



Q	Answer	Marks
1	a) 3 m s^{-2} b) 3 m s^{-2} c) 120 m	4
2	a) 1.5 m s^{-1} b) at rest, 60 m from the owner c) -1.5 m s^{-1} (1.5 m s^{-1} back towards the owner) d) average speed 1.2 m s^{-1} , average velocity 0	4
3	a) straight lines from (0, 0) to (8, 20), (8, 20) to (28, 20), (28, 20) to (33, 0) b) 530 m	4
4	T = 84	5
5	a) $V = 11$ b) 0.7 m s^{-2}	6
6	a) lines from (0, 0) to (25, 20), flat to (160, 20), down to (200, 0) b) 135 s c) 3350 m	6
7	a) $t = 6 \text{ s}$ b) 45 m c) $t = 12.5 \text{ s}$	7
8	a) -2 m s^{-2} b) 4 m c) 28 m	6
9	a) a triangle: straight up to V at $t = V/2$, then straight down to 0 at $t = 5V/6$ b) $\frac{5V}{6} \text{ s}$ c) $V = 24$, total time 20 s	6
10	a) 3 m s^{-1} b) up to (2.5, 3), flat to (15.25, 3), down to (17.25, 0) c) 12.75 s at constant speed, 17.25 s in total	6
11	a) $\frac{5V}{3} + \frac{10V}{9} = \frac{25V}{9}$ shown b) $25V^2 - 3240V + 54000 = 0$ shown c) $V = 19.6$ (the other root, 110, would need longer than 180 s to speed up and slow down)	9
12	a) straight line from (0, 0) to (3, V), then horizontal to (11, V) b) $V = 10.5$ (10.526...) c) 3.51 m s^{-2} d) the acceleration would not be constant, the change from accelerating to constant speed would not be sudden, and a real sprinter slows down near the end of the race	8

Full worked solutions, written out by hand, are on the solutions sheet for this topic.