \pm \sqrt{(-24.5)^2 - 4(4.9)(h)}}{2(4.9)} = \frac{24.5 \pm \sqrt{600.25 - 19.6h}}{9.8}$$

$$t_1 = \frac{24.5 - \sqrt{600.25 - 19.6h}}{9.8}$$

$$t_2 = \frac{24.5 + \sqrt{600.25 - 19.6h}}{9.8}$$

$$\Rightarrow \frac{24.5 + \sqrt{600.25 - 19.6h}}{9.8} - \frac{24.5 - \sqrt{600.25 - 19.6h}}{9.8} = 2$$

$$\frac{24.5 + \sqrt{600.25 - 19.6h} - 24.5 + \sqrt{600.25 - 19.6h}}{9.8} = 2$$

$$\sqrt{600.25 - 19.6h} + \sqrt{600.25 - 19.6h} = 2 \times 9.8$$

$$2\sqrt{600.25 - 19.6h} = 19.8$$

$$\sqrt{600.25 - 19.6h} = 9.8$$

$$600.25 - 19.6h = 96.04$$

$$h = \frac{600.25 - 96.04}{19.6}$$

$$h = 25.725 \text{ m}$$