Suggested answers and assessment

Checkpoint 3

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1. a) $v_f = v_i + a\Delta t$
$(0) = v_i + (9,8)(2,4)$
$v_i = -23,52$
$v_i = 23,52$ m.s^{-1} upwards

b) $v_f^2 = v_i^2 + 2a\Delta x$
$v_f^2 = (-23,52)^2 + 2(9,8)(30)$
$v_f^2 = 1\,141,19$
$v_f = 33,78$ m.s^{-1}
$v_f = v_i + a\Delta t$
$(33,78) = (-23,52) + (9,8)\Delta t$
$\Delta t = 5,85$ s

Exercise 2.2

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Cognitive levels of questions

Recall	Comprehension	Analysis, application	Evaluation, synthesis
	7b), 8b)	1, 2, 3, 4, 5, 6	7a)c), 8a)c)

1. a) $v_f^2 = v_i^2 + 2a\Delta x$
$(60)^2 = (-40)^2 + 2(9,8)\Delta x$
$\Delta x = 102,04$ m

b) $v_f = v_i + a\Delta t$
$(60) = (-40) + 2(9,8)\Delta t$
$\Delta t = 5,10$ s

2. a) $v_f^2 = v_i^2 + 2a\Delta x$
$(0)^2 = (-10)^2 + 2(9,8)\Delta x$
$\Delta x = -5,10$ m
$\therefore$ max height $= 5,10$ m $\therefore$ does not reach the girl

b) Orange:
$\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$\Delta x = (-10)(1) + \frac{1}{2}(9,8)(1)^2$
$\Delta x = -5,1$ m

Apple:
$\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$\Delta x = (0)(1) + \frac{1}{2}(9,8)(1)^2$
$\Delta x = 4,9$ m

$\therefore$ distance between them $= 11,25 - 5,1 - 4,9 = 1,25$ m

3. $v_f^2 = v_i^2 + 2a\Delta x$
$(250)^2 = (0)^2 + 2(9,8)\Delta x$
$\Delta x = 3188,78$ m

$v_f = v_i + a\Delta t$
$(250) = (0) + (9,8)\Delta t$
$\Delta t = 25,51$ s

4. a) $v_f^2 = v_i^2 + 2a\Delta x$
$(0)^2 = (-20)^2 + 2(9,8)\Delta x$
$\Delta x = -20,41$ m
$\therefore$ height above ground $= 20,41 + 12 = 32,41$ m

b) $v_f = v_i + a\Delta t$
$(0) = (-20) + (9,8)\Delta t$
$\Delta t = 2,04$ s

c) $v_f^2 = v_i^2 + 2a\Delta x$
$v_f^2 = (-20)^2 + 2(9,8)(12)$
$v_f^2 = 635,2$
$v_f = 25,20$ m.s.$^{-1}$
$v_f = v_i + a\Delta t$
$(25,20) = (-20) + (9,8)\,\Delta t$
$\Delta t = 4,61$ s

5. a) $v_f = v_i + a\Delta t$
$(0) = v_i + (9,8)(3)$
$v_i = -29,4$
$v_i = 29,4$ m.s^{-1} upwards

b) $\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$\Delta x = (-29,4)(3) + \frac{1}{2}(9,8)(3)^2$
$\Delta x = -44,1$ m
$\therefore$ height $= 44,1$ m

6. a) $v_f^2 = v_i^2 + 2a\Delta x$
$v_f^2 = (15)^2 + 2(9,8)(75)$
$v_f = 41,17$ m.s^{-1} down

b) $v_f = v_i + a\Delta t$
$(41,17) = (15) + (9,8)\Delta t$
$\Delta t = 2,67$ s

7. a) $v_f^2 = v_i^2 + 2a\Delta x$
$(8)^2 = (0)^2 + 2a(1)$
$a = 32$ m.s^{-2} down

b) 9,8 m.s^{-2} down

c) $v_f^2 = v_i^2 + 2a\Delta x$
$v_f^2 = (8)^2 + 2(9,8)(48)$
$v_f = 31,70$ m.s^{-1} down
$v_f = v_i^2 + a\Delta t$
$(31,70) = (8)^2 + (9,8)\,\Delta t$
$\Delta t = 2,42$ s

8. a) $v_f = v_i + a\Delta t$
$(-250) = (0) + a(10)$
$a = -25$
$a = 25$ m.s^{-2} upward

b) 9,8 m.s^{-2} down

c) $\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$\Delta x = 0(10) + \frac{1}{2}(-25)(10)$
$\Delta x = -1250$ m

$v_f^2 = v_i^2 + 2a\Delta x$
$(0^2) = (-250)^2 + 2(9,8)\Delta x$
$\Delta x = 3188,78$ m

height $= 1250 + 3188,78$
$= 4438,78$ m