

Constant Acceleration : Vertical Motion - Edexcel Past Exam Questions **MARK SCHEME**

Question 1 : Jan 06 Q1

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| 1. | (a) | Distance after 4 s = $16 \times 4 - \frac{1}{2} \times 9.8 \times 4^2$ $= -14.4 \Rightarrow h = (+) \underline{14.4 \text{ m}}$ | M1 A1 A1 (3) |
| | (b) | $v = 16 - 9.8 \times 4$ $= -23.2 \Rightarrow \text{speed} = (+) \underline{23.2 \text{ m s}^{-1}}$ | M1 A1 A1 (3) 6 |

Question 2 : Jan 07 Q5

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| 5. | (a) | $v^2 = u^2 + 2as \Rightarrow 0^2 = 21^2 - 2 \times 9.8 \times h$ $h = 22.5 \text{ (m)}$ | M1 A1 A1 <u>3</u> |
| | (b) | $v^2 = u^2 + 2as \Rightarrow v^2 = 0^2 + 2 \times 9.8 \times 24$ or equivalent $(= 470.4)$ $v \approx 22 \text{ (ms}^{-1}\text{)}$ accept 21.7 | M1 A1 A1 <u>3</u> |
| | (c) | $v = u + at \Rightarrow -\sqrt{470.4} = 21 - 9.8t$ or equivalent $t \approx 4.4 \text{ (s)}$ accept 4.36 - 1 each error | M1 A2 (1, 0) A1 <u>4</u> 10 |

Question 3 : Jan 08 Q2

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| 2.(a) | $27 = 0 + \frac{1}{2} a \cdot 3^2 \Rightarrow a = \underline{6}$ | M1 A1 (2) |
| (b) | $v = 6 \times 3 = \underline{18 \text{ m s}^{-1}}$ | M1 A1 f.t. (2) |
| (c) | From $t = 3$ to $t = 5$, $s = 18 \times 2 - \frac{1}{2} \times 9.8 \times 2^2$ Total ht. = $s + 27 = \underline{43.4 \text{ m, } 43 \text{ m}}$ | M1 A1 f.t. M1 A1 (4) 8 |

Question 4 : June 08 Q2

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| <p>2.</p> <p>(a) $v^2 = u^2 + 2as \Rightarrow 17.5^2 = u^2 + 2 \times 9.8 \times 10$ Leading to $u = 10.5$</p> <p>(b) $v = u + at \Rightarrow 17.5 = -10.5 + 9.8T$ $T = 2\frac{6}{7} \text{ (s)}$</p> <p>Alternatives for (b)</p> $s = \left(\frac{u+v}{2}\right)T \Rightarrow 10 = \left(\frac{17.5 + -10.5}{2}\right)T$ $\frac{20}{7} = T$ <p>OR $s = ut + \frac{1}{2}at^2 \Rightarrow -10 = 10.5t - 4.9t^2$ Leading to $T = 2\frac{6}{7}, \left(-\frac{5}{7}\right)$ Rejecting negative</p> <p>(b) can be done independently of (a)</p> $s = vt - \frac{1}{2}at^2 \Rightarrow -10 = -17.5t + 4.9t^2$ $\text{Leading to } T = 2\frac{6}{7}, \frac{5}{7}$ <p>For final A1, second solution has to be rejected. $\frac{5}{7}$ leads to a negative u.</p> | <p>M1 A1 A1 (3)</p> <p>M1 A1 ft. DM1 A1 (4) [7]</p> <p>M1A1 ft. DM1A1 (4)</p> <p>M1 A1 ft. DM1 A1 (4)</p> <p>M1 A1 DM1</p> <p>A1 (4)</p> |
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Question 5 : June 10 Q6

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| <p>Q6 (a) $(\uparrow)v^2 = u^2 + 2as$ $0 = 14.7^2 - 2 \times 9.8 \times s$ $s = 11.025$ (or 11 or 11.0 or 11.03) m Height is 60 m or 60.0 m ft</p> <p>(b) $(\downarrow)v^2 = u^2 + 2as$ $v^2 = (-14.7)^2 + 2 \times 9.8 \times 49$ $v = 34.3$ or 34 m s^{-1}</p> <p>(c) $(\downarrow)v = u + at$ OR $(\downarrow)s = ut + \frac{1}{2}at^2$ $34.3 = -14.7 + 9.8t$ $49 = -14.7t + 4.9t^2$ $t = 5$ $t = 5$</p> | <p>M1A1 A1 A1ft (4)</p> <p>M1 A1 A1 (3)</p> <p>M1 A1 A1 (3) [10]</p> |
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Question 6 : Jan 11 Q2

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| 2. (a) | $-6.45 = u - 9.8 \times 0.75$ $0.9 = u$ ** | M1 A1 A1 (3) |
| (b) | $0 = 0.81 - 2 \times 9.8 \times s$ $s = 0.041$ or 0.0413 | M1 A1 (2) |
| (c) | $h = -0.9 \times 0.75 + 4.9 \times 0.75^2$ $h = 2.1$ or 2.08 | M1 A1 A1 (3) [8] |